

**The Prognostic value of trait anger in
treatment of methamphetamine
dependence**

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Doctor of Philosophy**

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Statement of Originality

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university or other tertiary institution and, to the best of my knowledge and belief, contains no material previously published or written by another person, except where due reference has been made in the text. I give consent to this copy of my thesis, when deposited in the University Library**, being made available for loan and photocopying subject to the provisions of the Copyright Act 1968.

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Acknowledgement of Authorship and Collaboration

I hereby certify that the work embodied in this thesis has been done in collaboration with other researchers and contains published papers/ scholarly work of which I am a joint author. My contribution to the joint publications/ scholarly work includes the acquisition of data, analysis and interpretation of data, drafting and revising manuscripts for publication as per listed below.

Publications arising from the clinical trial

Baker, A., Kay-Lambkin, F., Lee, N., Claire, M. & Jenner, L. (2003). *A brief cognitive behavioural intervention for amphetamine users*. Canberra: Australian Government Department of Health and Ageing.

Baker, A., Lee, N., Claire, M., Lewin, T., Grant, T., Pohlman, S., Saunders, J., Kay-Lambkin, F., Constable, P., Jenner, L., & Carr, V. (2004). Drug use patterns and mental health of regular amphetamine users during a reported 'heroin drought'. *Addiction*, 99(7), 875-884.

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These publications are presented separately as Appendices.

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Dedication

This thesis is dedicated to my beautiful son Jack.

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“Take the first step in faith. You don't have to see the whole staircase, just take the first step”. Martin Luther King, Jr.

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Abstract

Methamphetamine is a potent stimulant with high abuse potential and is the second most widely used illicit drug in the world, after cannabis. The prevalence of methamphetamine use in Australia is among the highest in the world with an estimated 1.1 million people (6% of those aged 14 years and over) reporting lifetime use. Nearly all users of methamphetamine experience withdrawal and aggression is a common sequela. Methamphetamine use is a risk factor for a wide range of negative consequences including physical, neurological and psychiatric illness, property crime and violence. The relationship between methamphetamine use, anger and violence is complex and moderated by a range of individual, social and environmental factors. Treatment for methamphetamine use may be hindered by a propensity for anger in patients. This study utilises data from a randomised controlled trial of cognitive behaviour therapy for methamphetamine users to: (1) assess the reliability and validity of a measure of anger (the STAXI-2) in an Australian clinical sample of methamphetamine users; and (2) test the hypothesis that trait anger is prognostic of methamphetamine treatment outcome. A high level of internal consistency and factor analysis established the reliability and validity of the scale in this population group. A series of multivariate statistical models was developed to test whether trait anger upon entry to treatment is prognostic of treatment outcome. Contrary to the hypothesis, patients high in trait anger at baseline did no worse in treatment than patients with low trait anger; that is, trait anger did not modify the effect of treatment. These findings show that the STAXI-2 is a valid measure of anger in this population group and that high levels of trait anger should not be considered a barrier to the delivery of effective treatment to patients with methamphetamine use disorders.

CHAPTER 1 METHAMPHETAMINE FORMS, PATTERNS OF USE AND DEPENDENCE

1.1 TERMINOLOGY

The term *amphetamine* typically refers to both amphetamine and methamphetamine.

These drugs are similar in structure but methamphetamine is more potent, longer lasting and the predominant amphetamine form available globally (United Nations Office on Drugs and Crime, 2008). *Amphetamine Type Stimulants* (ATS) refers to a class of drugs including amphetamine, methamphetamine and ecstasy (MDMA) (United Nations Office on Drugs and Crime, 2006). For convenience, *methamphetamine* will be used hereafter in reference to both amphetamine and methamphetamine.

1.2 FORMS OF METHAMPHETAMINE

Four different types of methamphetamine are available in Australia: *base* (oil-based paste), *speed* (powder), *ice* (crystal form) and *pills* (tablets) (Australian Crime Commission, 2006; Topp & Churchill, 2002). Ice is highly potent and carries a higher risk of dependence than the other forms. Base is thought to have a higher dependence liability than speed and pills (Dean, 2004; Matsumoto, 2002).

How methamphetamine is administered depends on the drug type: base is usually converted to another form of methamphetamine; speed, ice and pills can be ingested via oral, nasal or anal administration. Apart from base, all of these forms of methamphetamine can be converted to a liquid for subcutaneous or intravenous injection (Australian Crime Commission, 2006; Nicholas, 2006; United Nations Office on Drugs and Crime, 2010).

The different routes of administration influence the onset of drug effects.

Methamphetamine smoked or injected produces an immediate and intense “rush” and this effect is not produced when taken orally or intranasally. Euphoria is experienced regardless of the route of administration but its onset varies, occurring immediately after smoking or injecting: about 3-5 minutes after intranasal use and approximately 15-20 minutes after oral ingestion (National Institute on Drug Abuse, 1998). The peak response of methamphetamine also varies according to the way methamphetamine is ingested. Methamphetamine effects peak approximately 15 minutes after intravenous injection (Jonsson, Anggard, & Gunne, 1971) and 1-3 hours after oral ingestion (Angrist, Corwin, Bartlik, & Cooper, 1987). A single dose can maintain an effect for 7-12 hours (Cook et al., 1993) and in some cases for up to 34 hours (Anggard, Jonsson, Hogmark, & Gunne, 1973; Dean, 2004). Cessation of methamphetamine use is often followed by a “crash” and the emergence of drug withdrawal (American Psychiatric Association, 2002). The route of administration has also been linked to methamphetamine dependence. Smoking methamphetamine is associated with a higher likelihood of dependence compared with oral or nasal use (Cho & Melega, 2002). Intravenous use increases the dependence potential to levels comparable to that of heroin or cocaine (Kramer, Fischman, & Littlefield, 1967).

1.3 PATTERNS OF USE

Patterns of use play a primary role in the development of drug dependence (Cohen, Greenberg, Uri, Halpin, & Zweben, 2007; Fazel, Bains, & Doll, 2006; Gossop, Griffiths, Powis, & Strang, 1992; McKetin, Kelly, & McLaren, 2006) and are indicators of the nature and extent of harm associated with substance use. The harmful consequences of particular patterns of methamphetamine use are described below.

Dosage

A moderate dose is likely to induce euphoria, confidence, motivation and an overall sense of wellbeing. This is combined with increased concentration, energy, alertness and reduced appetite. As the dose increases, the euphoria intensifies, but so do the adverse effects such as deficits in cognition and motor skills, restlessness, anxiety, reduced appetite, irritability, insomnia, confusion and aggression (Australian Bureau of Criminal Intelligence, 2003; Cho & Melega, 2002; Dean, 2004; Srisurapanont, Jarusuraisin, & Kittirattanapaiboon, 2001; Topp, Day, & Degenhardt, 2003). Continued use at high levels can produce psychosis, delirium, paranoid hallucinations, panic, loss of behavioural control (American Psychiatric Association, 2002; Miczek & Tidey, 1989) and neuropsychological deficits (Greenwell & Brecht, 2003; McKetin, Kelly, et al., 2006; McKetin, McLaren, Lubman, & Hides, 2006; Nordahl, Salo, & Leamon, 2003; Rawson, Gonzales, & Brethen, 2002b). Long-term use is associated with life-threatening physical, neurological and psychological disorders such as cerebral hemorrhage, coma and sudden death (Srisurapanont et al., 2001).

The introduction of ice has contributed to an increase in reported methamphetamine related problems in Australia (Topp & Churchill, 2002; Topp, Degenhardt, Kaye, & Darke, 2002) and in other countries (Cho & Melega, 2002). An increasing trend among young people toward smoking ice has been identified as a risk factor for dependence (McKetin, McLaren, & Kelly, 2005). Methamphetamine production typically occurs in clandestine laboratories using the chemical precursor pseudoephedrine (Australian Crime Commission, 2006; United Nations Office on Drugs and Crime, 2010). Changes to the supply of chemical precursors (e.g. through legislative change, customs control etc.) can inadvertently cause harm to the user when manufacturers respond by altering

their base chemicals. Any adverse effects (e.g. cardiac arrest, seizure) that occur from changing the chemical structure may not be realized until the new batch is consumed. In this situation, the role of clinicians would be to assist in implementing behavioural strategies based on a harm reduction approach such as how to recognize signs of overdose or drug toxicity and what to do in an emergency.

Potency, purity and toxicity

The potency of methamphetamine is unknown to the user at the point of intake. If the potency is low, the user may increase the frequency of use to achieve the desired effects. Increasing the frequency of injecting methamphetamine amplifies the risk of vein damage and the likelihood of transmitting blood borne viruses. With repeated use, previously sought-after effects may be superseded by a range of adverse reactions such as aggression. Conversely, the rising prevalence of high purity and high potency methamphetamine increases the risk for aggressive behaviour and the onset of psychosis (Kelly, McKetin, & McLaren, 2005; McKetin, McLaren, & Kelly, 2005; McKetin, McLaren, Kelly, Hall, & Hickman, 2005; Topp et al., 2002).

There is another less documented side to the problems associated with drug potency that relates to the impurities present. When the purity of a drug is low, this is usually because the level of adulterants (i.e. cutting agents) has been increased. Adulterants are added to substances purely for financial gain. Adding adulterants increases the weight of a substance, which in turn increases the relative costs to the buyer while raising the seller's profit margin. The potential for harm then relates to whatever cutting agent has been used, and the toxicity of these agents varies dramatically (Dayrit & Dumlao, 2004; Puthaviriyakorn et al., 2002). In Australia, for example, the purity levels of methamphetamine have varied dramatically during the past decade. At the same time,

the adulterants commonly used in methamphetamine have also varied and have included ammonia, naphthalene (Qi, Evans, & McCluskey, 2006, 2007) and lithium (Senjo, 2005).

Variability in potency and purity are indicative of the manufacturer's level of expertise, as well as the type and quality of precursors and cutting agents used. In Australia, for example, the median purity levels of methamphetamine taken from non-representative samples of seizures between 2000-2001 and 2004-2005 ranged from 1% to 80% (Australian Crime Commission, 2006).

Methamphetamine dependence can contribute to methamphetamine related toxicity. The toxic dose of methamphetamine varies and, while higher doses are more likely to produce toxic effects, in some cases low doses will promote toxicity. The main toxic effects associated with methamphetamine use are psychosis, seizures (Dean, 2004) and cardiovascular damage. Neurotoxicity that occurs because of methamphetamine dependence has been linked to structural changes in the brain. Extensive neural damage in certain brain regions can lead to permanent neuropsychological injury. In behavioural terms, this can be seen as impairments in cognitive function (e.g., learning, memory loss), deficits in executive function (Anglin, Burke, Perrochet, Stamper, & Dawud-Noursi, 2000; Barr et al., 2006; Kalechstein et al., 2000) and psychosis (Kalechstein et al., 2000). Methamphetamine users appear to be at risk of premature and accelerated coronary heart disease (Karch, Stephens, & Ho, 1999; Logan, Fligner, & Haddix, 1998; Webb et al., 2003) that may manifest as chest pain, cardiac arrhythmias, palpitations and hypertension (Derlet, Rice, Horowitz, & Lord, 1989; Fukunaga, Mizoi, & Adachi, 1987; Lan, Lin, Yu, Lin, & Chu, 1998; Turnipseed, Richards, Kirk, Diercks, & Amsterdam, 2003). Long-term use of methamphetamine can induce cardiomyopathy

(Crean & Pohl, 2004; Frishman, Del Vecchio, Sanal, & Ismail, 2003; Hong, Matsuyama, & Nur, 1991; Jacobs, 1989; Wijetunga, Seto, Lindsay, & Schatz, 2003; Yu, Larson, & Watson, 2003; Zhu et al., 2000). The severity of cardiovascular effects appears to be dose-related as blood pressure increases in a dose-related manner (Frishman et al., 2003; Schindler, Gilman, Graczyk, Wang, & Gee, 2003).

Methamphetamine induced cardiac arrhythmias and sudden cardiac death have been associated with large methamphetamine doses (Fukunaga et al., 1987). Sensitization or 'reverse tolerance' to the cardiovascular effects of methamphetamine may contribute to sudden death due to a low dose of methamphetamine; after periods of abstinence a methamphetamine binge can induce sudden death (Fukunaga et al., 1987).

Cardiovascular complications can occur with all major routes of administration, however the risk is likely to be higher via injecting as this delivers a higher dose (Darke, Kaye, & Ross, 1999; Hall & Hando, 1994). Methamphetamine interactions with other drugs can increase the toxicity and stress on the cardiovascular system (Bailey & Shaw, 1989; Kaye, McKetin, Duflou, & Darke, 2007; Logan et al., 1998; Zhu et al., 2000). Additionally, the different routes of drug administration each carry their own specific medical complications. Intranasal use can lead to necrosis of the nasal septum and throat disease (Cook et al., 1993; Rawson, Gonzales, Marinelli-Casey, & Ang, 2007). Smoking is often associated with respiratory illness. Injection can lead to endocarditis, sepsis, thrombosis and renal infarction (Meyer & Gordon, 1991).

Frequency of use

Australian population surveys suggest that although the most commonly reported frequency of methamphetamine use was once or twice a year (44% of recent users), one

in eight users (12%) reported daily or weekly use and a further one in six (16%) reported monthly use (Australian Institute of Health and Welfare, 2007).

Polydrug use

Polydrug use can increase both the acute effects and the long-term risks associated with each drug (Dean, 2004) and is common among methamphetamine users (Australian Crime Commission, 2006; Srisurapanont et al., 2001). Concurrent use of methamphetamine and alcohol can slow down the metabolism of methamphetamine, increasing its adverse effects (Dean, 2004). A recent trend to combine methamphetamine with ketamine is also associated with significant harm. Ketamine is a potentially lethal anaesthetic used in veterinary practice and it often causes loss of consciousness or coma in humans. The combination of ketamine with methamphetamine can be taken without the knowledge of the user. For example, methamphetamine and ketamine have been combined, produced and marketed as ecstasy (Australian Crime Commission, 2006). These drugs have also been combined and surreptitiously dissolved in alcohol for the purpose of sexual assault (Taylor, Novaco, Guinan, & Street, 2004).

1.4 DEPENDENCE AND WITHDRAWAL

The development of dependence on any drug heightens the risk of adverse consequences. Methamphetamine dependence includes chronic or episodic patterns of use that are typically a cycle of bingeing followed by a brief cessation. When taken in high doses by smoking or injection, methamphetamine is associated with aggressive or violent behaviour, intense anxiety, paranoid ideation and psychosis. The development of tolerance to methamphetamine often leads to an escalation to high doses of use. Some methamphetamine users develop reverse tolerance (sensitisation), where small doses

produce significant adverse psychological and neurological effects (American Psychiatric Association, 2002). Current research that has identified possible indicators of risk for the development of methamphetamine dependence is discussed below.

Methamphetamine acts on three primary neurotransmitters: dopamine, noradrenalin and serotonin, which in turn, impact on a range of systems throughout the body. Dopamine is important in the regulation of movement, cognitive processes (concentration, attention and memory), motivation and reward pathways (Dean, 2004; Vallone, Picetti, & Borrelli, 2000). Noradrenalin is involved in mediating cardiovascular effects, arousal, concentration, attention, learning and memory (Dean, 2004; Ressler & Nemeroff, 1999). Serotonin influences mood, appetite, sleep, cognition, perception, motor activity, temperature regulation, pain control, sexual behaviour and hormone secretion (Dean, 2004; Saxena, 1995).

The methamphetamine withdrawal syndrome has a prevalence of 87% among dependent users, making it as likely as opiate and cocaine withdrawal (Schuckit, 1994). As a clinical syndrome, methamphetamine withdrawal develops within a few hours to several days after cessation or reduction of use (refer to Appendix 1 for diagnostic features) and usually lasts for three to five days, although some symptoms can last weeks. Withdrawal symptoms are generally the reverse of those experienced during intoxication: fatigue, insomnia or hypersomnia, increased appetite, and psychomotor retardation or agitation (American Psychiatric Association, 2002). Methamphetamine withdrawal is thought to occur in three stages: (i) drug craving and agitation; (ii) reduced energy, increase in appetite and sleep; and (iii) loss of interest in pleasure, anxiety and slowness in movement (Srisurapanont, Jarusuraisin, & Jittiwutikan, 1999,

1999b). Intense drug craving is considered to be one of the most problematic symptoms due to its high potential to cause relapse to use (Srisurapanont et al., 2001).

1.5 PREVALENCE

The prevalence of global methamphetamine use can only be estimated crudely for a number of reasons. The gathering of data to monitor methamphetamine use is relatively recent (Klee, 2001) and relies on the willingness of the user to report their illicit use, a situation that probably leads to under-reporting (McGregor & Makkai, 2003). Data collection systems vary across countries, and many countries do not differentiate between methamphetamine, amphetamine and other stimulants (United Nations Office on Drugs and Crime, 2008). Some countries may only report data that relates primarily to drug seizures, and prevalence data from low income countries is rare (Klee, 2001).

1.5.1 A brief history of global trends

Amphetamine was first synthesised in 1887, but the first medicinal use was not until 1932 as a bronchial dilator for treating asthma (Anglin et al., 2000). Methamphetamine (a derivative of amphetamine) was first synthesised from ephedrine in 1893 (Suwaki, 1997). It was not widely used until World War II when it was given to troops from Japan, Germany and the United States to enhance performance, increase alertness and counter fatigue (Anglin et al., 2000). Japanese civilians employed in the production of military supplies during WWII were also given methamphetamine to improve output (Anglin et al., 2000). At the end of WWII, surplus army stock of methamphetamine flooded the Japanese drug market leading to what has been described as the first methamphetamine epidemic (1945-1957) (Anglin et al., 2000). In 1954, the estimated number of methamphetamine users in Japan was 550,000 and approximately 10% of this group experienced symptoms of methamphetamine-induced psychosis (Anglin et

al., 2000). In 1951, a series of violent crimes and homicides was linked to methamphetamine use. Japan responded by amending its Mental Health Act to include involuntary admission and treatment for methamphetamine users and by introducing the 1951 Stimulants Control Law to restrict supply. However, methamphetamine use in Japan slowly spread across all social strata, leading to another surge of use during the 1970s (Anglin et al., 2000; Suwaki, 1997).

What was described as the second epidemic of methamphetamine use occurred in the United States during the 1960s. Illicit methamphetamine laboratories emerged in San Francisco in 1962 and were aided by widespread distribution by motorcycle gangs (Anglin et al., 2000; Miller, 1997). At the same time and in addition to the illicit drug market, amphetamine was being prescribed widely for obesity and anxiety. During 1967, 31 million amphetamine prescriptions were written in the United States (Anglin et al., 2000). A series of violent crimes linked to methamphetamine use and the involvement of motorcycle gangs in its manufacture and trafficking led to a public outcry. The US government responded by implementing legislative controls to curb manufacture (Anglin et al., 2000; Miller, 1997; Morgan, 1997).

The prevalence of methamphetamine use during the past decade has been described as a global epidemic (Farrell, Marsden, Ali, & Ling, 2002). While the previous two epidemics were isolated to Japan and the United States, the rise in methamphetamine manufacture, trafficking and consumption during the past decade has spread across the world (United Nations Office on Drugs and Crime, 2006, 2010; World Drug Report, 2006). At a global level, there have been some attempts to implement legislation to curb manufacture and trafficking (United Nations Office on Drugs and Crime, 2007, 2008,

2010). Despite the historical links between methamphetamine use and violence, relatively little is known about whether this relationship exists in the current climate.

1.5.2 Recent global trends

Methamphetamine production is dependent on access to precursor chemicals (Australian Crime Commission, 2006; United Nations Office on Drugs and Crime, 2008, 2010). East and South East Asia continue to be the primary areas of production (United Nations Office on Drugs and Crime, 2006, 2008, 2010). Oceania (Australia and New Zealand), parts of Europe and South Africa have become prominent manufacturing regions. Between 2000 and 2006 methamphetamine seizures in Oceania increased more than 20-fold. During 2007 Australian domestic production is considered to have stabilized. However, the decline in seizures in Australia may reflect a global spread of production to other regions (United Nations Office on Drugs and Crime, 2008). In 2008, significant methamphetamine seizures were reported for East and South-East Asia, as well as North America (United Nations Office on Drugs and Crime, 2010).

Precursor chemicals necessary for methamphetamine production continue to be primarily sourced from China (United Nations Office on Drugs and Crime, 2008, 2010). Manufacture and trafficking of methamphetamine traditionally occurred in Asia and North America (World Drug Report, 2006) but is now spreading to West and Central Europe (United Nations Office on Drugs and Crime, 2006) the Middle East (United Nations Office on Drugs and Crime, 2008) and more recently, to Argentina, Brazil, Guatemala, the Islamic Republic of Iran, Kazakhstan and Sri Lanka (United Nations Office on Drugs and Crime, 2010). Large-scale production and use of methamphetamine in Europe continues to be localized to the Czech Republic and some Baltic States (Australian Crime Commission, 2006; United Nations Office on Drugs and

Crime, 2008). Ice consigned for the Australian market comes primarily from China (United Nations Office on Drugs and Crime, 2008). The largest number of methamphetamine laboratories recently detected were in the United States of America, the Czech Republic, Australia and China (United Nations Office on Drugs and Crime, 2010).

1.5.3 Prevalence of methamphetamine use in Australia

The prevalence of methamphetamine use in Australia is typically estimated via national household surveys (Australian Institute of Health and Welfare, 2008a). Data collection systems have been established for subpopulations and include routine data screening conducted in a custodial setting (Adams, Sandy, Smith, & Trigone, 2007) and surveys of injecting drug users from capital cities (Stafford, Sindicich, & Burns, 2009).

In 2007, Australian residents aged 12 years and over (N=23,356) reported their use of alcohol and other drugs. Population estimates were derived by weighting survey response data to the Australian population aged 12 years and over (Australian Institute of Health and Welfare, 2008a). Methamphetamine use is reported in Table 1.1. An estimated 1.1 million Australians (6% of those aged 14 years and over) have used methamphetamine in their lifetime. In 2007 an estimated 395,000 Australians used methamphetamine, and many used alcohol (81%), cannabis (63%) or ecstasy (53%) concurrently. The estimated prevalence of lifetime use decreased from 9% in 1998 to 6% in 2007. The estimated annual prevalence rates for recent (past year) use also declined from 4% in 1998 to 2% in 2007; a relative decrease of 32% (Australian Institute of Health and Welfare, 2008a, 2008b). The estimated age of initiation to methamphetamine use was 21 years and remained stable from 2004 to 2007.

Males were more likely than females to report lifetime use (8% versus 5%) and recent

Table 1.1 Methamphetamine use, persons aged 14 years or older by age and sex, 2007 (AIHW, 2008, p.64)

		AGE				SEX		
		14-19	20-29	30-39	40+	Males	Females	Persons
(percent)								
PERIOD OF USE	Ever	2.1	16.0	11.4	2.5	7.7	4.9	6.3
	1yr	1.6	7.3	3.9	0.4	3.0	1.6	2.3
	1mth	0.9	3.5	1.8	0.1	1.4	0.7	1.0
	1wk	0.4	1.5	0.9	0.1	0.7	0.3	0.5
(numbers)								
PERIOD OF USE	Ever	37,000	470,400	346,400	237,500	656,000	426,000	1,081,200
	1yr	26,900	214,700	118,300	39,900	256,300	138,800	394,800
	1mth	14,700	101,500	53,500	11,000	118,500	59,800	178,100
	1wk	7,000	42,700	28,000	5,100	57,500	24,200	81,600

use (3% versus 2%). Those aged 20-29 years were most likely to report lifetime (16%, 0.5 million) and recent use (10%, 0.1 million). Among adolescents (14-19 years): 2% (37,000) had ever used methamphetamine; 2% (27,000) had used recently (past year) and females were twice as likely as males to report recent use (2% vs. 1%). Patterns of use are reported in Table 1.2

Table 1.2. Frequency of methamphetamine use, recent users aged 14 years or older, by age, by sex, 2007 (percent) (AIHW, 2008, p64)

Frequency	AGE GROUP				SEX		Persons
	14-19	20-29	30-39	40+	Males	Females	
(percent)							
Daily or weekly	12	16	11	11	15	12	14
About once month	37	23	3.9	18	23	19	22
Every few months	21	29	1.8	27	25	30	27
Once or twice year	29	32	0.9	44	37	40	38

The proportion of males reporting recent use declined from 1998 to 2007 but this was not evident for females (Australian Institute of Health and Welfare, 2008a, 2008b).

The main forms of methamphetamine recently (past year) used were estimated as speed (51%), ice (27%) and base (12%), and are reported in Table 1.3. A higher proportion of males than females reported use of speed (54% vs. 47%), while ice was more often used by females (29% vs. 26%) (Australian Institute of Health and Welfare, 2008a, 2008b).

The Drug Use Monitoring in Australia (DUMA) program collects data from

Table 1.3. Form of methamphetamine used, recent users aged 14 years or older, by sex, 2007 (percent) (AIHW, 2008, p.65)

	FORMS EVER USED			MAIN FORMS USED		
	Males	Females	Persons	Males	Females	Persons
FORM OF DRUG						
Powder	83	75	80	54	47	51
Ice/ Crystal	50	58	53	26	26	27
Base/ Paste	39	30	36	11	15	12
Tablet	27	21	25	6.1	3.3	5.1
Prescribed Amphetamine	15	19	17	2.6	4.3	3.2
Liquid/ Ox Blood/ Red	15	12	14	1.1	1.7	1.3

police detainees in ten sites across Australia (Adams et al., 2007). The most recent survey describes self-reported data (N=3,911) collected during 2007 and suggests that the production, trafficking and consumption of methamphetamine are increasing. It is further argued that the level of methamphetamine use in Australia and New Zealand is among the highest in the world (Adams et al., 2007). Among those detainees surveyed, 41% reported methamphetamine use in the preceding 12 months and, of this group, 37% reported weekly use and almost one in five (18%) reported daily use. The most frequently used form of methamphetamine was ice (63%), followed by speed (23%) and liquid forms (11%). One in five methamphetamine users reported an increase in the potency of methamphetamine. More than half of those reporting recent (past 12 months) methamphetamine use also reported concurrent use of cannabis (63%) or alcohol (27%) (Adams et al., 2007). Any increases in methamphetamine potency will place the user at

even greater risk of suffering adverse effects. As discussed in Section 1.3, increases in drug potency heighten the potential for addiction to methamphetamine among non-dependent users and the likelihood of methamphetamine toxicity and/or drug overdose fatalities. The potential clinical needs of these patients are likely to change from outpatient to acute inpatient care.

The Illicit Drug Reporting System (IDRS) (Stafford et al., 2009) surveys injecting drug users in major capital cities across Australia. In 2008, 69% of the national survey sample (N=911) reported recent (past 6 months) methamphetamine use, a slight decrease from a reported 74% in 2007. Respondents who had used methamphetamine recently reported a median average of 18 days of use (i.e. less than weekly use) during this six-month period, compared with 24 days in 2007. However, fluctuations in reported use varied across states during the 2008 interval: NSW, for example, reported 40 days (nearly twice a week) and the Northern Territory reported 6 days (once a month). The form of methamphetamine mostly used was ice (47%), followed by speed (44%) and base (8%). The perceived purity of methamphetamine remained stable, with ice described as 'high' and speed as 'low' (Stafford et al., 2009).

1.6 RISK FACTORS

To date, a small number of studies have identified risk factors for developing methamphetamine abuse and/or dependence (Brecht, O'Brien, von Mayrhauser, & Anglin, 2004; Degenhardt & Topp, 2003; McKetin, Kelly, et al., 2006; McKetin, McLaren, et al., 2006). Population based studies and longitudinal research seeking to identify a causal relationship between risk factors and methamphetamine dependence are also lacking.

Longitudinal research

A small number of longitudinal studies of risk factors for methamphetamine use have been published and describe populations from Australia (Degenhardt, Coffey, Carlin, Moran, & Patton, 2007; Degenhardt, Coffey, Moran, Carlin, & Patton, 2007; Hayatbakhsh, Najman, Bor, & Williams, 2009), New Zealand (LaGasse et al., 2011; Wilkins & Sweetser, 2010) Thailand (Sherman et al., 2008) and the United States (Brecht, Greenwell, & Anglin, 2005; Gruenewald, Johnson, Ponicki, Remer, & Lascala, 2010; Riggs, Chou, & Pentz, 2009; Smith et al., 2008; Smith et al., 2011). The most common risk factors for methamphetamine abuse and/or dependence are: gender (Degenhardt, Coffey, Carlin, et al., 2007; Hayatbakhsh et al., 2009; Miura, Fujiki, Shibata, & Ishikawa, 2006), polydrug use (Degenhardt, Coffey, Carlin, et al., 2007; Hayatbakhsh et al., 2009; Wu, Pilowsky, Schlenger, & Galvin, 2007), and antisocial behaviour (Degenhardt, Coffey, Carlin, et al., 2007; Hayatbakhsh et al., 2009; Miura et al., 2006; Russell et al., 2008).

Epidemiological research spanning ten years followed a cohort of Australians from adolescence to young adulthood (N=1943). Findings indicate that males (16%) were more likely than females (9%) to use methamphetamine as young adults. Polydrug use during adolescence predicted adult onset of methamphetamine use, with daily cannabis users at highest risk of initiating methamphetamine use. Frequency of methamphetamine use was associated with social and occupational problems; young adults who used methamphetamine at least weekly were likely to be unemployed and have limited education. Antisocial behavior during adolescence also predicted adult methamphetamine use in females, but not in males (Degenhardt, Coffey, Carlin, et al., 2007).

Prospective research from birth to age 21 years (N=2042) identified five independent risk factors predicting methamphetamine abuse and/or dependence by age 21 years (Hayatbakhsh et al., 2009). Males as compared with females, reported higher rates of methamphetamine abuse and dependence. Aggression and delinquent behaviour, sexual abuse, tobacco and alcohol use during early adolescence predicted methamphetamine dependence at early adulthood (Hayatbakhsh et al., 2009).

Methamphetamine exposure in utero is a risk factor for neurobehavioural problems at birth. Physiological stress and higher levels of methamphetamine metabolites in newborns were associated with increased central nervous system stress (Smith et al., 2008). The impact of prenatal methamphetamine exposure on the development of cognitive and motor skills in children at age 1, 2 and 3 years (n=331, 288 and 278, respectively) has a modest effect on fine motor performance at age one, which is mostly resolved by age three years (Smith et al., 2011).

School-based interventions designed to prevent the initiation of illicit drug use followed participants (n=1002) from age 11 to age 28 years (Riggs et al., 2009). Those who received the intervention (n=502) were significantly less likely than controls (n=500) to report lifetime methamphetamine use. Brecht and colleagues (Brecht et al., 2005) investigated treatment completion patterns for methamphetamine patient admissions over a period of ten years. Consistent risk factors for treatment non-completion and shorter treatment retention for both residential and outpatient admissions were: low educational status, being younger at treatment admission, daily methamphetamine use and injecting drug use. A consistent indicator for treatment completion and retention was undergoing legal supervision. Homelessness and chronic psychiatric illness were risk factors for retention in outpatient treatment (Brecht et al., 2005).

Population-based studies

Wu and colleagues (2007) examined gender differences in the prevalence and characteristics of methamphetamine use among young people aged 16 to 25 years (N=24,409). Risk factors for methamphetamine abuse were a lifetime use of at least three illicit drug classes, and a past year history of substance use disorders. Kramer and colleagues (2009) report that initiation to illicit drugs prior to age 15 years and a family history of substance abuse are risk factors for developing methamphetamine dependence in adulthood. Miura and colleagues (2006) also report that a history of family substance abuse increased the risk of developing methamphetamine dependence, when they interviewed juveniles incarcerated in detention (n=1362). Similar findings are reported by Russell and colleagues (2008) who conducted a systematic review of (mostly cross-sectional designed) studies that identified risk factors for methamphetamine abuse among adolescent populations. Family instability (history of crime, substance abuse) and a history of psychiatric illness were significant risk factors for methamphetamine abuse and dependence among adolescents (Russell et al., 2008).

Co-morbidity

Psychiatric comorbidity is a major health concern for those with methamphetamine dependence, particularly for Axis I disorders such as psychosis, depression and anxiety (Salo et al., 2011). Many comorbid symptoms are exacerbated by ongoing methamphetamine use and conversely, remaining abstinent reduces the severity of psychiatric symptoms (Glasner-Edwards et al., 2010; Zweben, Cohen, Christian, & al., 2004). Adolescent onset of methamphetamine use is a risk factor for developing mental health problems in young adulthood (Degenhardt et al., 2007). Young women with methamphetamine dependence were more likely than their male counterparts to have

attempted suicide (Brecht et al., 2004; Glasner-Edwards, Mooney, Marinelle-Casey, et al., 2008; Glasner-Edwards, Mooney, Marinelli-Casey, et al., 2008; Zweben et al., 2004). Gender differences in psychopathology associated with methamphetamine use have been found for depression which is more common among females as than males (Salo et al., 2011; Yen & Chong, 2006).

A new area of research is investigating biological markers for comorbidity. Bousman and colleagues (2009) review of biological processes that increase susceptibility to methamphetamine disorders, report that 14 genes have been specifically linked to methamphetamine dependence (Ikeda et al., 2007) and methamphetamine dependence with psychosis (Kishimoto et al., 2008).

1.7 SUMMARY

Methamphetamine is a powerful and highly addictive stimulant that facilitates the emergence of: (i) agitation (ii) violent behavior (iii) intense paranoia (iv) psychotic behavior (v) visual and auditory hallucinations (National Institute on Drug Abuse, 1998). The attraction of methamphetamine lies in its ability to produce feelings of: (i) euphoria (ii) confidence (iii) motivation (iv) increased energy and (v) an overall sense of wellbeing. The high potency of methamphetamine enhances its desired effects but also intensifies the adverse effects and increases the likelihood of drug dependence. The onset of methamphetamine dependence can be a consequence of drug toxicity (Dean, 2004), frequency of use (Australian Institute of Health and Welfare, 2007) or the route of administration (Cho & Melega, 2002). Methamphetamine dependence is associated with a range of harms including life-threatening physical, neurological and psychological disorders (Srisurapanont et al., 2001). Impairments in cognitive functioning, deficits in executive functioning systems (Anglin et al., 2000; Barr et al.,

2006; Kalechstein et al., 2000), extreme mood swings, delusions and hallucinations (Cohen et al., 2003; Kosten & Singha, 1999; Szuster, 1990) are a likely consequence of methamphetamine abuse or dependence. The estimated prevalence of methamphetamine use in Australia remains high. The increasing global prevalence of methamphetamine use during the past decade is partly attributed to changes in methamphetamine production that have led to increases in availability, accessibility and affordability. Chapter 2 explores links between methamphetamine use, anger and aggression. Theoretical constructs of anger are examined, along with a review of research investigating the link between methamphetamine use with anger and aggression.

CHAPTER 2 ANGER AND AGGRESSION

2.1 DEFINITIONS

2.1.1 Anger

Anger is a central feature of the human emotional experience (Norlander, 2005).

Historically, anger was defined as a purely physiological condition (e.g., increased heart rate) (Ax, 1953). Contemporary definitions regard it as not only a physiological state but a dynamic construct that includes subjective, cognitive and behavioural reactions (Berkowitz, 1993; Deffenbacher, Oetting, Lynch, & Morris, 1996; Kassinove & Sukhodolsky, 1995). According to Spielberger (1999), anger is a series of distinct domains and it is our predisposition towards anger, rather than our current or immediate experience of anger, that predicts how we express it. Hostility, anger and aggression are separate constructs but have shared properties that may overlap (Bowman & Cohen, 1996; Spielberger, Jacobs, Russell, & Crane, 1983; Spielberger et al., 1985).

2.1.2 Hostility

Hostility is generally understood to be an attitudinal construct based on cognitive sets (Buss, 1961). Its defining features are a predisposition towards distrust and dislike of others, which in turn foster negative thoughts and beliefs. Fundamental to this construct are the cognitive sets of cynicism, mistrust and denigration of others (Bettencourt, 1996). Spielberger's model (Spielberger, Krasner, & Solomon, 1988) defines hostility as an attitude that is expressed within the constructs of anger and aggression. Hostility may fuel anger and be expressed as vindictive and aggressive behaviour. The distinction between anger and hostility is that the effect of anger (i.e. feeling angry) is a consequence of an individual's hostile cognitive set (Eckhardt, Norlander, &

Deffenbacher, 2004). Hostility may cause an increased frequency of anger and aggression, therefore, hostility and anger may reciprocally activate each other and motivate aggression (Bettencourt, 1996).

2.1.3 Aggression

Aggression is understood to be the verbal and/or physical expression of hostility (Buss, 1961). Historically, aggression has been defined as harm through verbal or physical acts (Huesmann, 1984). According to contemporary models, the intent to cause harm is fundamental to the construct of human aggression (Anderson & Bushman, 2002; Berkowitz, 1993; Deffenbacher, Oetting, Lynch, et al., 1996; Parrott & Giancola, 2007) and defined as behaviour toward another that is executed with the immediate intent to cause harm (Anderson & Bushman, 2002, p. 2).

2.1.4 Violence

The World Health Organisation defines violence as: “The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community, that either results in or has a high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation” (World Health Organisation, 2002, p.4). Central to this definition are social and cultural values that sanction acceptable behaviour. These values vary widely and evolve over time (World Health Organization, 2002). The likelihood of violence depends on a complex interplay of individual, relationship, social, cultural and environmental factors (Dahlberg & Krug, 2002), discussed below.

2.1.5 Pathways from anger to aggression and violence

Anger can be a positive experience, providing energy to boost determination to overcome obstacles and achieve personal goals (Novaco, 1996). Anger can obstruct cognitive processes that are essential to moral reasoning and judgment; it can reduce inhibitions against aggression by providing justification for retaliation; and it can sustain a state of vigilance where an individual remains primed for provocative events (Anderson & Bushman, 2002). Anger can act as an information cue by informing the individual about possible causes, culpability and ways of responding to an event. Anger can prime aggressive cognitive scripts and associated behaviours, while increasing arousal levels (Anderson & Bushman, 2002).

2.2 ANGER, AGGRESSION AND SUBSTANCE USE

At an individual level, the potential risk factors for both aggressive behaviour and substance use include biological, psychological and behavioural characteristics. These risk factors can emerge in childhood or adolescence in response to family and peers, as well as social and cultural values. A number of different models have sought to explain the relationship between anger, aggression and substance use, and several of these models are outlined below.

The Pharmacological model

The direct effects of certain substances on an individual can be pharmacological, neurotoxic (damage caused by prolonged use or excessive dose) or withdrawal effects (abstinence or reduction following prolonged use) (Hoaken & Stewart, 2003; Pihl & Hoaken, 2002; Pihl, Peterson, & Lau, 1993). A pharmacological model of substance use and aggression views substance use as having a direct effect on the brain that produces aggressive behaviour. There may also be a temporary physiological effect that causes

cognitive dysfunction and/or a loss of emotional control (Friedman, 1998). Central to this model is the regulation of signal transmission to key sites within the brain (Friedman, 1998). Aggressive behaviour is thought to occur when substance use interrupts or otherwise alters this neurotransmission (Miczek, Fish, de Bold, & de Almeida, 2002). The neurotransmitters noradrenalin, serotonin, dopamine and gamma-aminobutyric acid play an important role in both the aetiology of aggression (Boles & Miotto, 2003; Coccaro, Bergeman, & McClearn, 1993; Coccaro & Kavoussi, 1996; Fishbein, Lozovsky, & Jaffe, 1989; Haden & Scarpa; Kavoussi, Armstead, & Coccaro, 1997; Volavka, 2002) and substance use (Dean, 2004; Miczek et al., 2002; Pihl & Hoaken, 2002). These neurotransmitters are critical to regulating a range of behaviours (Berman & Coccaro, 1998; Boles & Miotto, 2003; Fishbein et al., 1989) as well as the ability to accurately collect and process information vital to our wellbeing (Volavka, 2002). Interruptions to this system may produce mental fatigue and slow response rate (Haden & Scarpa, 2007). Under these conditions, an individual placed in a stressful situation is likely to misinterpret another's intentions as threatening and react aggressively (Pernanen, 1981). There is some evidence to support the view that certain factors (e.g., neurotransmitters) may provide the condition (or context) under which anger and aggression is likely to occur (Miczek & Tidey, 1989; Nordahl et al., 2003; Parker & Auerhahn, 1998). How well this model applies to the effects of methamphetamine is unknown. There is evidence that methamphetamine use causes an influx of neurotransmitters, followed by a state of depletion. High doses of methamphetamine interrupt the noradrenergic system by inducing a prolonged state of arousal and sleep deprivation. This type of interruption may provide the biological context in which aggressive behaviour is easily aroused (Nordahl et al., 2003): a depleted state of noradrenalin that may induce changes in mood that trigger aggression

(Boles & Miotto, 2003; Coccaro & Kavoussi, 1996). If this pattern of substance use is prolonged, this may lead to the development of behavioural pathology (Fischman & Haney, 1999) and toxic psychosis (Ellinwood, 1974; Ellinwood, 1967, 1971; Fukushima, 1994; Kosten & Singha, 1999).

Volavka (Volavka, 1997, 1999, 2002) argues that neurochemical regulation is one of the key factors in developing a propensity for aggressive behaviour, illustrated in Figure 2.1.

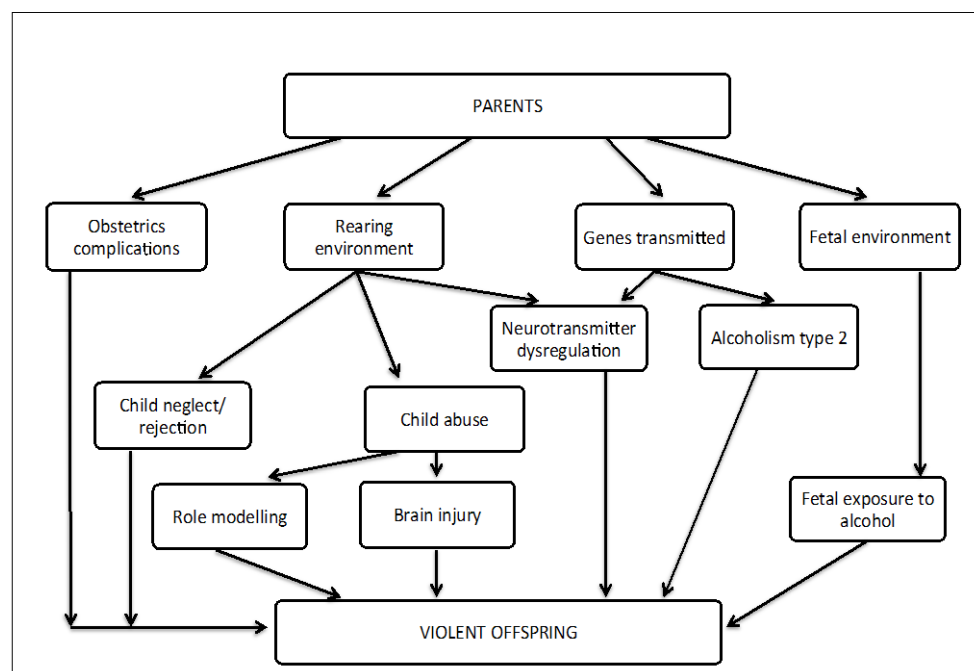


Figure 2.1 Volavka's Intergenerational Transmission Model of Violence

This model posits that parents provide the biological and environmental conditions from which aggression may develop: “Pre- and peri-natal events interact with genetic factors in determining the likelihood an individual will exhibit aggressive behaviour” (Haden &

Scarpa, 2007, p.3). Both neurochemical traits and parenting practices play a key role in determining whether a child will develop aggressive tendencies. This model is described as a dynamic process in which nature continually interacts with nurture (Haden & Scarpa, 2007); however, neurochemical dysregulation significantly influences the likelihood of developing aggressive traits (Haden & Scarpa, 2007). Current research provides evidence that methamphetamine use disrupts neurochemical regulation (discussed in Chapter 1). Sekine and colleagues (2006) investigated if brain serotonin density could be associated with psychiatric symptoms by comparing abstinent- with non-methamphetamine users on the Aggression Questionnaire (Buss & Perry, 1992). Abstinent methamphetamine users reported significantly higher levels of aggression, indicating that the longer methamphetamine is used, the more severe the decrease in serotonin transporter density will be. This dose-response relationship suggests a link between methamphetamine use and damage to serotonin neurons (Sekine et al., 2006) and is a step closer to establishing whether the neurochemical dysregulation caused by methamphetamine use directly influences the development of aggressive behaviour.

The Biopsychosocial model

The Biopsychosocial model of substance use and aggressive behaviour is an extension of the Psychosocial model in which personality factors are determinants of substance use and aggression. Both models propose that impulsive-aggressive personality traits in childhood cause early onset of substance use (Cloninger, 1999). The influence of psychosocial factors on aggressive behaviour begins during early childhood and continues through to adulthood. Developmental factors contributing to violence include a hostile environment, harsh discipline, family aggression, lack of parental supervision

and exposure to substance abuse (Chermack, 1997). The Biopsychosocial model extends the Psychosocial model by proposing that substance use and aggressive behaviour are a result of the net effect of distal factors, proximal factors and a conflicting situation (Moore & Stuart, 2005). Distal factors include a history of childhood abuse, past substance use patterns, familial or cultural norms towards violence and psychopathology (Moore et al., 2008) that are brought to the conflict situation. Proximal factors include acute intoxication, information processing deficits, provocation, impulsivity and the setting/context of the event (Moore et al., 2008). Intoxication or drug effects interact with cultural norms that condone the use of violence, leading to the perpetration of violence if conflict arises.

2.2.1 Developmental factors

Developmental factors are predictive of adult violence and substance abuse. Early childhood aggression is predictive of heavy drinking in adolescence and these factors combined increase the risk of violent behaviour in adulthood (Roth, 1994). Deviant behaviour in childhood is a fairly reliable predictor of aggressive behaviour in adulthood (Friedman, Kramer, & Kreisher, 1999). Potential influences on aggression may also include the context and environment in which drugs are consumed (Bond & Silveira, 1993; Haggard-Grann, Hallqvist, Långström, & Möller, 2004; Hoaken & Stewart, 2003), and personality factors including hostility (Rothschild, 1992) and impulsivity (Finley, Buffett-Jerrott, Stewart, & Millington, 2002).

In summary, factors that influence the development of aggression and problematic substance use often become intertwined in early childhood and continue through to adulthood (Chermack, 1997). Biological and environmental factors appear to influence the onset of problem behaviour during early childhood. As children mature,

interpersonal relationships with family, friends and peers take on a significant role in the development of personality traits that may contribute to the onset of aggressive behaviour (Mercy, Butchart, Farrington, & Cerda', 2002) and problematic substance use. Communities adopt a particular culture in which norms and values of that society are sanctioned. Within each community are subcultures that fail to adopt society rules. One example is the subculture of drug cartels (described below), in which violence plays a key role in maintaining social order. According to Mercy and colleagues, any culture that condones violence as a means of resolving conflict subsequently endorses violence (Mercy et al., 2002).

2.3 CRIMINAL BEHAVIOUR

Goldstein (1985) developed a model of the relationship between substance use and violence based on the following three premises: (1) violence is perpetrated while under the influence of substances; (2) violent crimes are committed to obtain currency to support substance use; and (3) the nature of interactions and transactions within the drug culture are inherently violent. In a study of methamphetamine users, Wright and Klee (2001) found empirical support for all tenets of Goldstein's model (1985): feelings of excessive confidence, energy and paranoia produced by methamphetamine use led to violent behaviour; violent assaults were committed to procure methamphetamine; and weapons were used during transactions to purchase methamphetamine. The authors concluded that the links between substance use and aggression are complex and worthy of further investigation. While there are some concerns regarding the methodology employed by this study, such as a small (43 methamphetamine users) non-random sample and the lack of a standardised measure of anger and aggression, this study

provided important information concerning methamphetamine use, aggression, violence and crime: an area that has yet to be fully investigated.

Australian routine data collected from police detainees (N=3911) examined the relationship between substance use and crime (Adams et al., 2007). Forty-one percent of detainees self-reported methamphetamine use. Among this group, 62% reported their methamphetamine use was not linked to their criminal behaviour. However, one in five reported all of their criminal activity was a result of methamphetamine use and, of this group, property offences was the crime most associated with methamphetamine use (61%), followed by drug (25%) and violent offences (22%) (Adams et al., 2007). As with previous studies, these authors also report that the relationship between drug use and crime is complex and requires further investigation.

2.4 CO-MORBIDITY

There are five general models that seek to explain the relationship between co-morbid (i.e. co-occurring) substance use and psychiatric disorders: (1) a pre-existing substance use disorder increases the risk of developing another psychiatric disorder; (2) a psychiatric disorder increases the likelihood of developing a substance use disorder; (3) either disorder can increase the risk of co-morbidity; (4) risk factors for co-morbidity are common to both disorders; and (5) these are prevalent disorders that co-occur by chance (Mueser, Drake, & Wallach, 1998).

Hiday (1997) reviewed empirical research examining the relationship between substance use, psychiatric disorder and violent behaviour. Her findings were presented as a series of explanatory models. Co-morbid psychiatric disorder and substance dependence is described as a two-way path whereby each could predispose, precipitate

or perpetuate the other. When this model is extended to include violent behaviour, the social setting is presented as a primary contributor to both violent behaviour and to the psychiatric disorder: neurobiology may be the origin of psychiatric disorder but social factors mediate its course, manifestations and connections to violence (Hiday, 1997).

Methamphetamine users often present with a co-existing psychiatric disorder and high rates of concurrent polydrug abuse/dependence (Darke & Hall, 1995). One of the difficulties with making a diagnosis is that symptoms of one disorder may overlap with those of other disorders. Methamphetamine intoxication, for example, can be similar in presentation to hypomania, while methamphetamine withdrawal shares similar features to depression (Baker et al., 2005b; First, Spitzer, Gibbon, & Williams, 1998). The relationship between substance use, mental health and criminal behaviour is complex and poorly understood; however, anger and aggression are fundamental to all of these models.

The relationship between methamphetamine use, psychiatric symptomatology and aggressive behaviour has been linked to pre-existing conditions. Large doses of methamphetamine by individuals with a pre-existing psychotic disorder have been found to cause violent outbursts (Roth, 1994). Pre-existing psychiatric morbidity may influence the development of substance use (Roth, 1994) and aggressive behaviour (Reiss, 1993). Personality traits (e.g., poor impulse control) may influence the choice of drug (e.g., stimulants) and together these factors manifest as aggressive behaviour (Hoaken & Stewart, 2003). Antisocial personality disorder and psychopathy, for example, are associated with sensation-seeking and poor impulse control, which in turn have been associated with initiating stimulant use and subsequent uninhibited aggression (Pihl et al., 1993). Methamphetamine-induced psychosis may be transient,

prolonged or persistent (Boles & Miotto, 2003) and the strength of this relationship is thought to be dependent on having a prior psychiatric condition (Reiss, 1993).

Individuals who are most likely to become aggressive while using methamphetamine may be those with pre-existing impulse control problems or aggressive tendencies (Hoaken & Stewart, 2003). Whether these traits are symptomatic of a possible underlying psychiatric condition is not known.

There is also evidence to support a contrasting view: anger, aggression and violent behaviour may lead to substance use and psychiatric disorder. The trauma of being a witness to or a victim of chronic aggression and violence (e.g., domestic violence) can lead to the development of substance abuse/dependence (as a dysfunctional coping style) and psychiatric illness (e.g., Post Traumatic Stress Disorder, PTSD) (Cohen et al., 2003; Kendler, Karkowski, Neale, & Prescott, 2000). These two disorders may co-exist, leading to a diagnostic co-morbidity (Back et al., 2000; Cohen et al., 2003; Duncan, Saunders, Kilpatrick, Hanson, & Resnick, 1996).

Although violence does not inevitably lead to psychiatric disorder, chronic exposure to violence can increase the likelihood of its development (Back et al., 2000; Duncan et al., 1996). Substance users who had experienced assault at an early age and were currently experiencing ongoing assaults reported high rates of psychiatric disorder (e.g., PTSD), severe levels of psychiatric symptoms and higher rates of Axis I and Axis II disorders (Back et al., 2000).

Similar findings among adolescent methamphetamine users provide support for this view (Rawson, Gonzales, Obert, McCann, & Brethen, 2005). Comparisons between adolescent methamphetamine and non-methamphetamine users indicated that the

methamphetamine group reported significantly higher levels of psychiatric morbidity. Symptoms included auditory hallucinations, suicidal ideation and depression, as well as school and legal problems. Many of this group associated with drug using peers and had parents with problematic drug use. Subsequently, their level of exposure to abuse and violence, particularly in the family home, was significantly higher than those who did not use methamphetamine (Rawson et al., 2005).

2.5 METHAMPHETAMINE USE, ANGER AND AGGRESSION

In a review of studies that have examined associations between substance use and aggression, evidence to support a relationship between methamphetamine use and aggression was found to be inconsistent (Hoaken & Stewart, 2003). Methamphetamine can alleviate aggression in children diagnosed with Attention Deficit Disorder (Connor & Steingard, 1996) and yet produce extreme mood states such as sudden outbursts of intense aggression, as well as social isolation and withdrawal (Miczek & Tidey, 1989). The adverse effects of methamphetamine intoxication have been described as a contributing factor in the perpetration of violent crime including manslaughter and murder (Ellinwood, 1971; Simonds & Kashani, 1979). Chronic methamphetamine use has been described as a likely contributor to the development of paranoid psychosis and subsequent outbursts of aggression and violence (Angrist & Gershon, 1969; Ellinwood, 1971; Klee & Morris, 1994a; Wright & Klee, 2001). Animal and human studies suggest that the link between methamphetamine use and violence may be explained by patterns of methamphetamine use such as chronic high doses by intravenous route (Miczek & Tidey, 1989). Aggressive behaviour may also be a consequence of methamphetamine withdrawal syndrome among individuals who are highly dependent on methamphetamine (Boles & Miotto, 2003). Methamphetamine may appeal to those

already predisposed to aggression, whether by making them feel confident enough to exhibit aggression or used to justify aggressive behaviour (Boles & Miotto, 2003).

Individuals with a history of paranoid delusions and methamphetamine use are at high risk of exhibiting violence.

Few studies have sought to specifically examine the relationship between methamphetamine use, anger and aggression. One exception is the work conducted in the United Kingdom by Klee and colleagues during the early 1990s (Klee, 1992, 1998; Klee & Morris, 1994b; Wright & Klee, 2001; Wright, Klee, & Reid, 1999). Their research established the existence of a relationship between methamphetamine use, aggression and violence. They identified antecedents to the commission of violent crime that included methamphetamine intoxication or withdrawal (Wright & Klee, 2001).

Sommers and Baskin (2006) examined the links between methamphetamine use and violence among a cohort of methamphetamine users (N=205). Twenty-seven percent of participants were reported to have become violent while using methamphetamine: half of these acts involved domestic violence, 28% were drug-related, 9% were gang-related and 11% involved random acts of violence (Sommers & Baskin, 2006).

Methamphetamine was described as having a direct effect on behaviour by influencing how users interpreted events. For example, normal everyday interactions were transformed into a battle, only to be resolved by engaging in aggressive and violent behaviour. Subsequently, a relatively minor dispute was likely to become a violent event (Sommers & Baskin, 2006). According to Sommers and Baskin (2006), methamphetamine mediated violence by exaggerating one's "sense of outrage over transgressions of personal codes (respect, space, verbal challenges), resulting in violence to exert social control or retribution" (Sommers & Baskin, 2006, p92.). Their

research documents the context or situations (e.g., the family home) in which violence occurred. Methamphetamine related domestic violence poses a serious threat to the welfare and protection of children who are witness to these events (Sommers & Baskin, 2006). These findings support previous concerns raised by Assael (2005) regarding the devastating consequences of child abuse and neglect experienced by children whose parents (or carers) are methamphetamine users.

Sommers and Baskin's (2006) study of methamphetamine users found that many participants (73%) reported they were not aggressive. Among the remaining participants who had engaged in aggression or violence, most reported a history of violence prior to the onset of methamphetamine use. These findings add support to previously conducted Australian research (Hall, 1996) which concluded that a history of aggressive and violent behaviour prior to the onset of methamphetamine use was a significant predictor for the perpetration of violence subsequent to commencing methamphetamine use.

Cartier and colleagues (Cartier, Farabee, & Prendergast, 2006) examined the relationship between methamphetamine use, violent crime and general recidivism among parolees. During the year post release, methamphetamine use was found to be a significant predictor of violent crime and general recidivism. Involvement in the drug trade was also related to violent crime and recidivism.

In summary, evidence to support a relationship between methamphetamine use and aggression is inconsistent (Hoaken & Stewart, 2003). Methamphetamine can both alleviate (Connor & Steingard, 1996) and facilitate aggressive behaviour (Miczek & Tidey, 1989). Methamphetamine intoxication may contribute to the commission of violent crime (Ellinwood, 1971; Simonds & Kashani, 1979). Although chronic high

doses of methamphetamine may contribute to the development of paranoid psychosis and subsequent aggression (Angrist & Gershon, 1969; Ellinwood, 1971; Klee & Morris, 1994a; Wright & Klee, 2001), individuals with a history of paranoid delusions who use methamphetamine are likely to exhibit violence (Hoaken & Stewart, 2003).

2.6 CONCLUSION

Anger, aggression and substance use are complex behaviours that are not completely understood because they represent a multifaceted problem that stems from biological, psychological, social and environmental factors (Ax, 1953; Bandura, 1983; Boles & Miotto, 2003; Dahlberg & Krug, 2002). Added to this is the lack of a universal definition of anger. Consequently, there is a degree of confusion regarding how to accurately measure anger and how to formulate clinically meaningful diagnoses. There is currently no unified basis from which clinical interventions can be developed, implemented and evaluated consistently across populations and over time (Cohen, Hsueh, Russell, & Ray, 2006). Chapter 3 describes the development of the STAXI-2 (Spielberger, 1999) as a measure of anger and aggression. Indicators of scale validity and reliability of anger measures are explained. The psychometric property of the STAXI-2 among a cohort of methamphetamine users is examined for construct validity and internal consistency to determine scale validity and reliability.

CHAPTER 3 AN ASSESSMENT OF THE PSYCHOMETRIC PROPERTIES OF THE STAXI-2

There is some evidence to suggest the existence of a relationship between methamphetamine use, anger and aggression. However, our current understanding of this relationship is limited by various factors including the lack of a measure of anger validated for methamphetamine users. Chapter 3 examines the utility of the STAXI-2 (Spielberger, 1999), a measure of anger that has been validated in the general population and among psychiatric patients, within a cohort of regular methamphetamine users.

3.1 THE MEASUREMENT OF ANGER

Assessment is a key feature of patient care. Psychological assessment guides clinical judgment, provides information to create treatment programs, and assists with predicting behaviour and determining treatment outcome (Anastasi, 1988; Haynes, Richard, & Kubany, 1995; Spielberger et al., 1985). The development of a valid and reliable measure of anger has been a point of concern for researchers and clinicians (Barlow, 1991; Eckhardt et al., 2004; Novaco, 1996; Spielberger, 1988; Thorne, 1953). Thirty years ago, for example, Biaggio (1980) and colleagues (1981) investigated the validity and reliability of four scales commonly used to assess anger: the Buss Durkee Hostility Inventory, (BDHI) (Buss & Durkee, 1957); the Reaction Inventory (RI) (Evans & Stangeland, 1971); the Anger Self-Report (ASR)(Zelin, Adler, & Myerson, 1972); and the Anger Inventory (AI) (Novaco, 1975). In the first study, Biaggio (1980) examined response data (n=150) from these four scales and found that validity and reliability could only be partially established; a second study (n=60) reported similar

findings (Biaggio, 1980; Biaggio, Supplee, & Curtis, 1981). Biaggio (1980) assessed the validity and reliability of these four scales by performing a correlation analysis and a varimax rotated factor matrix of the four scales. The BDHI Total Hostility and the ASR Total Expression scales were found to assess a similar trait, as indicated by significant correlations ($r = 0.64$, $p < 0.01$) between these scales. Concurrent and discriminant validity was confirmed for the BDHI and ASR subscales, indicated by the significant correlations yielded between these scales. However, predictive validity for these scales was not confirmed. The RI and AI scales correlated significantly ($r = 0.82$, $p < 0.01$) indicating both scales assess the propensity for anger arousal. Correlations between these two scales with the BDHI and ASR total scores were also significant however, the values were low to moderate (ranging from $r = 0.16$ to $r = 0.45$), suggesting that the RI and AI scales tap into a different domain of anger, namely, the tendency towards becoming angry, the readiness to admit and express anger. The ASR and BDHI scales however, appear to measure modes of anger and hostility expression. Biaggio (1980) concludes that there are two pairs of scales measuring different traits: the RI and AI, and the BDHI and ASR. The response formats also vary between a true-false binary option (BDHI), 5-point rating (RI, NI), and a 6-point Likert-scale (ASR). Variability in response formats can be problematic (discussed below).

In the second study (Biaggio, Supplee and Curtis, 1981) a correlation matrix comprising the four anger scales yielded significant correlations for the BDHI and ASR scales (ranging from 0.28 to 0.78) but the magnitude for many of the correlation coefficients was considered to be too low, suggesting that both scales were tapping into similar but not identical dimensions of anger/hostility expression (Biaggio et al., 1981). Construct validity was therefore not confirmed. Guilt scales from both inventories (BDHI and

ASR) were not correlated (most values were zero), suggesting the presence of discriminant validity as evidenced by a lack of correlation with other constructs. Based on these findings, Biaggio and colleagues (1981) concluded that the BDHI and ASR scales assess dimensions of anger/hostility expression; and the RI and AI scales measure the extent to which one is willing to admit being angry. However, they argue that validity cannot be compellingly established due to the possible influence of differences in measurement. The two pairs of scales measure different traits (RI and AI, the other being BDHI and ASR) using three types of response formats: a multiple response scale for the RI and AI; a true-false format for the BDHI; and a rating scale for the ASR. The high correlations obtained between RI and AI ($r=0.82$) point to evidence of convergent validity, but could also be attributed to the uniformity of method (that is, both use a multiple response format). The low correlations obtained for the two scales measuring different traits could indicate the presence of discriminant validity, however, the differences in each method (true/false vs. rating scale) could also attribute to the low correlations (Biaggio et al., 1981). Scale reliability was examined by conducting test-retest analysis using Pearson product-moment correlation, producing coefficients ranging in value from 0.17 to 0.82. Reliability was confirmed for two scales: the BDHI (correlations ranging from 0.65 to 0.82) and the RI (correlation coefficient 0.70). Reliability was not established for the ASR and the NI scales due to moderate (0.54) and low (0.17) correlation coefficients, respectively.

Anger can be a positive experience, providing motivation to achieve goals (Averill, 1983). Anger also contributes to a range of behaviours that can be problematic, such as: aggression (Ax, 1953; Bandura, 1973; Buss, 1961; Buss & Durkee, 1957; Dodge, 1980; Dollard, Doob, Miller, Mowrer, & Sears, 1939; Izard, 1971; Miller, 1941; Novaco,

1976, 1979; Spielberger et al., 1983; Spielberger et al., 1988), violent crime (Lench, 2004), psychiatric disorder (Chemtob, Novaco, Hamada, Gross, & Smith, 1997; Lench, 2004) and poor health (Spielberger, Ritterband, Sydeman, Reheiser, & Unger, 1995; World Health Organization, 2002). Despite this evidence, problematic anger continually fails to be recognised as a potential disorder in itself, rather, it is generally considered as a symptom of a larger problem or condition and/or as a variant on an existing psychological disorder (Lench, 2004). There are no universal criteria for problematic anger: no defining features for what constitutes an anger problem, or a prescribed threshold for intervention (Lench, 2004). Defining and describing target behaviours for intervention becomes ambiguous, leading to difficulties in making clinical decisions as to the level of anger at which an intervention should occur or whether there have been improvements in anger subsequent to treatment. Summarising the existing literature on the treatment of anger and aggression is also difficult because there is a wide variation in the types of behaviours that characterise anger and require clinical intervention. These behaviours can range from: bullying behaviour, experiencing psychiatric symptoms (e.g., antisocial behaviour), engaging in physical aggression (e.g., fighting), or violent crime (e.g., murder). It follows then that prescribed interventions also vary considerably: admission to a psychiatric hospital, attending outpatient care, individually designed psychological interventions, or incarceration at a correctional centre (Mulvey, 1994). In conjunction with this are the ongoing behavioural assessments of target behaviours that often rely on information that is equally varied and obtained from a range of information sources, which may not be accurate. These include, for example, self-report, criminal reports, direct observation, and clinical notes, each with its own limitations (Reppucci, 1999).

It has been argued that the development of anger measures has generally not been informed by theory (Novaco, 1995) and the lack of progress toward the construction of valid and reliable measures of anger is because of a general failure to recognise anger as a clinically relevant construct (Eckhardt et al., 2004). Novaco (1996) argues that anger has generally been overlooked by clinical research. To be able to recognise anger as a clinically significant concept and to advance the field of anger research, the validity and reliability of anger measures must be addressed.

3.2 SCALE VALIDITY

The validity of a scale refers to the degree to which it measures the domain it has been designed to measure (American Educational Research Association Psychological Association & National Council on Measurement in Education, 1999; Cronbach & Meehl, 1955). The validation of a scale is usually undertaken when there is no prior existing measure or the scale has not been validated in the population being investigated (Streiner & Norman, 1995). The three principal categories of validity are content, criterion and construct validity and are described in Table 3.1.

3.2.1 Content validity

Content validity is designed to measure the accuracy with which the test items represent the construct being measured (Anastasi, 1988; Haynes et al., 1995). A construct is the domain or attribute being assessed and is often based on theoretically defined attributes of people (Haynes et al., 1995). Test performance reflects the attributes being assessed. In test validation 'the attribute about which we make statements in interpreting a test is a construct.' (Cronbach & Meehl, 1955, p285). Content validity requires a precise definition of the target construct.

Table 3.1 Measures of validity

Validity Measure		Description	Method Of Estimation	Estimator
Content Validity		The accuracy with which test items represent the domain being measured	Critical review of literature and/or of test items by expert panel	n/a
Criterion Validity	Concurrent	Relevant for tests designed to make a diagnosis of current status	Comparison of response scores for test items from the test scale and the criterion measure	Pearson correlation for continuous measures
	Predictive	Relevant for tests designed to predict future outcomes	Effectiveness with which item scores can predict target behaviour	Phi coefficient for dichotomous measures
Construct Validity	Convergent	Examines the degree with which scale items relate to the construct being investigated	Correlation between scale items and variables representing the selected construct determines the degree with which items relate	Spearman, Pearson, Point-Biserial correlation coefficient
	Discriminant	Examines the degree with which scale items do not relate to the construct being investigated		

The procedure used to assess content validity is usually a critical review by experts as to the clarity and completeness of the scale or a critique of the literature, or both (Anastasi, 1988). This requires a systematic analysis of the domain to be measured to achieve authenticity of the scale, that is, to make certain that all concepts relevant to the construct of interest are included in the scale (Anastasi, 1988). Content validity should therefore be built into the construction of a test through the choice of appropriate test items (Anastasi, 1988).

One of the difficulties in establishing content validity is whether the domain being measured has been represented adequately, that is, whether the content of the scale includes all relevant items, as well as excluding irrelevant items (Gould, 1994). This is particularly challenging for behavioural research where the task is to construct a definitive list of item content for a specific domain, for example, personality constructs (Arnell & Sim, 1993; Bannigan & Watson, 2009). This is followed by constructing scale items that must represent all components of that domain (Anastasi, 1988; Streiner & Norman, 1995). There are however circumstances where content validity may not be suitable because there may not be a uniform set of prior experiences from which test

items can be taken (Anastasi, 1988; Bannigan & Watson, 2009). Personality tests, for example, may present a particular challenge when trying to establish what prior experiences are representative of the domain to be examined. Content validity can also vary across different populations and, therefore, when content validity is established it is relevant to the population on which it has been tested. For example, a scale that has been designed to measure anxiety and validated using response data from an adult inpatient psychiatric sample is not valid for use among adolescent school students due to, for example, dissimilarities in age.

3.2.2 Face validity

Face validity refers to whether a test appears to measure what it has been designed to measure, that is, whether a test ‘looks valid’ to respondents (Anastasi, 1988). An example of poor face validity is the use of test items that respondents view as irrelevant or silly. In this situation, these items can be re-worded or eliminated to improve face validity of the scale. Anastasi (1988) argues that face validity is not a true measure of validity because it is a superficial view of how things appear and requires no mathematical or statistical formulation. However, those who support face validity argue that if respondents view an item as irrelevant or silly, they are likely to omit this item and this will occur irrespective of the psychometric properties of an item (Streiner & Norman, 1995).

3.2.3 Criterion validity

Criterion validity is established by comparing a scale that is undergoing construction with a criterion measure that is valid, reliable and represents the construct being investigated, such as a ‘gold standard’ (Anastasi, 1988; Bannigan & Watson, 2009).

There are two types of criterion validity: concurrent and predictive, described below (Bannigan & Watson, 2009).

Concurrent validity

Concurrent validity evaluates the degree to which the scale undergoing construction correlates with the gold standard scale (Bannigan & Watson, 2009; McDowell & Newell, 1996) and can be used to measure the accuracy of a complete test or each test item (item analysis). One method of assessing concurrent validity is to have the scale under construction and the gold standard scale completed by a selected sample. The scores from both scales are then assessed by computing a Spearman or Pearson correlation coefficient. Scales that have produced correlation coefficients with minimum values within the range 0.3 to 0.5 are often considered to be valid (Cronbach & Meehl, 1955). The value of the correlation coefficients represents the degree of concurrent validity, with higher values (approximating 1.0) indicating a greater degree of correspondence between items (Anastasi, 1988; Bannigan & Watson, 2009). All scales (that is, all domains/ subscales) that correlate with the criterion measure (the gold standard) within the recommended range (as above) are retained for inclusion in the scale undergoing construction (Anastasi, 1988). It is essential that the criterion selected is a direct and independent measure of the domain of interest (American Psychiatric Association, 2002).

Predictive validity

Predictive validity is the extent to which item scores can predict the target behaviour being examined. It is investigated by comparing summary scale scores across two intervals in time and assessing the degree to which the scale, or scale items, can predict the target outcome over time (Bannigan & Watson, 2009). This type of validity is

designed to measure the effectiveness of a scale in predicting performance or some other relevant outcome.

To assess predictive validity, response scores from the scale under construction are correlated with those from the selected follow-up scale (Anastasi, 1988; Streiner & Norman, 1995). A high correlation between the two scales (for example, 0.8) indicates a strong association between the scale under construction and the scale used at follow-up (Anastasi, 1988; Cronbach & Meehl, 1955; Reber, 1988; Streiner & Norman, 1995). The type of correlation performed will depend on the level of measurement (that is, nominal, ordinal, interval or ratio) used by the scales being compared. Pearson Product Moment Correlation (r) is performed when scales use continuous (interval) measures; Spearman Rank Order Correlation (ρ) for dichotomous (ordinal) measures; Point-Biserial correlation when measurements are a combination of continuous and dichotomous (Streiner & Norman, 1995). An example of scales that include predictive validity are personnel selection tests that rely on the ability of a scale to predict performance after specialised training (Anastasi, 1988).

Construct validity

Construct validity is the degree to which an instrument measures the theoretical construct which it was been designed to measure and includes the following subtypes: convergent, divergent and discriminant (Campbell & Fiske, 1959; Cronbach & Meehl, 1955). Convergent and discriminant validity examine the degree to which the test items of an instrument relate to (convergent validity) or do not relate to (discriminant validity) the theoretical construct of interest (Campbell & Fiske, 1959). Validity is established by first defining the construct to be measured. The next step is to find a valid and reliable instrument that has been previously established as a measure of the chosen construct.

Then, to estimate the degree to which the instrument under construction is related to the selected instrument, a correlation coefficient (e.g., Spearman or Pearson) is computed from responses to all items of the whole scale from each instrument. Construct validity is established if a high correlation (for example, 0.7) is obtained between the test items and the selected scale items (Floyd & Widaman, 1995; Watson & Thompson, 2005). Importantly, test items of constructs that theoretically should *not* be related to each other, should *not* yield a high correlation, that is, they should discriminate between dissimilar constructs, thereby establishing discriminant validity. For example, questionnaire items designed to test the construct of self-esteem will correlate highly if they include items such as: “I feel good about myself”, “I feel loved and accepted by my friends”. In the same test, items seeking information about religious status or political voting history should yield low correlations, since these items are not relevant to self-esteem. Divergent validity is obtained when the items do not correlate strongly with measurements of a similar but distinct trait (Anastasi, 1988).

Construct validity can be expressed as a series of hypotheses that aim to predict the correlations between the scale undergoing construction and other instruments (Bannigan & Watson, 2009; McDowell & Newell, 1996). The correlations indicate the strength and direction of the relationship between two items and would be expected to be >0.3 (Streiner & Norman, 1995). Construct validity is examined during the construction of a new instrument or when an instrument is to be used among a group that differs from the original sample on which the scale was initially validated (Streiner & Norman, 1995). Estimates of validity depend on the population being measured, as well as the circumstances under which they are assessed (Streiner & Norman, 1995). Therefore,

when a scale is used in a new context or with a different sample, it can be necessary to re-establish its psychometric properties (Anastasi, 1988).

Construct validity cannot be proven definitively; it is an ongoing process by which new predictions are tested and constructs are refined (Bannigan & Watson, 2009; McDowell & Newell, 1996). Cronbach and Meehl (Cronbach & Meehl, 1955) state that construct validity cannot be expressed as a single coefficient; rather, construct validity can establish upper and lower limits to define the 'proportion of test variance which can be attributed to the construct' (Cronbach & Meehl, 1955, p32). The statistical procedure best suited to assess construct validity is factor analysis (Anastasi, 1988; Streiner & Norman, 1995), discussed below.

3.3 FACTOR ANALYSIS

3.3.1 The common factor model

The primary goal of factor analysis is to determine the number and nature of factors (latent variables) that explain the variation and co-variation among observed measures (indicators) (Tabachnick & Fidell, 1996). According to the common factor model (Thurstone, 1947), each indicator in a set of observed measures is a linear function of one or more common factors and one unique factor. Factor analysis partitions the variance of each indicator into two parts: common variance and unique variance. There are two main types of analyses based on the common factor model: exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). Both EFA and CFA aim to reproduce the observed relationships among a group of indicators with a smaller set of latent variables. The fundamental difference between EFA and CFA is the number and nature of prior specifications and restrictions made on the factor model, and the variance that is analysed (discussed below) (Tabachnick & Fidell, 1996).

3.3.2 Exploratory factor analysis

Explanatory Factor Analysis seeks to identify the construct that influences a particular response pattern by identifying the relationship among specified variables and response patterns (Floyd & Widaman, 1995). EFA has two primary goals: explanation and data reduction. The goal of explanation is to identify relationships among similar items and classify these items according to themes or factors (Floyd, 1995). For instance, the analysis aims to discover the underlying constructs of a scale. Data reduction is the process of selecting which items are to be included and excluded. Criteria for inclusion and exclusion of items will depend on whether the item represents the construct under investigation. For instance, all items that make up an instrument designed to assess a particular construct (e.g., anger) are factor analysed to identify separate dimensions (e.g., state anger, trait anger) that represent the theoretical constructs within that domain (Floyd & Widaman, 1995). EFA does not involve pre-specification of an underlying model or number of factors.

3.3.3 Confirmatory factor analysis

CFA seeks to test whether a particular construct influences responses in a predicted way (DeCoster, 1998), thereby confirming predictions about the nature of that construct. The central feature of CFA is that it is hypothesis-driven; all aspects of the model (such as, the number of factors, the relationships between indicators and factors) are specified prior to analysis (Tabachnick & Fidell, 1996).

The decision for selecting CFA over EFA depends on whether the assessment of the structure is based on empirical or theoretical grounds (Tabachnick & Fidell, 1996). If there are no *a priori* hypotheses (specifications) about the underlying structure to be examined (such as, the initial number of latent factors expected) then EFA is

recommended (Tabachnick & Fidell, 1996). When hypotheses regarding the underlying structure have been previously developed, then CFA is recommended because this technique pre-specifies the number of latent factors and then assesses the fit between the actual data and the hypothesised structure (Anastasi, 1998; Tabachnick & Fidell, 1996).

3.3.4 Factor analysis and construct validity

Construct validity requires that the instrument only measure those characteristics of the construct it was designed to measure. Confirmatory Factor Analysis tests for construct validity by assessing whether the instrument measures the same number of domains as the construct by analysing the interrelationships between item responses. Items predicted to belong to a specific domain are expected to correlate highly and those that measure different domains should correlate minimally or not at all. The number of factors extracted from a set of data should correspond with the number of domains hypothesised as belonging to the construct (Dawe, Loxton, Hides, Kavanagh, & Mattick, 2002).

Exploratory Factor Analysis also seeks to reveal any latent (underlying) variables that cause the manifest variables to co-vary. During factor extraction, the shared variance of each measured item is partitioned from its unique variance and error variance to reveal the underlying factor structure: that is, only the shared variance is analysed and included in the solution (Floyd & Widaman, 1995; Watson & Thompson, 2005). This process is often referred to as data explanation. The second use of EFA is for data reduction, in which a set of measured variables is to be combined in summary indices. The goal is to discover optimal weightings of the measured variables so that a large set of related variables can be reduced to a smaller set of general summary scores that have maximum variability and reliability (Watson & Thompson, 2005).

Confirmatory factor analysis is used to confirm *a priori* hypotheses relating to the expected constructs of an instrument. A factor structure is hypothesized and observed data are then tested for their fit with this structure. Confirmatory factor analysis can also be used as a procedure to examine convergent and discriminant validity (Costello & Osborne, 2005).

What distinguishes EFA from CFA is how the variability within an item is used. Confirmatory factor analysis includes all the variability within an item in the analysis, whereas exploratory factor analysis only uses the variability in an item that it has in common with the other items (Floyd & Widaman, 1995; Watson & Thompson, 2005; Widaman, 1993).

Central to factor analysis is correlation, which measures the strength and direction of the linear relationship between two items (Tabachnick & Fidell, 1996). Factor analysis produces a correlation matrix describing the correlation between all pairs of test items (known as inter-item correlations). Correlation values range from -1.00 (perfect negative correlation) to $+1.00$ (perfect positive correlation), with higher absolute values indicating a greater degree of correspondence, or relationship, between items. A value of zero indicates no linear correlation (Tabachnick & Fidell, 1996).

Each individual item is correlated with a corresponding factor. Each factor represents an underlying construct or theory that the instrument measures. If an item correlates with i.e. loads onto more than one factor, it could be representing something other than what the theory or construct suggests (Streiner & Norman, 1995). The analysis produces factor loadings for each test item, which are the regression weights used to predict the behaviour or trait being investigated (Costello & Osborne, 2005).

3.3.5 Factor extraction

Conducting a factor analysis requires selecting a method for extracting the factors.

There are a number of different extraction methods, including Principal Axis Factoring (PAF), Principal Components Analysis (PCA), maximum likelihood and parallel analysis (Watson & Thompson, 2005). Each extraction method applies a different technique and is based on different assumptions (Tabachnick & Fidell, 1996; Watson & Thompson, 2005). PAF is a confirmatory technique, developed to ‘express the variance shared among n observed variables as a function of p underlying common factors’ (Widaman, 1993 p267). PCA is an exploratory technique that aims to reduce the number of items within a data set (Kaiser, 1970, 1974). Maximum likelihood is a method for fitting a statistical model to data and providing estimates for the model’s parameters (Costello & Osborne, 2005; Fabrigar, Wegener, MacCallum, & Strahan, 1999). Fabrigar and colleagues (1999) argue that selecting a method for factor extraction should be guided by the distribution of the data. If data are normally distributed then maximum likelihood should be applied because this technique computes a ‘wide range of indexes for the goodness of fit of the model’ (Fabrigar et al., 1999, p277). If data are highly skewed, then other extraction methods, such as PAF, are recommended (Fabrigar et al., 1999). Costello and Osborne (2005) support this view and add that the information available on the advantages and disadvantages of extraction methods is scarce and confusing.

Decisions regarding the number of factors to be selected is an essential part of conducting a factor analysis (Hayton, Allen, & Scarpello, 2004). A number of procedures are available to guide the selection process. The eigenvalue of a factor (Kaiser, 1970, 1974) is the total amount of variance explained by that factor. The Kaiser

criterion proposes that only factors with an eigenvalue ≥ 1.0 are retained for analysis (Cattell, 1966). The scree test plots the eigenvalues of each factor on the Y-axis and the factors on the X-axis (Cattell, 1966; Pallant, 2001). An inspection of this plot uses the shape of the curve to determine the number of factors to be retained. The point at which the shape of the curve changes direction and becomes horizontal is known as the elbow; all factors above this point are retained as these are considered to contribute to most of the explanation of the variance in the data. The addition of each extra factor contributes little to the explanation of the variance (Pallant, 2001). Latent Roots (Guttman, 1954) uses three lower bound values based on the number of dimensions with eigenvalues at or above a specified value (Widaman, 1993). The weakest lower bound includes eigenvalues greater than unity, when unity is defined as the ‘communality estimate’ (Widaman, 1993, p180). The middle lower bound includes eigenvalues ≥ 0 when the ‘square of the highest correlation in the row is used as a communality estimate’ (Widaman, 1993, p180). The strongest lower bound includes eigenvalues ≥ 0 when the ‘squared multiple correlation of each variable with all remaining manifest variables is used as the communality estimate’ (Widaman, 1993, p180).

Parallel analysis (Horn, 1965) can be conducted in a number of ways. One method is to: (i) generate a random dataset containing the same number of observations and variables as the experimental data (as well as the same characteristics as the experimental dataset); and then (ii) analyse the random data using PCA and extract the eigenvalues. Steps (i) and (ii) are repeated multiple times (≥ 50 times) to create a set of ≥ 50 parallel eigenvalues, which are then averaged. Eigenvalues are plotted for the random and experimental data sets. Factors from the experimental data set with eigenvalues greater

than the corresponding eigenvalue from the random data set are retained (Hayton et al., 2004).

The communalities of items can also be considered when making decisions as to which items, if any, should be excluded from the factor. The communality is the percentage of variance in one variable shared by all the other variables (Watson & Thompson, 2005).

Thresholds for defining high communalities vary such that a value of ≥ 0.80 can be considered to indicate a high level of communality (Velicer & Fava, 1998). Costello and Osborne (2005) argue that, realistically, one is more likely to attain a low to moderate value of 0.40 to 0.70. Low communalities (values ≤ 0.25) indicate variables that do not have much in common with the others, are therefore considered to be unique, and can be omitted from the scale (Watson, 1998). Low values can also indicate the presence of outliers among the variables (Costello & Osborne, 2005; Tabachnick & Fidell, 1996).

Choosing the appropriate criteria for making factor retention decisions is an important step in factor analysis, but can be difficult. There is currently no consensus as to which criteria are the most appropriate to use, and different criteria can generate different results (Hayton et al., 2004). Each method has its own limitations. The Kaiser criterion has been criticised for overestimating the number of factors to be retained (Horn, 1965) and for differentiating between those factors that lie immediately above and below the criterion value (Fabrigar et al., 1999). The scree test has been described as subjective and ambiguous, particularly if there is no easily identifiable break, or multiple breaks, and the researcher must decide at which point to set the cut off (Hayton et al., 2004; Watson & Thompson, 2005). Hayton and colleagues (2004) argue that parallel analysis is superior to other methods because it relies on mathematical computations and therefore lacks subjectivity. However, Watson and Thompson (2005) point out that all

factor analysis techniques will include some level of subjective and qualitative interpretation (Watson & Thompson, 2005). A more valid approach might be to use more than one method when making a final decision as to the number of factors to extract.

3.3.6 Factor rotation

All methods of factor analysis share a common goal: to achieve as simple a structure as possible. To achieve this goal, factors are rotated in order to simplify and clarify the data. Rotation helps to produce better fitting solutions that are more replicable across studies (Watson & Thompson, 2005). Rotation does not increase the amount of variance that can be extracted from the items (Child, 1990; Costello & Osborne, 2005; Tabachnick & Fidell, 1996). Rotation aims to distribute the amount of variance in the data across the selected number of factors to maximise the loadings (the correlation) of items on factors (Kieffer, 1998).

There are two methods of rotation: orthogonal (factors are not correlated) and oblique (factors are correlated). Each method of rotation could produce different factors from the same data set (Costello & Osborne, 2005). Decisions as to what type of rotation to perform and the number of rotations to be executed are based on the aim of the research being conducted.

Orthogonal rotation

Orthogonal rotation produces factors that are not correlated with one another (Ford, MacCallum, & Tait, 1986; Tabachnick & Fidell, 1996). Orthogonal methods include Varimax, Quartimax and Equimax (Bryman & Cramer, 2004). Varimax seeks a simple solution: it searches for a rotation (that is, a linear combination) of the original factors

that will maximise the variance within a factor by increasing the high loadings and decreasing the low loadings (Costello & Osborne, 2005; Kieffer, 1998). Quartimax tends to produce a final solution in which there is a single general factor with which most of the items are strongly correlated (Hair, Anderson, & Tatham, 1987). Quartimax focuses on simplifying the rows of the factor-loading matrix by rotating the factors in a way that will maximise the squared loadings for each variable. This in turn, enables each item to load most strongly on a single factor (Hair et al., 1987). This method, therefore, would be particularly useful if a general factor is suspected (Pett, Lackey, & Sullivan, 2003). Equimax is a combination of Varimax and Quartimax solutions and aims to simplify both the factors (columns) and items (rows) simultaneously (Pett et al., 2003). Equimax is recommended to be used only when the number of factors has been clearly identified (Tabachnick & Fidell, 1996).

The goal of rotation is to simplify and clarify the data (Costello & Osborne, 2005). Supporters of the orthogonal method claim that orthogonal rotations are easier to interpret than oblique rotations, which in turn enables conceptual clarity (Ford et al., 1986; Nunnally, 1978). Critics argue that orthogonal rotations tend to oversimplify the relationship between the variables and the factors. In doing so, the relationship between factors and variables might not be represented accurately (Bryman & Cramer, 2004). Orthogonal rotations tend to produce simple solutions based on the assumption that factors are uncorrelated. Pett and colleagues (2003) argue that this assumption is not practical for behavioural research because there will always be some degree of association between factors. Although many behaviours might be conceptually different, there will be some degree of correlation within a given construct (Pett et al., 2003); behavior patterns do not function independently and therefore a degree of

correlation among factors is expected (Costello & Osborne, 1995). For example, general health could be considered to include both physical and emotional factors, that is, two separate factors that are correlated dimensions of a construct (Pett et al., 2003).

Oblique rotation

An oblique rotation is generally defined as a method of rotating data that allows factors to be correlated, providing an interpretation of the variables forming the clusters that represent the factors in the analysis (Watson & Thompson, 2005). This method of rotation is thought to increase the statistical complexity of factor analysis by generating two matrices: a structure matrix of the correlations between factors and variables; and a pattern matrix of unique relationships between each factor and each observed variable. The pattern matrix is free from any overlap among factors and describes the meaning of factors (Tabachnick & Fidell, 1996).

Oblique rotations consider the complexity of the variable being examined and it is this feature that suggests that this method of rotation provides a more accurate representation of behaviour (Ford et al., 1986). However, Tabachnick and Fidel (1996) point out that when an oblique rotation is used, factors do not necessarily correlate.

One of the possible limitations of the oblique method is that if factors are highly correlated, then interpreting each factor could prove difficult (Kieffer, 1998); that is, factors are usually easier to interpret when some items load highly onto one factor and other items do not (Tabachnick & Fidell, 1996). Promax is the method of rotation generally used for an oblique rotation. Tabachnick and Fidell (1996) point out that, in practice, differences between techniques available for extraction and rotation tend to be

minimal and differences that remain after extraction usually disappear after data are rotated.

According to Tabachnick and Fidel (1996), most researchers initially opt for PCA and varimax rotation. A series of factor analyses will then be conducted using different numbers of factors, different methods of extraction and the use of both oblique and orthogonal rotations. The solution selected for interpretation will be a number of factors with some combination of extraction and rotation techniques.

3.3.7 Simple factor structure

A simple factor structure is defined as ‘where the loadings of items on their putative factors are as high as possible...[and]...the loadings of these items on other factors are as low as possible’ (Watson & Thompson, 2005, p332). All methods of factor analysis seek to achieve as simple a structure as possible; however, the factor structure also needs to be examined for theoretical and clinical significance and appropriateness (Child, 1990).

3.3.8 Item loadings and factors

Factor loadings are the correlation coefficients between the items and factors. The squared factor loading is the percentage of variance in the indicator variable explained by the factor (Child, 1990; Watson & Thompson, 2005). The description of factors in terms of the items they comprise is made on the basis of the strength of that correlation. In all factor analyses, a decision is required as to what magnitude of loading an item on a factor leads to the allocation of an item to one factor or another (Child, 1990).

Loadings of ≥ 0.3 (Ferguson & Cox, 1993) or ≥ 0.4 (Ferguson & Cox, 1993; Watson & Thompson, 2005) are recommended as an optimum value, however, the meaning of the

factor loading values will vary according to the context within which research is conducted. For example, factor loadings >0.45 can be considered high if items are dichotomous, but a Likert scale might consider >0.60 as high (Costello & Osborne, 2005). Comfrey (Comfrey, 1973; Comfrey & Lee, 1992) suggests the value of a loading can be classified as follows: loadings ≥ 0.71 (representing 50% to 100% overlapping variance) are excellent; 0.63 (representing 40% overlapping variance) are very good; 0.55 (representing 30% overlapping variance) are good; 0.45 (representing 20% overlapping variance) is fair; and 0.32 (representing 10% overlapping variance) is poor.

When items load onto more than one factor, a simple structure has not been achieved. In this situation, removing the cross loading items from the factor analysis could assist in clarifying the solution. Decisions for removing items can also be based on the magnitude of the factor loadings, however, removal of any item will change the distribution of variance across factors (Ferguson & Cox, 1993).

3.3.9 Describing factors

Once a simple solution has been achieved, the factors need to be labeled in order to give them some meaning (Child, 1990). The labels ascribed should represent the collection of items that load on a factor (Tabachnick & Fidell, 1996). In developing a questionnaire, the construct to be measured is defined and factors arising from the analysis are assessed for how closely each factor represent this construct (Tabachnick & Fidell, 1996).

3.4 SCALE RELIABILITY

The reliability of an instrument is the extent to which a scale measures a construct consistently (Anastasi, 1988; Cronbach & Shavelson, 2004). Measures of reliability,

listed in Table 3.2, include correlations to indicate the level of correspondence between two sets of scores (Anastasi, 1988; Cronbach & Shavelson, 2004). A correlation coefficient score can range in value from 0 (no relationship) to +1.00 (perfect positive) or –1.00 (perfect negative) (Anastasi, 1988).

Table 3.2 Measures of reliability

Reliability Measure	Description	Reliability Estimator	Error Variance	Formula
Inter-scorer	Repeat the same test using a different person to score	The degree of consensus between raters for measurements taken using the same instrument	Inter-scorer differences	Pearson's product-moment correlation for continuous rating scales
				Spearman's rank correlation for ordinal scales
				Intra-class correlation coefficient
Test-retest	Repeat the same test to the same person on a second occasion	Correlation between test scores obtained by the same person on the two occasions when the test is administered	Time sampling. Random fluctuations of performance from one test occasion to another	Pearson product-moment correlation coefficient
Alternate-form	Using alternate forms of a test on different occasions administered to the same person	Correlation between scores obtained by the same person on the two forms	Content sampling (immediate administration); Content sampling and Time sampling (delayed administration)	Correlation
Split-half	Divide test into equal halves and obtained two scores from the same person	Correlation between scores obtained by same person from each test half	Content sampling	Spearman-Brown coefficient
Coefficient alpha	Formula to indicate reliability based on item responses from a specific population	Average correlation of all possible split-halves in a test	Content sampling; and heterogeneity of behaviour domain	Cronbach's alpha
Kuder-Richardson coefficient	Consistency of responses to all test items: inter-item consistency	Correlation between scores obtained on each test item (with a binary response option) by the same person on a single occasion	Content sampling; and heterogeneity of behaviour domain	Kuder-Richardson 20

The Pearson Product-Moment Correlation Coefficient represents the linear relationship between two scores (Tabachnick & Fidell, 1996). Spearman's Rank Correlation Coefficient (rho) is employed for non-parametric ranked data (Anastasi, 1988). Classical measurement theory (for example, Novick, 1966) assumes that each person

has a true score that would be obtained if there were no errors in measurement and defines reliability by the formula: obtained score = true score $\pm$ error score (DeVon et al., 2007; Novick, 1966). However, a true score is never known because no measure can fully capture the domain being investigated, particularly when that domain is human behaviour (DeVon et al., 2007). Error variance refers to fluctuations in performance from one test interval to the next due to random events, for example, changes in weather (Anastasi, 1988; Tabachnick & Fidell, 1996). Two frequently used indicators of reliability are test-retest reliability (temporal stability) and internal consistency (Tabachnick & Fidell, 1996).

Test-retest reliability

Test-retest reliability is conducted by administering the same test, to the same person, on two occasions and calculating the agreement between the two scores, known as the intraclass correlation for continuous measures (Anastasi, 1988; Tabachnick & Fidell, 1996) and kappa (Cohen, 1960) for categorical measures. A high test-retest correlation (for example, $r \geq 0.7$) indicates a reliable measure (Cronbach, 1951) as well as a high degree of stability (DeVon et al., 2007). Test re-test reliability assumes there will be no substantial change in the construct being measured during the original and re-test period and as a general rule, the re-test should be conducted within two to four weeks (DeVon et al., 2007; Waltz, Strickland, & Lenz, 2005). The length of time that has elapsed between the original test and the re-test is important: the shorter the time interval, the higher the correlation; the longer the time interval, the lower the correlation (DeVon et al., 2007). Test-retest scales are suited to cognitive and trait scales that are not likely to change significantly over time (DeVon et al., 2007).

Internal consistency

The internal consistency of a scale is the degree to which the items that make up the scale are all measuring the same underlying attribute reflected in the interrelatedness of item scores (Cortina, 1993; Green, Lissitz, & Mulaik, 1977). Internal consistency can be measured statistically by way of split-half reliability, Cronbach's alpha and the Kuder-Richardson coefficient (KR-20) (item-total correlations) (Anastasi, 1988).

Split-half reliability assesses the overall internal consistency of a test and is conducted on a single occasion. Test items are randomly divided into equal halves, for example, by separating odd-numbered items from even-numbered items. Two scores (one from each test half) are obtained for each person from a given sample. Scores are correlated to produce a coefficient of reliability that indicates the degree of internal consistency of the instrument (Anastasi, 1988). The Spearman-Brown formula has been used widely as a test for split-half reliability (Anastasi, 1988).

Cronbach's alpha (Cronbach, 1951) is an indicator of reliability that is based on item responses from the population being examined. It is based on the average correlation of all possible split-halves in a test (Anastasi, 1988). The recommended threshold value for Cronbach's alpha correlation is ≥ 0.7 (Nunnally, 1978). Waltz and colleagues (Waltz et al., 2005) argue that, because measures of reliability derived from Cronbach's formula relate specifically to the population being examined, it is necessary to re-assess reliability each time a test is administered to a population that differs from previous samples. Cronbach's formula requires only a single administration of a given test to determine reliability, making this a quick and efficient method of estimation (DeVon et al., 2007).

The Kuder-Richardson formula (KR-20)(Kuder & Richardson, 1937) is similar to Cronbach's alpha. It examines the reliability of a single form test administered on one occasion to determine the consistency of responses to test items, often referred to as inter-item consistency (Anastasi, 1988). The KR-20 formula uses the correlation coefficient as an indicator that expresses the degree and direction of the relationship between two items (Biaggio, 1980, 1987; Biaggio et al., 1981). The degree of consistency varies according to two sources of error: content sampling (relevant to alternate-form, split-half reliability); and heterogeneity of the behaviour being examined (Anastasi, 1988). The KR-20 formula applies to test items with a dichotomous response format (for example, Yes/No). Test items with a multiple response format can be examined using Cronbach's alpha (Cronbach, 1951; Cronbach & Meehl, 1955; Streiner & Norman, 1995).

Alternate-form reliability

Alternate-form reliability is examined by administering one form of a test on the first occasion and an alternate form of the test on a second occasion to the same person (Anastasi, 1988). The correlation between the scores obtained on the two forms is the reliability coefficient of the test (Anastasi, 1988). Two types of reliability are measured: temporal stability and consistency of responses to different item samples (Anastasi, 1988). Measures of reliability also include varying degrees of error. Measurement error can be standard or systemic error. The standard error of measurement refers to fluctuations in individual scores due to chance (Anastasi, 1988).

3.4.1 The validity and reliability of anger measures

Spielberger (Spielberger et al., 1983; Spielberger et al., 1985; Spielberger, Reheiser, & Sydeman, 1995a) has argued that anger scales appear to be constructed without explicit

definitions of anger and aggression. This view was supported by Novaco (Novaco, 1986) who also noted both the lack of theory on which anger measures were being developed and the absence of operational definitions of anger. Consequently, both researchers have focused on the theoretical and conceptual foundations of anger and, from that point, constructed and developed sound measures of anger. They have since been considered as leaders in the field of anger research and continue this area of investigation. Their significant contribution to the measurement of anger includes the development of the State Trait Anger Expression Index (Spielberger, 1988) and the Anger Inventory (Novaco, 1975).

3.5 DEVELOPMENT OF THE STAXI

3.5.1 STAXI scales and subscales

Spielberger (1988) views anger as a multidimensional construct, distinct from hostility and aggression, and explained within a state-trait personality theory. He developed the State Trait Anger Expression Inventory (STAXI) to assist clinicians with understanding the multiple components of anger and to assess the experience and expression of anger within a state-trait personality construct.

Spielberger began examining the constructs of state and trait anger in 1978, which led to the development of the State and Trait Anger scales. In 1981, he extended this work to include constructs of how anger is expressed, and developed the Anger Expression scale. These scales provided the basis for the construction and validation of the STAXI, which was published in 1988 (Spielberger, 1988).

The STAXI (Spielberger, 1988) is a 44-item questionnaire comprising two scales: the State-Trait Anger scale (20 items) and the Anger Expression scale (24 items), described

in Table 3.3. There is also an Anger Expression Index score, designed to provide an overall score of anger expression and control. This score is calculated by adding the

Table 3.3 Description of the STAXI (1988) scales and subscales

Scale/ Subscale		Number of Items	Description
State-Trait Anger Scale	State Anger	10	Measures the intensity of angry feelings and the extent to which a person feels like expressing anger at a particular time
	Trait Anger	10	Measures how often angry feelings are experienced over time
Anger Expression Index	Anger Expression	16	Measures how often angry feelings are experienced and either expressed or suppressed
	Anger Control	8	Measures how often the person controls the expression of angry feelings

item response scores from the scales of anger expression (16 items) and anger control (8 items). Participants use a 4-point response scale to rate: (i) the intensity of their angry feelings at the point of assessment (state anger), ranging from ‘Not at all’ (1) to ‘Very much so’ (4); and (ii) how frequently they experience (trait anger) and express anger (anger expression), ranging from ‘Almost never’ (1) to ‘Almost always’ (4).

Spielberger (1988) recognised the absence of a clinical threshold or cut-off by which clinicians could identify problematic anger. He therefore developed guidelines for each scale/subscale based on percentile scores that could indicate problematic anger described as: ‘High Anger’ (scores ≥ 75 th percentile) and ‘Low Anger’ (scores ≤ 25 th percentile). Scores falling between the 25th and 75th percentiles are considered to be within the normal range (Spielberger & Sydeman, 1994).

Spielberger (1988) developed a series of five hypotheses based on the state-trait anger theory on which the STAXI was constructed. Hypotheses I and II predicted that individuals high in trait anger, when compared with those low in trait anger would:

experience anger more frequently (elicitation hypothesis); and with more intensity (intensity hypothesis). Hypotheses III and IV predicted that individuals high in trait anger, when compared with those with low trait anger would: express anger in a dysfunctional manner (negative expression hypothesis); experience more negative consequences because of their anger expression (consequence hypothesis). Hypothesis V predicted that: scores attained by individuals with high trait anger, as compared with those of low trait anger would correlate more highly with measures of anger-related constructs, than with measures of anxiety, depression, intoxication, paranoid thinking and psychoticism (discrimination hypothesis). Deffenbacher and colleagues evaluated these hypotheses and found support for all tenets of the model (discussed further, below).

3.5.2 Reliability and validity of the STAXI

The reliability and validity of the STAXI as a measure of anger and its expression has been reported across a wide variety of populations and among a range of psychological and health domains (Eckhardt et al., 2004). These include: children (Del Barrio, Aluja, & Spielberger, 2004), adolescents (Nickel et al., 2005) and adults (Deffenbacher, Oetting, Lynch, et al., 1996); psychiatric out-patients (McMurran et al., 2000); juvenile (Cornell, 1999; Granic & Butler, 1998; Swaffer & Hollin, 2001) and adult offenders (Ford, 1991; McDougall, Venables, & Roger, 1991; Stuckless, Ford, & Vitelli, 1995; Suter, 2002); post-war veterans (Chemtob et al., 1997); and community samples including Australian community studies (Milovchevich, Howells, Drew, & Day, 2001).

Evidence to support the psychometric properties of the STAXI has been established among different cultures (Bishop & Quah, 1998; Haseeth, 1996; Kassinove, Sukhodolsky, Eckhardt, & Tsytsarev, 1997; Reyes, Meininger, Liehr, Chan, & Mueller,

2003; van der Ploeg, 1988), across different age groups, including children (Del Barrio et al., 2004), adolescents (Reyes et al., 2003; Spielberger, 1988; Swaffer & Epps, 1999) and adults (Deffenbacher, Oetting, Thwaites, et al., 1996; Forgays, Kirby Forgays, & Spielberger, 1997); among juvenile (Swaffer & Epps, 1999) and adult offenders (Dear, Watt, & Dockerill, 2003; Kroner & Reddon, 1995); psychiatric patients (Gothelf, 1997) and military personnel (Hull et al., 2003; Spielberger, 1988).

In Spielberger's original work, the internal reliability of both state and trait anger scales was confirmed by Cronbach's alpha values ranging from 0.84 to 0.93 (Spielberger, 1988). Trait anger also includes two subscales, Angry Temperament and Angry Reaction, and analyses confirmed their internal reliability, evidenced by Cronbach's alpha values of 0.85 and 0.73, respectively (Fuqua et al., 1991; Spielberger, 1988). Spielberger's view of state and trait anger as discrete constructs was also established, with analyses indicating a low correlation ($r = 0.27$) between the scales (Fuqua et al., 1991, Spielberger, 1988). Finally, the internal consistency of the anger expression and anger control scales was substantiated by Cronbach's alpha values ranging from 0.73 to 0.84 (Fuqua et al., 1991; Spielberger, 1988, 1996).

Evidence of discriminant and convergent validity of the STAXI has also been confirmed by data from several different measures and methodologies and support trait anger as a unique emotional dimension of personality. One example comes from research undertaken by Deffenbacher and colleagues (1996b) who compared the trait anger scale with symptoms of psychiatric distress, as measured by Symptom Checklist-90-Revised (SCL-90-R) (Derogatis, 1977) and its edited version, the Brief Symptom Inventory (BSI) (Derogatis & Melisaratos, 1983). These instruments are designed to assess the level of psychiatric distress experienced during the past seven days across

primary symptom constructs including interpersonal sensitivity, hostility, paranoid ideation and psychoticism (Derogatis, 1983). The validity and reliability of these instruments has been established across a range of populations (Derogatis, 1975, 1977; Derogatis & Melisaratos, 1983; Derogatis, Rickels, & Rock, 1976) including adolescent and adult psychiatric inpatients (Piersma, Boes, & Reaume, 1994), forensic patients (Boulet & Boss, 1991) and cocaine users (Ladd & Petry, 2003). Deffenbacher and colleagues (1996b) reported that trait anger correlated with almost all psychological SCL-90-R states and that the correlations were higher with state anger-hostility intensity than with the intensities of other emotional and psychological states as well as general symptom intensity. For example, trait anger correlated higher with the anger-hostility scale ($r=0.55$) on the SCL-90-R that includes hostile thoughts and action items than with general ($r=0.42$) or phobic anxiety ($r=0.29$) scales that reflect anxiety and inhibition. These findings provide evidence of both convergent and discriminant validity of the trait anger scale (Spielberger, 1988).

The clinical utility of the STAXI is evidenced by its ability to differentiate between clinical populations. Psychiatric inpatients primarily diagnosed with schizophrenic and schizoaffective disorders reported significantly higher state and trait anger scores than non-psychiatric adults. Further, within the psychiatric group, patients diagnosed with depression reported lower state and trait anger scores, which suggests that anger scores might assist with differential diagnosis (Cullari, 1994). Violent males scored significantly higher trait anger scores than non-violent males (Barbour & Eckhardt, 1998). Juvenile offenders involved in the commission of violent crime scored significantly higher trait anger scores than non-violent offenders (Granic & Butler, 1998). Angry adult offenders reported significantly higher trait anger scores than non-

angry offenders (McDougall et al., 1991). Male and females prisoners differed significantly in their experience and expression of anger. Female prisoners reported significantly higher scores for all but one of the STAXI subscales: state anger, trait anger, angry reaction, angry temperament, anger-in, anger-out and anger expression; whereas male prisoners reported significantly higher scores for the anger control scale (Suter, Byrne, Byrne, Howells, & Day, 2002). Problematic alcohol (Leibsohn, Oetting, & Deffenbacher, 1994) and cannabis users (Stoner, 2001) reported significantly higher levels of anger than non-substance users. Students reporting high trait anger (i.e. upper quartile scores) reported drinking more frequently and getting drunk more often than their low (i.e. lower quartile scores) trait anger peers, suggesting that high trait anger could be a predictor of alcohol related harm (Leibsohn et al., 1994). The expression of anger differed significantly among cannabis and non-cannabis users, with frequent users (i.e. 1-5 occasions per week) reporting higher levels of the outward expression of anger (Stoner, 2001).

The STAXI has also been employed as an indicator of treatment outcome across a range of subpopulations by comparing pre- and post-treatment STAXI scores. Deffenbacher and colleagues (Deffenbacher, Lynch, Oetting, & Kemper, 1996; Nickel et al., 2005) compared pre-and post-treatment STAXI scores (within and between groups) of adolescents attending one of two anger treatment programs with those of controls (i.e. Treatment X vs. Treatment Y vs. No Treatment). Those attending treatment reported significantly lower STAXI scores compared with controls; however, scores did not differ significantly between the two treatment groups, suggesting that treatment had effectively reduced the experience and expression of anger. In a subsequent study of adults, Deffenbacher and colleagues (Deffenbacher, Dahlen, Lynch, Morris, &

Gowensmith, 2000) employed the STAXI trait anger scale as a selection criterion for treatment, as well as an indicator of treatment outcome. High trait anger (upper quartile scores) was employed as the criterion for inclusion into an anger treatment study.

Comparison of pre- and post treatment scores indicated that, compared with controls, trait anger reduced significantly in the treatment group, and further analysis indicated a large treatment effect size. Additional studies have examined the impact of anger treatment for adults with (Deffenbacher et al., 2000; Murphy, Taft, & Eckhardt, 2007; Richards, MacLachlan, Scott, & Gregory, 2004) and without (Deffenbacher, Oetting, Huff, & Thwaites, 1995) a history of violence. Finally, Howells and colleagues (2005) employed the STAXI as a treatment outcome indicator by examining pre- and post treatment scores across all STAXI scales. One of their findings suggests that the act of completing an anger assessment might contribute to positive change, irrespective of whether treatment is provided (Howells et al., 2005).

The utility of the STAXI has also been supported by studies within the domain of health where anger has been related to hypertension, cardiovascular diseases and cancer (Deffenbacher, Oetting, Thwaites, et al., 1996; Siegman, 1994; Spielberger et al., 1988; Spielberger, Reheiser, & Sydeman, 1995b). For instance, the STAXI has been found to predict treatment outcomes for male pain patients. Burns and colleagues (Burns, Johnson, Devine, Mahoney, & Pawl, 1998) found that among male patients attending rehabilitation for chronic pain, those who expressed their anger outwardly increased their lifting capacity. This study further suggests that the outward expression of anger during treatment could impact negatively on the therapeutic relationship between the patient and clinician, which in turn has a detrimental effect on treatment outcome (Burns et al., 1998).

Spielberger commenced revisions to the STAXI (Spielberger, 1988) in 1993 after identifying the need to expand our understanding of anger across a number of key areas (revisions are also tabled in Section 3.7). Three specific revisions were undertaken: (i) subscales were developed to measure three components of state anger; (ii) the anger control scale was revised; and (iii) a new scale to measure the inward control of anger was developed. Looking specifically at the intensity of anger as an emotion, Spielberger identified three additional components that he added to the construct of state anger: feeling angry, feeling like expressing anger verbally, and feeling like expressing anger physically. He developed five additional questionnaire items to represent these additional components of state anger, which expanded this scale from 10 items to 15. Spielberger (1999) also considered that the subscale of anger control was limited by not addressing the control of suppressed anger in the original STAXI (1988). He revised the construct of anger control and retained seven of the eight items included in the Anger Control-Out (ACO) scale. He then developed an additional 8-item subscale, Anger Control-In (ACI), to measure how anger is suppressed by reducing its intensity. These two subscales then represented the expression of anger control construct.

Further to these changes, two additional objectives guided the development of the revised scale, the STAXI-2 (1999). These were: i) to investigate how various components of anger are evaluated among individuals with and without an 'abnormal personality' (Spielberger, 1988, p1); and ii) to develop a way to measure how the various components of anger might contribute to the development of illness, such as coronary heart disease and cancer (Spielberger, 1999). The remaining three STAXI scales, trait anger, anger expression-out (AXO) and anger expression-in (AXI) were not changed and were included in the STAXI-2 (1999).

Twenty-five new items were constructed and added to the STAXI (44 items), and the combined 69 items became known as the STAXI Experimental Test Form (STAXI-EFT). Among these 25 new items, one was constructed to replace a state anger item that was considered ambiguous and seven were constructed to examine two distinct components of state anger not previously assessed. These were the intensity of angry feelings and formed the subscales of Feeling Angry, Feel Like Expressing Anger Verbally and Feel Like Expressing Anger Physically. The remaining 17 new items were constructed to examine the domains of anger control-out (3 of 17 items) and the control of suppressed anger (anger control-in, 14 of 17 items).

Factor analysis of the 69 items was computed separately for males and females. These analyses produced seven- and nine-factor solutions for females and males, respectively; however, an eight-factor solution was selected as appropriate for both genders (Spielberger, 1999). Factor analysis of the 69 items using the eight-factor solution reduced the number of items from 69 to 57. Two separate criteria guided the selection of the final 57 items: item content and strength of item loadings. Item content was considered the most important criterion because it provides clarity of meaning for each item as related to the conceptual definition of the scale; and the uniqueness of each item within the total item set. The strength of each item loading was computed separately for males and females and items with values ≤ 0.3 were considered redundant and omitted from the scale (Spielberger, 1999, p22). The eight items considered redundant were from the scales of state anger (3 items), ACO (3 items), and ACI (2 items). This revised version of eight factors comprising 57 items formed the basis of the new scale, the STAXI-2, described below.

3.6 THE STAXI-2

The original STAXI was developed to assess the constructs of state and trait anger (as previously discussed); the STAXI-2 was developed to provide more concise detail of the experience and expression of anger. Spielberger (1999) was particularly interested in examining how anger might contribute to psychiatric disorder.

Table 3.4 Description of the STAXI (1988) and STAXI-2 (1999) state anger scales

Item No.	Staxi-2 Scale/subscale	Total Scale Items	Scale/subscale Score Range	Description of Scale/Subscale	Item Retained from the STAXI	New Item Developed for the STAXI-2
	State Anger	15	15-60	Measures the intensity of angry feelings and the extent to which one feels like expressing anger at a particular time		
	Feeling Angry (S-Ang/F)	5	5-20	Measures the intensity of angry feelings currently experienced		
1	Am furious				Yes	
2	Feel irritated				Yes	
3	Feel angry				Yes	
6	Am mad				Yes	
10	Feel annoyed					Yes
	Feel like expressing anger verbally (S-Ang/V)	5	5-20	Measures the intensity of current feelings related to the verbal expression of anger		
4	Feel like yelling at somebody				Yes	
9	Feel like swearing				Yes	
12	Feel like cursing out loud					Yes
13	Feel like screaming					Yes
15	Feel like shouting out loud					Yes
	Feel like expressing anger physically (S-Ang/P)	5	5-20	Measures the intensity of current feelings related to the physical expression of anger		
5	Feel like breaking things				Yes	
7	Feel like banging on the table				Yes	
8	Feel like hitting someone				Yes	
11	Feel like kicking someone					Yes
14	Feel like pounding someone					Yes

One item was eliminated from the STAXI: 'I am burned up'.

3.6.1 The STAXI-2 scales and subscales.

Differences between the STAXI (Spielberger, 1988) and STAXI-2 (1999) are reported in Tables 3.4 to 3.7. Forty-two items were retained from the STAXI. Three of the original five scales remain the same: trait anger (T-Ang), anger expression-out (AXO)

and anger expression-in (AXI). Two trait anger subscales also remain the same: angry temperament (T-Ang/T) and angry reaction (T-Ang/R).

Table 3.5 Description of the STAXI (1988) and STAXI-2 (1999) trait anger scales

Item No.	Staxi-2 Scale/subscale	Total Scale Items	Scale/ subscale Score Range	Description of Scale/Subscale	Item Retained from the STAXI	New Item Developed for the STAXI-2
	Trait Anger	10	10-40	Measures how often angry feelings are experienced over time		
	Angry Temperament (T-Ang/T)	4	4-16	Measures the disposition to experience anger without specific provocation		
16	Am quick tempered				Yes	
17	Have a fiery temper				Yes	
18	Am a hotheaded person				Yes	
21	Fly off the handle				Yes	
	Angry Reaction (T-Ang/R)	6	6-24	Measures the frequency that angry feelings are experienced in situations involving frustration and/or negative evaluations		
16	Feel like yelling at somebody				Yes	
9	Feel like swearing				Yes	
12	Feel like cursing out loud				Yes	
13	Feel like screaming				Yes	
15	Feel like shouting out loud				Yes	
	Feel like expressing anger physically (S-Ang/P)	5	5-20	Measures the intensity of current feelings related to the physical expression of anger		
19	Get angry when slowed down by others' mistakes				Yes	
20	Feel annoyed when not given recognition for doing good work				Yes	
22	Say nasty things when mad				Yes	
23	Furious when criticised in front of others				Yes	
24	Feel like hitting someone when frustrated				Yes	

The original 10-item state anger scale (SAS) was extended to include 5 new items. The revised 15-item scale (described in Table 3.5) includes three subscales designed to assess three distinctive components of the intensity of anger as an emotional state: Feeling angry (S-Ang/F); Feel like expressing anger verbally (S-Ang/V); Feel like expressing anger physically (S-Ang/P).

The anger expression scales were revised for the STAXI-2 (Spielberger, 1999) to include the direction in which anger was expressed and how anger was managed: the ACO scale retained 7 of the original 8 items; the ACI scale is entirely new.

Table 3.6 Description of STAXI (1988) and STAXI-2 (1999) anger expression scales

Item No.	Staxi-2 Scale/subscale	Total Scale Items	Scale/sub scale Score Range	Description of Scale/Subscale	Item Retained from the STAXI	New Item Developed for the STAXI-2
	Anger Expression	16	16-64	Measures the expression of anger		
Anger Expression Out (AX-O)		8	8-32	Measures how often angry feelings are expressed in verbally or physically aggressive behaviour		
27	Express anger				Yes	
31	If someone is annoying, apt to tell them how I feel				Yes	
35	Lose temper				Yes	
39	Make sarcastic remarks to others				Yes	
43	Do things like slam doors				Yes	
47	Argue with others				Yes	
51	Strike out at whatever is infuriating me				Yes	
55	Say nasty things				Yes	
Anger Expression In (AX-I)		8	8-32	Measures how often angry feelings are experienced but not expressed (suppressed)		
29	Keep things in				Yes	
33	Pout or sulk				Yes	
37	Withdraw from people				Yes	
41	Boil inside but don't show it				Yes	
45	Tend to harbour grudges that don't tell anyone about it				Yes	
49	Am secretly quite critical of others				Yes	
53	Am angrier than willing to admit				Yes	
57	Irritated a great deal more than people are aware				Yes	

The expression and control of anger are conceptualized as having four components:

- Anger expression-out (AXO) - the expression of anger (verbally and physically) towards others or objects in the environment;
- Anger expression-in (AXI) - the suppression (holding in) of anger;
- Anger control-out (ACO) - monitor and prevent expressing anger outwardly;
- Anger control-in (ACI) - calm down and reduce angry feelings.

Table 3.7 Description of STAXI (1988) and STAXI-2 (1999) anger control scales

Item No.	Staxi-2 Scale/subscale	Total Scale Items	Scale/subscale Score Range	Description of Scale/Subscale	Item Retained from the STAXI	New Item Developed for the STAXI-2
	Anger Control	16	16-64	Measures the control of anger	Yes	
Anger Control Out (AC-O)		8	8-32	Measures how often a person controls the outward expression of angry feelings		
26	Control temper				Yes	
30	Am patient with others				Yes	
34	Control urge to express angry feelings					Yes
38	Keep cool				Yes	
42	Control behaviour				Yes	
46	Can stop from losing temper				Yes	
50	Try to be tolerant and understanding				Yes	
54	Control my angry feelings				Yes	
Anger Control In (AC-I)		8	8-32	Measures how often a person attempts to control angry feelings by calming down or cooling off		
28	Take a deep breath and relax					Yes
32	Try to calm down as soon as possible					Yes
36	Try to simmer down					Yes
40	Try to soothe angry feelings					Yes
44	Endeavour to become calm again					Yes
48	Reduce anger as soon as possible					Yes
52	Do something relaxing to calm down					Yes
56	Try to relax					Yes

There are three different response formats and each has a 4-point scale:

- state anger questions are designed to assess the intensity of anger felt at the point of assessment. Participants indicate how they ‘feel right now’ by rating themselves as: ‘Not at all’ (1), ‘Somewhat’ (2), ‘Moderately so’ (3), ‘Very much so’ (4);
- trait anger questions ask participants to rate how they ‘generally feel or react’ as: ‘Almost never’ (1), ‘Sometimes’ (2), ‘Often’ (3), ‘Almost always’ (4);
- anger expression asks individuals how they ‘generally react or behave’ when feeling angry or furious as: ‘Almost never’ (1), ‘Sometimes’ (2), ‘Often’ (3), ‘Almost always’ (4).

3.6.2 Validity and reliability of the STAXI-2

The development of the STAXI-2 (1999) was based on response data from two cohorts: community sample of adults (N=1,644; 977 females, 667 males) and psychiatric inpatients (N=276; 105 females, 171 males). The mean age of the adult sample was 27 years (range 16-63 years); no mean age has been reported for the psychiatric sample.

Scale validity

Factor analysis of the 57 items of the STAXI-2 (1999) was performed separately for the two populations. The initial factor extraction was by principal axis method; rotation of the data was by Promax (Hendrickson & White, 1964) with oblique rotation. Three criteria determined the number of factors to be extracted: Guttman's latent roots >1.00 (Guttman, 1954); the Scree test (Cattell, 1966); and the Breaks Criterion (Cliff & Hamburger, 1967; Pennell, 1968). Selection of the final 57 items was based on two criteria: (i) strength of the loadings of each item; and ii) content validity and clarity of meaning for each construct 'relevant to the conceptual definition of the STAXI-2 scale or subscale for which it was intended' (Spielberger, 1999, p22). An eight-factor solution provided the best structure for the total sample (that is, both genders). Spielberger's (1999) factor loadings for the eight-factor solution are described in Appendix 2.

Scale reliability

A Cronbach alpha value of ≥ 0.7 (Cronbach, 1951) was selected as an indicator of scale reliability. The internal consistency of the STAXI-2 state and trait anger scales and subscales was considered to be consistently high as indicated by a Cronbach's alpha value of 0.84 (median = 0.88) (Spielberger, 1999, p9), with the exception of the trait anger subscale of angry reaction (T-Ang/R) with values of 0.76 (females) and 0.73

(males). Spielberger (1999) describes the anger expression, anger control and anger index scales as ‘uniform and adequate’ (p12). Overall, these findings establish the internal reliability of the STAXI-2 (Spielberger, 1999). Spielberger’s (1999) Cronbach’s Alpha Coefficients for the STAXI-2 are described in Appendix 3.

3.6.3 Studies that have examined the validity and reliability of the STAXI-2

At the time of conducting the current study (2001-2), and as far as the candidate is aware, no published research (other than Spielberger’s) had been undertaken to assess the psychometric properties of the STAXI-2. Several published studies have since examined the validity and reliability of the STAXI-2. Most of these have translated the STAXI-2 into another language and examined the validity and reliability of the adapted scale. These include: adaptations of the STAXI-2 into Swedish (Lindqvist, 2003), Spanish (Spielberger, Buela-Casal, Agudelo, Carretero-Dios, & Santolaya, 2005) and Spanish for children and adolescents (Del Barrio et al., 2004), French (Borteyrou, Bruchon-Schweitzer, & Spielberger, 2008) and Chinese (Maxwell, Sukhodolsky, Sit, & Maxwell, 2009). Other studies have utilised the STAXI-2 (Spielberger, 1999) to assess the psychometric properties of similar scales written in Spanish (Magan, Sanz, & Garcia-Vera, 2008). Two Australian studies have employed the STAXI-2 as a measure of anger (Richards et al., 2004). Overall, these studies recommend that future research examine the properties of the STAXI-2 among different populations.

3.7 STUDY AIMS

The current study aimed to assess the psychometric properties of the STAXI-2 (Spielberger, 1999) among a cohort of regular methamphetamine users. Internal

consistency and construct validity were employed as indicators of scale validity and reliability, respectively.

3.8 METHOD

3.8.1 Development of the study

The current study was part of the first large scale randomised controlled trial (RCT) of cognitive behaviour therapy (CBT) for regular methamphetamine users. Information relating to anger was collected for validation of the STAXI-2. The methodology described in this chapter is a brief outline of the validation of the STAXI-2. A detailed account of the trial is presented in Chapter 4.

3.8.2 Recruitment

Ethical approval was granted in September 2001 (HREC H-839 1299; HAREC 9912153.19). Patients were volunteers recruited to the study between October 2001 and September 2002 from the Newcastle region of NSW and from the Greater Brisbane Region of South-East Queensland. Recruitment to the study occurred via an information flyer (Appendix 4) that was placed on noticeboards in the waiting areas of health centres (for example, Methadone Clinic, Alcohol and Other Drug Treatment Centre, Psychiatric Outpatients), legal agencies (for example, Probation and Parole centres) and by media release. Further information describing recruitment is reported in Chapter 4.2.

3.8.3 Criteria for inclusion and exclusion

The inclusion criterion was regular methamphetamine use defined as a minimum Opiate Treatment Index (Darke, Ward, Hall, Heather, & Wodak, 1991) score of 0.14 for methamphetamine use (i.e. at least weekly use). Exclusion criteria were suicidality, acute psychosis, acquired cognitive impairment and current enrolment in counselling for

methamphetamine use. Participants currently enrolled in pharmacotherapy (i.e., methadone maintenance treatment or Buprenorphine) were not excluded from the study, an approach adopted in similar studies (Baker, Boggs, & Lewin, 2001a, 2001b; Darke et al., 1991; Gossop, Marsden, & Stewart, 2000; National Drug and Alcohol Research Center, 2001).

3.8.4 Procedure

Individuals wishing to participate in the study contacted the research team, at which point the aims were described and an interview time arranged. The interview commenced with screening for suitability to the study (Appendix 5). If the inclusion criteria were met, written consent was sought (and parental consent if aged less than 18 years); Appendix 6. If entry criteria were not met, a list of treatment agencies was offered. Interviews were completed in approximately one hour and twenty dollars was provided upon completion of each assessment as reimbursement for any costs (such as travel) arising from participation. All participants were provided with an information booklet (National Drug and Alcohol Research Centre, 1998) describing the harms associated with methamphetamine use.

3.8.5 Interview schedule

The initial interview schedule collected data on demographic characteristics, drug use and psychiatric history, drug related harm, psychiatric distress, criminal behaviour, anger and aggression. Participants' baseline responses to the STAXI-2 provided the data to examine the psychometric properties of this scale, the focus of the current chapter. Interviews were conducted by clinicians who have prior experience in administering all instruments included in the interview schedule (described further in 4.2.5).

3.9 STATISTICAL METHODS

The psychometric properties of the STAXI-2 were evaluated by examining the validity and reliability of the scale. All analyses were conducted using baseline responses to the 57-items of the STAXI-2 (1999). Data were analysed using SPSS version 19. The rationale for selecting these analyses is described below.

3.9.1 Description of the sample

A brief outline of the sample is presented in this chapter, with a complete description provided in Chapter 4.

3.9.2 Exploratory data analysis

Factor analysis does not always require that data be normally distributed. If the purpose of factor analysis is to provide a summary of relationships among variables within a large data set, then normality is not essential. When statistical inferences are used to establish the number of factors within a data set assumptions of normality are required (Tabachnick & Fidell, 1996), and it is for this reason that assessments of normality were conducted for the current study prior to conducting the factor analysis.

Multivariate normality assumes that the selected variables (or items) and their linear combinations are normally distributed (Tabachnick & Fidell, 1996). Tests of normality aim to assess the skewness and kurtosis of a distribution and can be determined mathematically or by visual inspection of graphs (Tabachnick & Fidell, 1996). An important aspect of a variable is the shape of its distribution because this indicates the frequency for the range of values of the variable. Of interest is how well the distribution approximates the normal distribution and therefore whether measures of central tendency and variance are valid. Skewness is the deviation of the distribution from

symmetry while kurtosis is the ‘peakedness’ of the distribution (Tabachnick & Fidell, 1996). A normal distribution yields skewness and kurtosis values equal to zero (Tabachnick & Fidell, 1996). The degree with which scores are skewed (either positively or negatively) is indicated by how much their obtained value varies from zero. Tests of significance for both skewness and kurtosis compare the obtained value against a null hypothesis of zero, and alpha levels are set at 0.01 or 0.001 (Tabachnick & Fidell, 1996). Tests of skewness and kurtosis were conducted, however, we report assessments of normality as the inspection of histograms of baseline responses to each of the 57 items of the STAXI-2.

Data was also examined for variability in response patterns. Frequency distributions indicate the percentage of variance in each item by assessing the frequency of scores to each possible response option for every item of an instrument. Items that exceed the 90% threshold can be considered redundant as they provide minimal discriminability among participants.

Measures of sampling adequacy were then conducted to establish the factorability of the data, using the Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Bartlett’s Tests of Sphericity. The KMO assesses the suitability of data for factor analysis (Kaiser, 1970, 1974). This analysis provides an index score (ranging from zero to one) of the proportion of variance among the variables and it is recommended that this value exceeds ≥ 0.6 for factor analyses (Tabachnick & Fidell, 1996). Scores ≤ 0.6 indicate that the data are not suitable for factor analysis because the analysis will not produce factors that are distinct or reliable (Tabachnick & Fidell, 1996). Bartlett’s Test of Sphericity (Bartlett, 1954) tests the hypothesis that the variables are not correlated, that is, the population correlation matrix is an identity matrix where each variable

correlates perfectly with itself but is not correlated with any other variables (Tabachnick & Fidell, 1996). Bartlett's tests of Sphericity should be significant ($p < 0.05$) (Pallant, 2001), but this test is considered to be highly sensitive when applied to large data sets and is therefore recommended for smaller samples of five or less cases per variable (Tabachnick & Fidell, 1996).

3.9.3 Construct validity

Construct validity is examined when the aim of the research is to investigate the underlying construct of a scale and/or when the research sample differs to the population on which the scale was originally validated (Tabachnick & Fidell, 1996). Construct validity is important here because the STAXI-2 had not previously been tested among methamphetamine users (Spielberger, 1999). Other types of validity considered less suitable were: content validity used to assess the representation of the domain to be measured; and criterion validity relevant to test prediction (Anastasi, 1988).

One of the most common methods for assessing construct validity is factor analysis (Anastasi, 1988; Cronbach & Meehl, 1955; Tabachnick & Fidell, 1996). The following steps were taken to conduct this analysis. First, minimal variation in the distribution of scores is a necessary condition for factor analysis, as is approximate normality of the distributions. Therefore, frequency distributions were examined and tests of normality were conducted to assess the suitability of the data. Exploratory rather than confirmatory factor analysis was selected as a method of factor analysis. The process by which factors are extracted was selected as PAF, rather than PCA. The method for factor rotation was selected as oblique rather than orthogonal. Reasons for selecting these particular methods are discussed below.

3.9.4 Factor analysis

Exploratory factor analysis, PAF, was selected to analyse the data because this technique seeks to identify the construct that is influencing response patterns by identifying the structure among variables and response patterns. In contrast, CFA seeks to test whether a particular construct influences responses in a predicted way (Tabachnick & Fidell, 1996). The rationale for selecting EFA, rather than CFA is because we initially seek to examine what is the best factor structure in this population without specifying any structure, or preconceived model. Given that the STAXI-2 has not previously been validated in this population, we seek to understand the degree with which (if at all) the original factor structure is relevant to our population.

Initial solution

The initial solution is the first output generated from the factor analysis. Data are analysed without specifying the number of factors to be extracted from the analysis and therefore without any specific structure to be imposed on the data (Tabachnick & Fidell, 1996). The amount of total variance explained is indicated by eigenvalues ≥ 1.0 (Kaiser, 1970, 1974); and Catell's scree test (Cattell, 1966).

Factor loadings

Factor loadings provide a measure of how much a given variable contributes to a particular factor (Tabachnick & Fidell, 1996). The minimum value for a factor loading to be included in an analysis can vary between ≥ 0.30 and ≥ 0.40 . A factor loading of 0.32 represents approximately 10% of shared variance with the other items in that factor (Tabachnick & Fidell, 1996). Costello & Osborne (2005) suggest that an item is considered to be cross-loading when it loads at ≥ 0.30 on two or more factors (Costello

& Osborne, 2005). The current study adopted a minimum value for factor loadings of ≥ 0.30 , which is in keeping with Spielberger's study (1999) and other prior research (Tabachnick & Fidell, 1996).

Extraction procedures

PAF was selected as the extraction technique for factor analysis. PAF extraction only includes the variance shared between observed variables and excludes error and unique variance (Tabachnick & Fidell, 1996). This contrasts PCA that distributes all the variance to the components (factors) such that each component includes error and unique variance for each observation (Tabachnick & Fidell, 1996). Importantly, PAF is recommended as a method for extraction when data are highly skewed (Costello & Osborne, 2005; Fabrigar et al., 1999).

The shared variance extracted by PAF is estimated by communalities (item communalities) ranging in value from 0 to 1. The sum of the communalities represents the variance distributed among factors; this value is less than the total variance within the data set (observed variables) (Tabachnick & Fidell, 1996). Thresholds for defining high communalities vary (Velicer & Fava, 1998) and selection of a criteria for making factor retention decisions is equally difficult.

Factor rotation

Factor rotation aids the ability to interpret factors without changing the mathematical structure of the results. Decisions regarding which method of rotation to use depend on the aims of the research (Tabachnick & Fidell, 1996). Orthogonal rotation produces factors that are not correlated with one another (Ford et al., 1986; Tabachnick & Fidell, 1996) and contrasts the oblique rotation allowing factors to correlate. This study

conducted a Promax method (Hendrickson & White, 1964) of oblique rotation, a decision based on the assumption that the underlying factors are correlated (Tabachnick & Fidell, 1996). Data may then be interpreted based on the variables forming clusters that represent the factors in the analysis (Watson & Thompson, 2005). For the current study, a simple structure is achieved if all STAXI-2 items relevant to a particular scale load onto a single factor.

Scale reliability

For a scale to be considered reliable, all scale items must measure the same thing, that is, the construct on which the scale was designed to measure. A reliable scale will yield a high level of internal consistency and items will correlate with each other. The primary measure for internal consistency is Cronbach's alpha, which produces a coefficient value on a scale of 0 to 1 to describe the accuracy of the scale (Cronbach, 1951; Cronbach & Meehl, 1955).

Two separate analyses were conducted to assess the reliability of the STAXI-2. The first analysis examined each of the factors produced by the PAF. The second examined the data using Spielberger's (1999) scale structure of state anger, trait anger, anger expression-out and -in, anger control-out and -in. Three measures of scale reliability were employed: Cronbach's Alpha value of ≥ 0.7 (Bland & Altman, 2007; Cronbach, 1951; Cronbach & Meehl, 1955); a Corrected Item-Total Correlation value ≥ 0.30 ; and Cronbach's Alpha If Item Deleted. A Corrected Item-Total Correlation measures the correlation of an item with the total scores on all other items. A low item correlation < 0.3 indicates that the item is measuring something other than what the scale has been designed to measure. Typically, items with low values are considered for removal from the scale, particularly if the scale's overall alpha value is low (< 0.7) (Tabachnick &

Fidell, 1996). The third measure of reliability is the Alpha If Item Deleted. Each item within a given scale has a corresponding value indicating the impact to the scale if this item is removed. If the alpha value for an item is higher than the final alpha value obtained, this item could be considered for removal in order to improve the overall reliability of the scale (Tabachnick & Fidell, 1996).

Sample size

For factor analysis, correlation coefficients can be less reliable when estimated from small samples (Tabachnick and Fidell, 1996); however, there is no absolute agreement on adequacy of sample size (Watson & Thompson, 2005) and there are few sample size guidelines (Osborne & Costello, 2004). There are two general approaches for estimating an adequate sample size: a minimum total sample size; or a ratio of subjects to variables (Osborne & Costello, 2004). Comfrey (1973) recommends the minimum number of subjects can be determined using the following scale: 50 very poor; 100 poor; 200 fair; 300 good; 500 very good; 1000+ excellent (Comfrey & Lee, 1992, p217). However, Tinsley and Tinsley (1987) argue this is a simplistic view because it does not account for the kinds of variables being considered (Tinsley & Tinsley, 1987). Whilst Guadagnoli and Velicer (1988) support Comfrey's (1973) view, their review of studies concluded that the range in absolute minimum sample sizes varied considerably, from 50 (Barrett & Kline, 1981) to 400 (Aleamoni, 1976). Gorsuch recommends a minimum ratio of 5 subjects to every item (Gorsuch, 1988). Streiner recommends a combination of these approaches: a ratio of 5 subjects per variable as well as a minimum of 100 subjects (Streiner, 1994). Nunnally argues that exploratory factor analysis should have a minimum ratio of 10:1 (Nunnally, 1978); however, Osborne and Costello point out that this ratio has not been supported by established research (Osborne & Costello, 2004).

They further add that the variation in suggested ratios is considerable, from 10:1 (Watson, 1998) to 5:1 (Kline, 1994), and conclude that there is no one ratio suitable for all research. Tinsley & Tinsley explain that as the sample size increases ‘random errors of measurement tend to cancel each other out, the item and test parameters begin to stabilise’ (Tinsley & Tinsley, 1987, p415); increasing sample size becomes less of a priority, particularly for samples ≥ 300 where the ratio of items to subjects becomes less important. Kass and Tinsley recommend a ratio of 5-10 subjects per item up to 300 subjects (Kass & Tinsley, 1979). Arrindell and van der Ende (1985) examined the stability of factors as a function of the subjects to variables ratio, relevant to exploratory and confirmatory factor analysis. Based on their findings, they argue that neither an absolute number of observations nor an observations-to-variables ratio influenced factor stability. They report that a ratio of 1.3 respondents per item produced a stable factor solution (based on a 76 item questionnaire). Additional research, where a sample of 78 subjects responding to a 20-item questionnaire produced a ratio of 3.9 subjects per item, equally produced a satisfactory level of factor stability. These results were evident for both principal components and principal factor analyses and suggest a degree of flexibility in the number of subjects required for a factor analysis. They argue that what is crucial to factor analysis is the precision with which an underlying factor can be defined, a process that relies on the estimation of correlation coefficients as well as the ‘degree of factor over determination’, that is, the number of variables in the data that are related to each factor. They recommend that when conducting a factor analysis, emphasis should be on both the number of factors expected to emerge (based on the theory under investigation) as well as the inclusion of more than enough variables to measure each factor. This in turn, increases the accuracy of the factor analysis, thereby lessening the importance of recruiting a large sample size (Arrindell & van der Ende,

1985). The current study recruited 153 subjects and examined the 57 items from the STAXI-2 (Spielberger, 1999) questionnaire. The ratio of subject to questionnaire items to was 3:1. Sample size was dictated by the methodology and design of the clinical trial (Baker, Lee, Claire et al., 2005), which formed the basis of the current study.

3.10 RESULTS

3.10.1 The sample

Recruitment rates and source of referral are described in Table 3.8. A complete description of the sample is provided in Chapter 4. At baseline, 153 regular

Table 3.8 Patients' referral source and recruitment rates by location

REFERRAL SOURCE	LOCATION				Total	
	Newcastle*		Brisbane#			
	n	%	N	%	n	%
Health Services						
Alcohol & Other Drug Treatment	0	0	64	42	64	42
Methadone Clinic	6	4	7	5	13	8
Psychologist/ Specialist/ Allied Health	1	0.7	4	3	5	3
General Practitioner	21	14	0	0	21	14
Judicial Services						
Community Justice/ Probation & Parole	8	5	0	0	8	5
Media Advertising						
Print Media	16	10	2	1	18	12
Self Referred						
Self referred	22	14	2	1	24	16
Total	74	48^	79	52^	153	100^

*Newcastle includes regions surrounding Newcastle, Lower Hunter, Hunter Valley and Lake Macquarie;
#Brisbane includes regions surrounding Brisbane and Sunshine Coast; ^percentage values are rounded

methamphetamine users completed the STAXI-2. The average age of participants was 30 years (S.D. 8, range 16 to 53 years) and almost two-thirds were male (n=94, 61%).

3.10.2 Assessment of normality

Inspection of the frequency distributions and histograms for responses to each of the 57 STAXI-2 items indicated that most items were skewed. However, only four items were

highly skewed (>90% of responses in one category) and therefore limited in their ability to discriminate among low scores. These items were from the state anger/ physical subscale: items 7: 'I feel like banging on the table'; 8: 'I feel like hitting somebody'; and 14: 'I feel like pounding somebody' were highly skewed toward an 'Almost never' response by 92% (141 of 153) of participants. Responses to item 11, 'I feel like kicking someone' were skewed towards 'Almost Never' from 94% (144 of 153) of participants. Statistical analyses for the assessment of normality are presented in Appendices 7-8.

3.10.3 Sampling adequacy

Tests for sampling adequacy were conducted using the KMO index and Bartlett's Test of Sphericity (Bartlett, 1954) (Appendix 9). The KMO index produced a value of 0.87 from a possible range of 0 to 1, which exceeds the recommended threshold of 0.6 for sampling adequacy, indicating the proportion of variance among the variables is sufficient to produce factors that are distinct or reliable (Tabachnick & Fidell, 1996). Bartlett's Test of Sphericity reached statistical significance (approx $\chi^2 = 7457.98$, $df=1596$, $p<0.001$), indicating that the correlation matrix was significantly different from the identity matrix (that is, the variables are not correlated). Together these tests indicate that the response data to the STAXI-2 satisfy the conditions for sampling adequacy.

3.10.4 Construct validity

Principal Axis Factoring, an Exploratory Factor Analysis technique was selected to assess the construct validity of the STAXI-2. To assist with interpreting the structure of the data, factors were rotated using an oblique rotation method (Costello and Osborne, 2005; Tabachnick and Fidell, 1996). All analyses are presented as Appendices 10-13.

The initial solution produced nine factors with eigenvalues ≥ 1.0 , accounting for 71% of the total variance, as reported in Table 3.9. Bartlett's Test of Sphericity indicates an

Table 3.9 Principal Axis Factoring initial solution of STAXI-2 item scores

Factor	Initial Eigenvalue		
	Total	% of Variance	Cumulative %
1	18.0	31.6	31.6
2	7.9	14.0	45.5
3	3.4	6.0	51.5
4	3.3	5.7	57.3
5	2.4	4.3	61.6
6	1.7	2.9	64.5
7	1.3	2.2	66.8
8	1.2	2.0	68.8
9	1.1	1.9	70.7

acceptable level of sampling adequacy. Results from the scree plot suggest an initial break between factors 3 and 4, and again between factors 6 and 7. Item communalities representing the percent of variance in each observed variable (shared with other observed variables) ranged from 0.59 to 0.93. These values fall within an acceptable range (Costello & Osborne, 2005; Tabachnick & Fidell, 1996), suggesting that the amount of data available for analysis is adequate and that the number of factors extracted is correct (Tabachnick & Fidell, 1996). High communalities (≥ 0.5) indicate that the factors extracted explain most of the variance in the variables being analysed. Low communalities (≤ 0.5) indicate there is a considerable amount of variance that remains unexplained and more factors might need to be extracted (Costello and Osborne, 2005; Tabachnick and Fidell, 1996). Item loadings from the initial solution are described in Table 3.10.

Inspection of the Factor Matrix revealed that many items were redundant as indicated by loadings below threshold (< 0.30) (Tabachnick & Fidell, 1996). Factors 7, 8 and 9

were considered redundant as indicated by 99%, 100% and 100%, respectively, of item loadings below threshold. All items cross-loaded across the nine factors.

Table 3.10 Principal Axis Factoring initial solution of nine factors item loadings

Factor	Item Loading Range		Number & Percent of Items Loading ≤ 0.30	
	Minimum	Maximum	n=57	%
1	0.020	0.81	11	19.3
2	0.006	0.78	35	61.4
3	0.004	0.55	45	78.9
4	0.010	0.42	48	84.2
5	0.001	0.52	49	86.0
6	0.007	0.33	54	95.0
7	0.001	0.46	56	99.0
8	0.005	0.29	57	100.0
9	0.001	0.27	57	100.0

The next step for this study is to examine the PAF initial solution for the total variance explained before and after rotation. When factors are correlated, the sums of squared loadings are unable to be added together to calculate a total variance explained. Instead, the analysis reports the total amount of variance explained before and after rotation for each individual factor. For this study, changes to the distribution of total variance subsequent to rotation were evident for Factors 2, 3 and 6, as reported in Table 3.11.

Table 3.11 Total variance explained from PAF initial solution before and after rotation

Factor	Extraction Sums of Squared Loadings	Rotation Sums of Squared Loadings
	Total	Total
1	17.7	15.0
2	7.6	13.6
3	3.1	9.4
4	3.0	5.7
5	2.2	4.7
6	1.3	8.7
7	0.9	2.1
8	0.8	2.7
9	0.7	3.3

All analyses are presented as Appendices 14-18. An oblique rotation produces three correlation matrices: factor correlation matrix, structure matrix and pattern matrix. The factor correlation matrix describes the correlations among the factors (Costello and Osborne, 2005). Correlations from this study ranged in value from 0.005 to –0.65 and are reported in Table 3.12. The highest correlation was between factors one and two.

Table 3.12 Initial solution factor correlation matrix extraction of nine factors with oblique rotation

Factor Correlation Matrix									
Factor	1	2	3	4	5	6	7	8	9
1	1.000	-.659	.269	.068	.005	.511	-.118	.226	.098
2	-.659	1.000	-.226	-.078	-.045	-.452	.158	-.115	-.117
3	.269	-.226	1.000	.451	.365	.366	.204	.259	.524
4	.068	-.078	.451	1.000	.299	.155	.185	.271	.350
5	.005	-.045	.365	.299	1.000	.411	.420	-.043	.227
6	.511	-.452	.366	.155	.411	1.000	.051	.148	.181
7	-.118	.158	.204	.185	.420	.051	1.000	-.087	.219
8	.226	-.115	.259	.271	-.043	.148	-.087	1.000	.175
9	.098	-.117	.524	.350	.227	.181	.219	.175	1.000

Extraction Method: Principal Axis Factoring.

Rotation Method: Promax with Kaiser Normalization.

The structure matrix produced correlations for each of the nine factors. The range in value of these correlations is reported in Table 3.13. In summary, the nine-factor solution might benefit by being reduced to a six-factor solution for the following reasons. The scree plot indicates an initial break between factors 3 and 4, and again between factors 6 and 7. The reason for selecting the break in the scree test at factors three and four was simply because it is where a line drawn through the points first changes direction. However, in this study the scree contained more than one break and therefore a judgment was made to select the point at which the first natural break occurred. The scree test can be effective when strong factors are produced, however

when there is more than one break, there is a degree of subjectivity because a judgment is required and in this study a second break appeared between factors four and five. The factor matrix revealed that three of the nine factors were redundant.

Table 3.13 Structure matrix correlations for each factor after oblique rotation

Factor	Structure Matrix Correlation	
	Minimum Value	Maximum Value
1	0.01	0.89
2	0.07	0.84
3	0.02	0.86
4	0.01	0.90
5	0.01	0.77
6	0.02	0.78
7	0.01	0.83
8	0.02	0.76
9	0.01	0.63

After rotation, the total amount of variance explained for each item was minimal for three of the nine factors. The total variance explained from the PAF initial solution before and after rotation indicated that at least three of the nine factors were contributing a minimal amount of total variance explained. These findings suggest that a minimum six-factor structure could provide an optimal solution for the current data. Further to this, a six-factor model is also in keeping with the structure of the STAXI-2, providing additional support for a decision to proceed with a six-factor analysis.

3.10.5 Principal Axis Factoring of six selected factors with and without oblique rotation

A six-factor solution (without rotation) was extracted by PAF analysis. Statistical outputs are presented as Appendices (Appendix 19-23). Inspection of the six-factor model revealed eigenvalues ≥ 1.0 for each factor, accounting for 61% of the total variance. A minimal difference of 4% of variance explained would be forfeited by

adopting a six-factor model; the nine factor model produced eigenvalues ≥ 1.0 , accounting for 65% of the total variance. Further support for the six-factor model was provided by the scree test, which indicated an initial break between factors 3 and 4, and another break between factors 6 and 7. Item communalities representing the percent of variance in each observed variable (shared with other observed variables) ranged from 0.61 to 0.93 and were considered within an acceptable range (Costello & Osborne, 2005). Following the extraction of six factors, an oblique rotation (Promax) was performed and the variance explained is summarised in Table 3.14 and the analyses are presented as Appendices (Appendix 24-26).

Table 3.14 Total variance explained by PAF extraction of six factors with oblique rotation

Factor	Rotation Sums of Squared Loadings
	Total
1	14.9
2	13.7
3	9.4
4	6.0
5	7.6
6	4.6
	56.2

In this study, the sums of squared loadings produced by oblique rotation are reported as the total variance explained by each individual factor extracted. The first two factors account for most of the variance explained.

The oblique rotation produced three correlation matrices. The factor correlation matrix produced correlations among the factors (Costello & Osborne, 2005) that ranged in value from 0.045 to -0.650 and are described in Table 3.15. The highest correlations were between factors 2 and 4, and factors 1 and 2 (negatively correlated). Next, the structure matrix produced correlations for each factor that ranged as follows: Factor 1

(0.30 to 0.89); Factor 2 (0.33 to 0.84); Factor 3 (0.31 to 0.88); Factor 4 (0.34 to 0.90); Factor 5 (0.30 to 0.60); and Factor 6 (0.31 to 0.74). Finally, the pattern matrix produced loadings between factors and variables where each loading is a unique relationship.

Table 3.15 Factor correlation matrix extraction of six factors with oblique rotation

Factor	1	2	3	4	5	6
1	1.000	-0.650	0.296	0.096	0.448	0.058
2	-0.650	1.000	-0.236	-0.117	-0.469	-0.045
3	0.296	-0.236	1.000	0.468	0.287	0.331
4	0.096	-0.117	0.468	1.000	0.149	0.302
5	0.448	-0.469	0.287	0.149	1.000	0.179
6	0.058	-0.045	0.331	0.302	0.179	1.000

Extraction by Principal Axis Factoring; Rotation by promax with Kaiser normalisation

Only variables with factor loadings ≥ 0.30 are interpreted (Tabachnick and Fidell, 1996).

The greater the loading, the more the variable is a pure measure of the factor. Based on Comfrey's (1973) estimates, an inspection of the pattern matrix indicated that all loadings exceeded the minimal threshold of ≥ 0.30 and is further discussed below. Item loadings for each extracted factor are reported in Table 3.16.

Factor 1

Factor 1 comprised 20 items, representing the following scales: trait anger (all 10 items); anger expression-out (7 of 8 items); anger expression-in (2 of 8 items); and anger control-out (1 of 8 items). The strength of the item loadings ranged from 0.35 to 0.91, with half of these loadings (10 of 20 items) weighted ≥ 0.70 , representing at least 50% overlapping variance. These 10 items were from the scales of trait anger (6 items) and anger expression-in (1 item) and -out (3 items). The complexity of variables is assessed by examining loadings for a variable across factors (Tabachnick and Fidell, 1996). Among the 20 items included in Factor 1, 10 items cross-loaded onto

Table 3.16 Factor loadings for the PAF six factor extraction with oblique rotation

STAXI-2 Scales /Subscales		Factor Loadings					
		F1	F2	F3	F4	F5	F6
State: Feeling Angry							
1	Am furious			.72			
2	Feel irritated			.74			
3	Feel angry			.89			
6	Am mad			.87			
10	Feel annoyed			.77			
State: Feel like expressing anger verbally							
4	Feel like yelling			.91			
9	Feel like swearing			.52			
12	Feel like cursing			.50			
13	Feel like screaming			.48			
15	Feel like shouting			.53			
State: Feel like expressing anger physically							
5	Breaking things			.65			
7	Banging on the table			.54			
8	Hitting someone				.90		
11	Kicking somebody				.88		
14	Pounding somebody				.84		
Trait: Angry Temperament							
16	Am quick tempered	.88					
17	Have a fiery temper	.91					
18	Am a hot-headed person	.87					
21	Fly off the handle	.86					
Trait: Angry Reaction							
19	Slowed by mistakes	.74					
20	Good work not recognised	.51					
22	Say nasty things	.55					
23	Criticised in public	.49					
24	Hitting when frustrated	.70					
25	Good work seen as poor	.48					
Anger Control-In							
28	Take deep breath, relax		.56				
32	Try to calm down asap		.84				
36	Try to simmer down		.75				
40	Try soothe angry feelings		.84				
44	Try to become calm again		.91				
48	Reduce anger asap		.89				
52	Do something relaxing		.79				
56	Try to relax		.89				
Anger Control-Out							
26	Control temper		.40				
30	Am patient with others		.56				
34	Control anger urges		.49				
38	Keep cool		.56				
42	Control behaviour		.50				
46	Can stop from losing		.50				
50	Tolerance, understanding		.79				
54	Control my angry feelings		.50				
Anger Expression-In							

29	Keep things in					.45
33	Pout or sulk			.70		
37	Withdraw from people			.46		
41	Boil inside but not show it					.73
45	Harbour grudges			.55		
49	Secretly critical of others			.51		
53	Angrier than will admit					.58
57	Others unaware irritated					.52
Anger Expression-Out						
27	Express anger	.81				
31	Tell someone if annoying	.76				
35	Lose temper	.77				
39	Make sarcastic remarks				.60	
43	Slam doors	.48				
47	Argue with others				.63	
51	Strike at what infuriates	.90				
55	Say nasty things				.50	
Cronbach's alpha		0.94	0.95	0.93	0.93	0.73
Percent Variance Explained		15%	14%	9%	6%	8%
Footnote: The order of factor numbering is related to the strength of the factors as indicated by the proportion of variance explained.						

another factor. These cross-loadings ranged in value from 0.3 to 0.44 and were from the scales of trait anger (6 items), anger expression-in (1 item) and –out (2 items), and anger control-out (1 item). Factor 1 accounted for 15% of the total variance.

Factor 2

Factor 2 comprised 16 items exclusively related to the construct of anger control, providing evidence of a simple structure (Thurstone, 1931). The strength of the loadings ranged from 0.3 to 0.9 and, although three items cross-loaded onto factor 1 (reported, above) and factor 6 (reported below), the strength of these item correlations was low (0.3 - 0.4). Factor 2 accounted for 14% of the total variance explained.

Factor 3

Factor 3 comprised 12 items, all of which were from the 15-item state anger scale. The remaining (3) state anger items loaded onto Factor 4 (described below). All items

loading onto Factor 3 were above threshold (≥ 0.30) and ranged from 0.48 to 0.97.

Factor 3 accounted for 9% of the total variance explained.

Factor 4

Factor 4 comprised 8 items with loadings ranging from 0.3 to 0.9. The most salient loadings onto this factor were the three items from the state anger (Physical) subscale: items 11, 8 and 14, with loading values of 0.90, 0.89 and 0.83, respectively. The five remaining items (value range of 0.3 to 0.4) cross-loaded onto Factor 3. Factor 4 accounted for 6% of the total variance explained.

Factor 5

Factor 5 comprised eight items almost exclusively from the subscales of anger expression (comprising 16 items), with the exception of a single item from trait anger (previously reported as cross-loading with Factor 1). The strength of the anger expression loadings ranged from 0.3 to 0.7, with one item cross-loading onto Factor 6. Factor 5 accounted for 8% of the total variance explained.

Factor 6

Factor 6 comprised 11 items from the scales of trait anger (5 of 10 items), anger control-out (2 of 8 items) and anger expression-in (4 of 8 items). Most of these items have been previously reported (above) as cross loading onto factors 1 (6 items), 2 (2 items) and 5 (1 item); two items from the anger expression-in subscale loaded exclusively onto factor 6. The strength of the 11 items ranged from 0.3 to 0.7. Factor 6 accounted for 5% of the total variance explained.

Summary of the factors

The structure of each factor in relation to each of the STAXI-2 scales and sub-scales is summarised as follows. The scale of state anger includes 15 items. Twelve items loaded onto Factor 3 and the remaining three items from the state anger/ Physical subscale, loaded onto Factor 4. The trait anger scale contains 10 items, all of which loaded onto Factor 1. Six items from the Trait/Temperament subscale cross-loaded onto a second factor: Factor 5. Factor 1 also contained items from the scales of anger control-out (1 item) and anger expression-in (3 items) and –out (6 items).

The anger expression scale contains 16 items divided equally into two subscales. The eight anger expression-out items loaded onto two factors: Factor 1 (6 items) and Factor 5 (2 items). One anger expression-out item cross-loaded onto a second factor: Factor 5. Factor 1 also contains items from other scales (described above). Factor 5 contains items from the scales of anger expression-in (5 items) and trait anger (1 item). All eight anger expression-in items loaded onto two factors. Three items loaded onto Factor 1, with one of these items cross-loading onto Factor 6. Five items loaded onto Factor 5, with two of these items cross-loading onto Factors 1 and 6. Factor 1 also contained items from the scales of anger expression-out and trait anger. The anger control scale contains 16 items, which are also divided equally between two subscales. All of the eight items comprising the anger control-out subscale loaded onto Factor 2. Three of these items cross-loaded onto Factors 1 (1 item) and 6 (2 items). Factor 2 also contains items from the sub-scale anger control-in. All items from the subscale of anger control-in loaded onto Factor 2. Among the six factors extracted, factors 5 and 6 have the most cross-loadings and therefore could be considered as having the least simple structure, as discussed in 3.11.2.

3.10.6 Reliability analysis

Two separate approaches were employed to examine the reliability of the STAXI-2. The first analysis examined items according to the results obtained in the six-factor rotated PAF model. All items that loaded onto Factor 1 were entered into the analysis as a separate factor, irrespective of the STAXI-2 scale or subscale from which they belonged, and so on for Factors 2-6. A Cronbach's alpha value of ≥ 0.7 (Bland & Altman, 2007; Cronbach, 1951; Cronbach & Meehl, 1955) was selected as an indicator of scale reliability. The second analysis employed Spielberger's (1999) model to examine response data: state anger, trait anger, anger expression-out, anger expression-in, anger control-out and anger control-in. In this analysis, each STAXI-2 scale or subscale (along with its corresponding items) was examined separately. For example, trait anger was analysed by entering baseline response data for the 10 items that make up that scale, and these items were entered into the analysis in the same order as Spielberger's structure. Statistical outputs are provided as Appendices (Appendix 27-29).

Reliability analysis with PAF six-factor extraction and oblique rotation

The internal consistency for each of the six factors was adequate, indicated by Cronbach's alpha values (ranging from 0.73 to 0.95) exceeding the optimal threshold value of ≥ 0.7 (Cronbach, 1951; Cronbach & Meehl, 1955) as reported in Table 3.17. The Corrected Item-Total Correlation indicates the degree to which each item correlates with the total score. Five of the six factors produced Corrected Item-Total Correlation values above minimum threshold (≥ 0.30), indicating that the items making up each factor correlate moderately and are therefore measuring the same construct. One of the

seven items from Factor 5 (Item 37 from the AXI subscale, ‘Withdraw from people’) produced a Corrected Item-Total Correlation value of 0.12, which is below minimum

Table 3.17 Reliability analysis of the PAF six factor extraction oblique rotation by varimax

Factor	Total Number of Items	Cronbach Alpha	Corrected item-total correlation range	Cronbach Alpha if item deleted range	Number of Items from STAXI-2 scale/subscale					
					State Anger	Trait Anger	Anger Control		Anger Expression	
							Out	In	Out	In
					15 Items	10 Items	8 Items	8 Items	8 Items	8 Items
1	15	0.94	0.41-0.87	0.93-0.95	-	10	-	-	5	-
2	16	0.95	0.64-0.80	0.94-0.95	-	-	8	8	-	-
3	12	0.93	0.56-0.82	0.92-0.94	12	-	-	-	-	-
4	3	0.93	0.85-0.89	0.88-0.92	3	-	-	-	-	-
5	7	0.73	0.12-0.58	0.77-0.67	-	-	-	-	3	4
6	4	0.75	0.42-0.63	0.76-0.65	-	-	-	-	-	4

threshold; however, the values produced by the remaining six items were all above threshold.

Each factor yielded a value for Cronbach’s Alpha If Item Deleted. Results indicated that the range of Cronbach’s alpha values was similar to its corresponding overall

Cronbach’s alpha, providing further support for the reliability of these factors.

Cronbach’s alpha values obtained for each of the six factors selected for analysis are reported in Table 3.18, along with Spielberger’s (1999) reliability analysis for both his adult normative sample and psychiatric sample.

Reliability analysis using Spielberger’s (1999) STAXI-2 structure

Results from the reliability analysis using Spielberger’s (1999) model found the internal consistency of all scales and subscales to be adequate, as indicated by Cronbach’s alpha values ranging from 0.74 to 0.94 (Cronbach, 1951; Cronbach & Meehl, 1955). In

relation to the Corrected Item-Total Correlation, all values obtained in the current analysis were above minimum threshold (≥ 0.30), indicating that the items and the

Table 3.18 Reliability analysis of STAXI-2 scales and subscales

STAXI-2 Scale / subscale	Cronbach's Alpha				Current Study Sample
	Spielberger Sample				
	Adult Normative		Psychiatric Patients		
	Female	Male	Female	Male	
State Anger					
State Anger Scale (S-Ang)	0.92	0.94	0.95	0.94	0.94
Feeling Angry (S-Ang/F)	0.87	0.88	0.91	0.91	0.87
Feel like express verbally	0.88	0.87	0.93	0.90	0.91
Feel like express physically	0.85	0.88	0.90	0.86	0.84
Trait Anger					
Trait Anger (T-Ang)	0.84	0.86	0.87	0.87	0.93
Angry Temperament	0.85	0.87	0.89	0.90	0.94
Angry Reaction	0.76	0.73	0.82	0.84	0.87
Anger Expression					
Anger Expression-Out (AXO)	0.74	0.73	0.78	0.80	0.84
Anger Expression-In (AXI)	0.78	0.74	0.82	0.80	0.84
Anger Control					
Anger Control-Out (ACO)	0.85	0.84	0.84	0.87	0.91
Anger Control-In (ACI)	0.93	0.91	0.91	0.91	0.91

overall scale are measuring the same construct. Additionally, for each scale and subscale the range of Cronbach's alpha if item removed values (ranged from 0.93 to 0.94) were similar to their corresponding final Cronbach's alpha value of 0.93, further indicating the reliability of the scale and support to retain these 57 items.

The internal consistency of the STAXI-2 state and trait anger scales and subscales was high as indicated by a Cronbach's alpha value of 0.84 (median = 0.88), (Spielberger, 1999, p9), with the exception of the trait anger subscale of angry reaction (T-Ang/R) with values of 0.76 (females) and 0.73 (males). Spielberger (1999, p12) describes the scales and subscales of anger expression, anger control and anger index, as 'uniform

and adequate'. Overall, these findings establish the internal reliability of the STAXI-2 (Spielberger, 1999).

3.11 DISCUSSION

This study aimed to assess the validity and reliability of the STAXI-2 (Spielberger, 1999) in a clinical sample of regular methamphetamine users. Results of the factor analysis of baseline responses to the 57 items of the STAXI-2 confirmed the construct validity of the scale. Findings from the analysis of the internal consistency of the scale established the reliability of the instrument. The alpha values obtained for the scales of trait anger and anger expression were higher than those used to norm the STAXI-2 (Spielberger, 1999) indicating a high degree of internal consistency for these particular domains. The high estimates of internal consistency are encouraging, particularly for trait anger, as this has been shown to be a relatively stable measure of anger over time. Together, these results corroborated the reliability and validity of the STAXI-2 in this population group and suggest that the instrument could be a valuable tool for clinicians working with methamphetamine users. The structure of each factor, its item loading and how they compare with Spielberger's STAXI-2 scales and subscales is discussed below.

3.11.1 Assessment of Distribution of Items

The distribution of responses to the 57 items of the STAXI-2 was assessed by examining the variation in response categories and by the distribution of responses based on histograms. Each STAXI-2 item holds a four-category response and four (of a possible 57) items yielded a >90% response to a single category indicating that for these four items, the variance among response options is minimal. The question then arises as to whether these items should be removed from the instrument given their limited variance. These four items were from the state anger scale representing the intensity of

anger felt and the extent to which one feels like expressing anger at that particular point in time (that is, “right now”). All items were positively skewed toward a ‘Not at all’ response as to how the patient was feeling at the time of the interview. Given that patients volunteered to be interviewed, it is not unreasonable to consider their current (temporary) state of anger was low.

The distribution of items based on histograms indicated that most items were skewed and would usually be considered unacceptable for analysis. However, we selected PAF because this method of analysis is robust to departures from normality and is recommended as a method for extraction when data are highly skewed (Costello & Osborne, 2005; Fabrigar et al., 1999).

Although the distribution of scores for the state anger/physical subscale was positively skewed, Spielberger’s (1999) assessment of normality also reports that state anger scores were positively skewed. Spielberger (1999) considered that the low scores across other STAXI-2 scales and subscales would suffice in providing adequate information toward understanding this type of responding (Spielberger, 1999). In construction of the STAXI-2, Spielberger reports that the distribution of raw scores across several scales was highly skewed and was therefore unable to discriminate among people with low levels of anger. Yet, to the reader, it is unclear which items are highly skewed as Spielberger only refers to ‘several scales (e.g., S-Ang, T-Ang/T)’ (1999, p55). Spielberger reports that for individuals with high levels of anger the STAXI-2 is not limited in its ability to assess individual differences in high levels of anger (Spielberger 1999, p45). He adds that clinically it is generally more helpful to detect high levels of anger than it is to distinguish between individuals with low levels of anger.

3.11.2 Construct Validity

The validity of the STAXI-2 scale as a measure of anger and aggression among treatment-seeking methamphetamine users was confirmed using factor analysis to establish construct validity. PAF produced an initial solution of nine factors with eigenvalues ≥ 1.00 accounting for 71% of the total variance explained. Inspection of item loadings revealed that three factors had item loadings whose values were below the recommended threshold of 0.30 and were therefore considered redundant, leaving a possible six-factor solution. This solution is in keeping with Spielberger's six-factor model (state, trait, anger control-in and -out, anger expression-in and -out). On this basis, a six-factor solution was selected for extraction by PAF with an oblique rotation. This solution yielded 65% of the total variance explained, satisfying the recommended guidelines for a minimum threshold of 50% as necessary for factor analysis (Gorsuch, 1988). The total amount of variance explained by each of the six factors was: Factor 1, 15%; Factor 2, 14%; Factor 3, 9%; Factor 4, 6%; Factor 5, 8%; and Factor 6, 5%.

State Anger

State anger measures the intensity of angry feelings and the extent to which one feels like expressing anger at that point in time (Spielberger, 1999). This scale comprises 15 items and participants are asked to rate the degree to which a series of statements reflect how they feel 'right now'. Items are designed to measure the intensity of angry feelings currently experienced, particularly those related to the verbal and physical expression of anger (Spielberger, 1999). In the current study, most items (12 of 15) loaded onto a single factor (Factor 3); 3 items loaded onto a second factor (Factor 4); and five items cross-loaded between these two factors. Although a simple structure (Thurstone, 1931)

was not produced, salient loadings for most scale items onto a single factor provides some support for the structure of state anger as defined by Spielberger (1999).

The three items with salient loadings onto the second factor (Factor 4) were specific to the state anger physical (S-Ang/P) subscale: 'I feel like kicking someone' (0.90); 'I feel like hitting someone' (0.89); and 'I feel like pounding somebody' (0.83). The high loading of the items onto this particular subscale suggests the importance of this aspect of state anger for this population group. These items reflect the intensity of one's current emotional state and a desire to express those feelings through physical acts. These findings suggest that the current sample experienced a higher intensity of wanting to become physically aggressive. State anger is a transient emotion that fluctuates over time and is indicative of anger that is current. Therefore, the current context or situation is highly relevant to this aspect of anger. This suggests that clinical intervention designed to reduce state anger could benefit by assessing the experience of state anger under certain conditions; for example, different environments (private versus public venue), different levels of methamphetamine use (quantity and frequency of use) and modes of administration (nasal vs. oral vs. intravenous).

Among the five items that cross-loaded, four were specific to the state anger verbal (S-Ang/V) sub-scale and loaded higher onto Factor 3 (ranging in value from 0.48 to 0.53) than Factor 4. These items point to a high degree of intensity for wanting to express anger verbally (e.g., by shouting). These results are relevant to clinical practice because they provide information about specific areas of behaviour that could benefit from intervention. Further research could investigate patients' internal dialogue during times of elevated state anger. This information might be useful for application of Cognitive

Behaviour Therapy techniques and the application of ‘thought stopping’ skills for behaviour change (Taylor, 2002).

In summary, the findings support the structure of Spielberger’s (1999) state anger scale. Most scale items loaded onto one factor for both the current study (12 of 15) and for Spielberger’s (11 for males, 12 for females), and item loadings were similar in range for the current study (0.32 to 0.97) and Spielberger’s (0.34 to 0.95) (Spielberger, 1999).

Both studies found that the remaining items loaded onto only one other factor, but these items represented different aspects of state anger: state anger/physical (females), state anger/verbal (males) (Spielberger, 1999) and state anger/physical in the current study.

Both studies report cross-loadings that were similar in value, ranging from 0.32-0.45 for the current study and 0.31-0.46 for Spielberger (Spielberger, 1999). Minor differences between the studies relate to the types of items that cross-loaded. Spielberger (1999) reports cross-loadings from the subscales of state anger/physical (2 items females) and state anger/verbal (2 items, males); and in the current study, from state anger/verbal (4 items) and state anger/feel (1 item).

Trait Anger

Trait anger is designed to measure how often angry feelings are experienced over time and is a long-standing characteristic of one’s personality (Spielberger, 1999).

Spielberger’s model (1999) emphasises the importance of measuring the disposition toward experiencing anger without specific provocation (angry temperament, T-Ang/T) and the frequency of experiencing angry feelings when feeling frustrated or due to negative evaluations (angry reaction, T-Ang/R) (Spielberger, 1999). This scale comprises 10 items in which participants are asked to rate the degree to which a series of statements reflect how they ‘generally feel’. In the current study, all trait anger items

merged with dominant loadings loaded onto one factor (Factor 1), and yet a simple structure (Thurstone, 1931) was not achieved: five items cross-loaded onto a second factor (Factor 6) and one item cross-loaded onto Factor 5. All items loading onto Factor 1 were dominant loadings, ranging in value from 0.48 to 0.91. Four of the five items cross-loading onto Factor 6 were from the subscale angry reaction (T-Ang/R), representing a tendency towards being highly sensitive to criticism (Spielberger, 1999). Item descriptions and factor loadings (F1 vs. F6) were as follows: Item 19: 'Get angry when slowed down by others' mistakes' (0.74 vs. 0.32); item 25: 'Feel annoyed when not given recognition for doing good work' (0.48 vs. 0.40); item 20: 'Feel annoyed when not given recognition for doing good work' (0.51 vs. 0.46); and item 23: 'Furious when criticised in front of others' (0.49 vs. 0.48). These items represent the frequency with which angry feelings are experienced in circumstances involving frustration and/or negative evaluation (Spielberger, 1999, p2). The two remaining items that cross-loaded onto Factor 6 were from the trait anger subscale angry temperament (T-Ang/T). Item descriptions and factor loadings (F1 vs. F6) were as follows: item 24: 'Feel like hitting someone when frustrated' (0.74 vs. 0.32); and item 22: 'Say nasty things when mad' (0.70 vs. 0.42). These items represent a disposition toward experiencing anger without provocation (Spielberger, 1999 p2). Finally, the item cross-loading onto Factor 5 was from the trait anger subscale angry temperament. This item loaded more onto Factor 1 (0.55) than Factor 5 (0.35), suggesting this item is specific to the dominant factor (Factor 1). Together, these findings suggest that for methamphetamine users the frequency with which angry feelings are experienced in circumstances involving frustration and/or negative evaluation is concerning (Spielberger, 1999 p2).

The finding that all trait anger items emerged with dominant loadings onto one factor (Factor 1), albeit shared with five anger expression-out items, is a point of difference between the current study and Spielberger's (1999) structure. The difference lies in the dispersion of items cross-loading onto other factors. In Spielberger's (1999) structure many items also loaded onto one factor (Factor 3: 7 items for females, 5 items for males); however, cross-loadings were spread across four other factors: Factor 6 (4 items for males); Factor 7 (4 items for females); Factor 5 (3 items for males) and Factor 1 (1 item for males). All of these items are from the angry reaction subscale, representing a tendency towards being highly sensitive to criticism (Spielberger, 1999, p16). These items are as follows: Item 19: cross-loaded onto Factors 3, 6 and 7; Item 22 cross-loaded onto Factors 3, 5 and 6; and Item 25 cross-loaded onto Factors 5, 6 and 7. Finally, item loadings across the entire scale were similar in value for both studies. The current study reported item loadings ranging from 0.32 to 0.91, which correspond to Spielberger's sample ranging from 0.30 to 0.89 (1999).

These findings arguably suggest that the current study produced a clearer, less ambiguous solution for the scale of trait anger, compared with Spielberger (1999). Trait anger is considered an essential feature of anger, a valuable indicator of a personality predisposed to anger. An understanding of trait anger is fundamental to clinical assessment, treatment and research. In clinical practice, high levels of trait anger could prove to be an important marker (clinical indicator) for problem behaviour. Personality traits predispose individuals to high levels of aggression (Anderson & Bushman, 2002). Trait anger is a stable personality trait that it is relatively consistent over time and across situations (Anderson & Bushman, 2002). Trait anger contains an individual's scripts, schemata and other knowledge structures that directly influence the execution of

aggressive behaviour (Anderson & Bushman, 2002; Mischel, 1973; Mischel & Shoda, 1995). The finding that the structure of this scale was successfully replicated by the current study suggests that, for clinicians working with methamphetamine users or similar populations, the assessment of trait anger could prove to be a valuable feature of clinical formulation.

Anger Control-In and Anger Control-Out

The anger control scale comprises 16 items divided equally into two subscales, which have been designed to measure how often one: i) controls the expression of angry feelings (ACI); and ii) attempts to control angry feelings by calming down or cooling off (ACO) (Spielberger, 1999). Participants are asked to consider ‘How I generally react when angry or furious’ (Spielberger, 1999, p6) and rate each item accordingly. This scale reflects the degree to which one is able to calm down and reduce anger (ACI) and monitor and control the outward expression of anger (ACO); and distinguishes the uniqueness of each construct.

In the current study, all 16 items emerged as dominant loadings onto one factor (Factor 2); three items of lower value cross-loaded onto a second factor (Factor 6: 0.32 and 0.32) and a third factor (Factor 1: -0.41). The three items that cross-loaded were specific to the outward control of anger (ACO) subscale: Item 26: ‘Control temper’; Item 46: ‘Can stop from losing temper’; and Item 34: ‘Control urge to express angry feelings’. The range in values for item loadings (0.32 to 0.91) was equal for both the current study and the STAXI-2 (Spielberger, 1999). The current findings are different to those reported by Spielberger (1999) where each subscale achieved a simple structure (Thurstone, 1931): ACI items loaded onto a single factor (Factor 2) for both males and females; and ACO items loaded onto a single factor for males (Factor 4) and females

(Factor 5). Findings from the current study are in direct contrast to the theoretical concept of anger control as two distinct constructs (ACI and ACO). In conducting the PAF, the current study specified a six-factor extraction to represent each construct of the STAXI-2: state, trait, anger expression-in, anger-expression-out, anger control-in and anger control-out. It was expected that each subscale (ACO and ACI) would load according to these separate factors. However, the distinct qualities of each subscale have not been recognised within the current study. Alternatively, and on a positive note, it could be argued that either one of the two subscales achieved a simple structure (Thurstone, 1931) with salient loadings onto one and only one factor.

These findings suggest that the current sample might not distinguish between the different types of behaviour that are measured by this construct: that is, controlling the expression of angry feelings might not be perceived as being a distinctively different concept, in terms of behaviour, to adopting strategies to calm down. This lack of distinction could be due to gender differences, such that women might adopt a range of strategies that include keeping feelings intact as well as adopting calming techniques. Certainly, the gender influence in the experience and expression of anger has been well established (Boles & Miotto, 2003; Burns et al., 1998; Driscoll, Zinkivskay, Evans, & Campbell, 2006; O'Reilly, 2007).

Anger Expression-In and –Out

The anger expression scale comprises 16 items divided equally into two subscales designed to measure how often feelings are: i) expressed through verbal or physical aggression (AXO); and ii) experienced but not expressed, that is, suppressed (AXI). A series of statements designed to measure these constructs was presented and participants

were asked to rate the degree to which these statements reflect how they usually react when feeling angry (Spielberger, 1999).

Items from the AXI subscale loaded across three factors. Factor 6 comprised four items with salient loadings of 0.73 and 0.58, which stated: 'I boil inside but don't show it' (Item 41); and 'Am angrier than willing to admit' (Item 53), respectively. These items did not load onto any other factor. Items 29 and 57 state: 'Keep things in' and 'Irritated a great deal more than people are aware', respectively. These two items also loaded onto Factor 6 with loading values of 0.45 and 0.52, respectively; they then cross-loaded onto different factors, with Item 29 loading onto Factor 1 (-0.46) and Item 57 loading onto Factor 5 (0.32). Item 37 states 'Withdraw from people' and cross-loaded onto Factors 1(-0.35) and 5 (0.46). The remaining three items of 45, 33 and 49 loaded solely onto Factor 5 with loading values of 0.55, 0.70 and 0.51, respectively. These items stated: 'Tend to harbour grudges but don't tell anyone' (45); 'Pout or sulk' (33); and 'Am secretly quite critical of others' (49).

These findings are different to those reported by Spielberger (1999), who achieved an almost perfect simple solution (Thurstone, 1931) among male and female respondents. For females, all items loaded onto a single factor, with the exception of one item of low value (0.34) that cross-loaded onto a second factor. In this situation, this cross-loading would usually be considered redundant and removed from the analysis, thereby completing a simple solution. Male responses were equally impressive, with all but one item producing dominant loadings onto a single factor. Three items of lower value, ranging from 0.32 – 0.38, cross-loaded onto other factors and could be considered redundant and removed from the analysis. The differences found between our sample and Spielberger's sample may simply be due to the sampling of a different population,

that is, a normative sample of adults versus regular methamphetamine users. These differences could also be due to gender; a factor considered by Spielberger but was not included in the design of this study.

Item responses to the AXO were similar to Spielberger's (1999). Analyses of item responses by females emerged as an almost perfect simple solution (Boles & Miotto, 2003) with dominant loadings on all scale items. One item, which states 'Do things like slam doors', cross-loaded onto another factor; however, this was of relatively low value (0.34). Male responses were more ambiguous with high loadings spread across two factors. There were no cross-loadings.

There were differences between the current study and Spielberger's (1999) sample for the AXI subscale. Spielberger (1999) reported that most items had dominant loadings onto a single factor (Factor 4, females and Factor 7, males). One small (0.34) cross-loading emerged for females (Factor 8) and the remaining items with cross-loadings emerged for males on items 29, 53 and 33. These items state: 'Keep things in' (29), 'Am angrier than willing to admit' (53) and 'Pout or sulk' (33). Item loadings ranged from 0.30 to 0.74 on Factor 4 (females); from 0.35 to 0.66 on Factor 7 (males); from (-0.32, 0.33) on Factor 6 (males), and from (0.38, 0.46) on Factor 5 (males). Item responses to the AXO were less ambiguous than AXI items, with six items loading onto a single factor and the remaining two items loading onto a second factor. There were no cross-loadings.

There are several possible explanations as to why the current study did not produce a clearer solution for the AXI subscale. One possibility is that the factor structure produced by the current study could represent a gender bias, which was not possible to

investigate in the current study because of design limitations. As previously mentioned, differences between males and females in their experience and expression of anger have been well established in some studies (Boles & Miotto, 2003), but not others (discussed below). One reason for gender differences could relate to the pattern of responses to items concerning turning anger inward. Studies that have examined the validity and reliability of the STAXI (Spielberger, 1988) and STAXI-2 (Spielberger, 1999) point to a strong cultural bias in the experience and expression of anger. Maxwell and colleagues (2009) describe the cultural norms that prescribe ways in which anger can or cannot be expressed. Their study reports on the validation of the STAXI-2 translated to Chinese and demonstrates significant differences between males and females on the subscales of AXI, ACO and ACI (Maxwell et al., 2009). These relate to the belief that the expression of anger towards others is not culturally sanctioned, and particularly among females (Maxwell et al., 2009). The influence of cultural norms on the regulation of affect and subsequent behaviour has been identified by Maxwell (2009) as an important area of investigation, particularly when instruments are used in another culture. Martin and Dahlen (2007) suggest using an additional instrument to accompany the STAXI-2, to expand the expression of anger beyond Spielberger's domains. This approach could be particularly relevant to specific cultural aspects of anger (Martin & Dahlen, 2007).

Lindqvist and colleagues (2003) sought to develop a Swedish version of the STAXI-2. They conducted an Exploratory Factor Analysis of the five state and trait anger and four expression and control STAXI-2 scales and subscales. Based on their findings, they suggest that anger is a culturally sensitive emotion that requires further development among larger samples. However, their study was limited in its design by recruiting only

male university students (Lindqvist, Daderman, & Hellstrom, 2003). Clinical research among methamphetamine users in the United States has reported on the ethnic diversity of methamphetamine users presenting for treatment (Brecht et al., 2005). Whether males and females differ in how they experience and express their anger is inconclusive. Several studies have found differences between men and women in their experience and expression of anger are well defined (Boles & Miotto, 2003; Cohen et al., 2003; Cohen et al., 2007). However, the presence of this relationship is not always established (for example, see Boles & Miotto, 2003). Driscoll and colleagues (2006) predicted that women could be more likely to consider anger expression in a negative light, such as loss of self-control. These predictions were not confirmed. DiLiberto and colleagues (2002) also predicted differences in how anger would be expressed according to gender, finding no difference in anger expression scores. They suggest that these unexpected findings can be a result of smaller sample size and younger participants, relative to Spielberger's STAXI-2 sample (DiLiberto, Katz, Beauchamp, Howells, & DiLiberto, 2002).

One other area worth noting is the possible influence of co-morbidity on one's experience and expression of anger. Co-morbidity refers to being diagnosed with two or more psychiatric conditions: for example, substance addiction and one other psychiatric disorder (American Psychiatric Association, 2002). Novaco (1996) has stressed the importance of understanding anger treatment and its relationship with Post Traumatic Stress Disorder (PTSD). Providing a clinical intervention that can address both PTSD and addiction (for example alcoholism) is particularly relevant for clinicians working with military veterans. One of the major difficulties faced by clinicians is that angry

individuals are often highly resistant to treatment (Novaco, 1996). According to Novaco (1999b), the treatment of anger remains a relatively neglected topic in clinical research.

Other areas of clinical importance are particularly relevant to the construct of expression of anger-in. The relationship between turning anger toward the self, self-injury and/or suicidal behaviour has been described by Linehan as a self-punishment model of psychiatric illness (Linehan, 1993). Anger turned toward the self is a prominent feature of those who self-injure (Klonsky, 2007; Klonsky, Olthmanns, & Turkheimer, 2003; Soloff, Lis, Kelly, Cornelius, & Ulrich, 1994). Previous research into methamphetamine use reports that patients admitted for methamphetamine abuse represent a more vulnerable population in terms of disabilities, chronic mental illness and homelessness (Brecht et al., 2005). In addition, psychiatric disorders are three times more likely to co-occur in people with a substance use disorder (Sinha & Schottenfeld, 2001). Future research might benefit from examining the potential relationship between methamphetamine use, anger, deliberate self-injury and mental health issues.

The validity and reliability of the STAXI-2 has been assessed for its utility among specific populations for whom anger and aggression are problematic. Dear and colleagues examined the psychometric properties of the STAXI among an Australian forensic sample and found support for the validity and reliability of the original STAXI scale (Dear et al., 2003). McEwan and colleagues assessed the relationship between social desirability response bias and the experience and expression of anger (McEwan, Davis, MacKenzie, & Mullen, 2009). Their findings point to the potential for impression management, that is, 'faking good', to negatively influence scores on the STAXI-2. Based on their findings, McEwan and colleagues (2009) suggest that the use of STAXI-2 in a forensic setting should also be accompanied by a measure of socially

desirable response, particularly if the STAXI-2 is to be used as a clinical tool for screening and intervention. Similar findings are reported by Suris and colleagues subsequent to a review of instruments designed to measure various aspects of anger (Suris et al., 2004). Their research concluded that construct definition and clarification in the study of aggression is complicated and subject to interviewer bias and social desirability. Improving psychometric properties of assessments for anger and its domains will help clarify anger constructs and define the appropriateness of anger measures with specific populations.

Finally, associations between current patterns of methamphetamine use, anger and aggression might also explain differences in how anger is experienced and expressed. Few studies have investigated the signs and symptoms of methamphetamine withdrawal. McGregor and colleagues report withdrawal from methamphetamine use can include agitation (McGregor et al., 2005). Klee (1998) reports that irritability and aggression are common during the come down and withdrawal period after methamphetamine use (Klee, 1998). Future research would benefit from examining whether there are substantial differences in how anger is experienced (e.g., anger intensity) and expressed during methamphetamine withdrawal.

3.11.3 Reliability

The finding that STAXI-2 scores were a reliable indicator of the experience and expression of anger in this patient group further confirms the utility of the STAXI-2 among methamphetamine users and similar populations. The clinical benefits of this finding relate to the usefulness of this measure to examine the domains of anger, as described above. Searches of the literature identified only two studies published in English examining the validity and reliability of the STAXI-2. Lindqvist and colleagues

employed Cronbach's alpha, mean inter-item correlation and coefficient theta as measures of reliability of the STAXI-2 (Lindqvist et al., 2003). Cronbach's alpha values in this study were: state anger, 0.81; trait anger, 0.75; anger expression-out, 0.64; anger expression-in, 0.77; anger control-out, 0.83; and anger control-in, 0.89. In the other published study by Maxwell and colleagues (Maxwell et al., 2009) Cronbach's alpha values were: state anger, 0.91; trait anger, 0.81; anger expression-out, 0.87; anger expression-in, 0.68; anger control-out, 0.87; and anger control-in, 0.82. Other measures employed for validity and reliability analysis differed to the current study and therefore could not be directly compared. Both studies found the STAXI-2 to be a valid and reliable measure (Lindqvist et al., 2003; Maxwell et al., 2009). Across the three studies, similar levels of internal consistency were observed.

3.11.4 Strengths and limitations of the study

In the construction of the STAXI-2, Spielberger (1999) reported that item loadings for females often varied in comparison to males. The current study did not examine gender differences because the design of the clinical trial, on which this study was based, did not require a sample size with adequate numbers of both males and females to permit this type of analysis.

The factor structure identified in this study was not the same as Spielberger's (1999); however, it was very similar as well as consistent with the theoretical structure of the STAXI-2. A reliability analysis of both the structure produced by the current sample as well as Spielberger's model confirmed the internal consistency for the factors produced by both structures. Future research could examine the psychometric properties of the STAXI-2 among different samples of drug users and compare with a non-drug using sample. Of particular interest would be a comparison of users of central nervous system

(CNS) stimulants (methamphetamine, cocaine) with users of CNS depressants (alcohol, cannabis, heroin) and compared with non-drug users.

Finally, this study did not apply a test-retest condition as an additional measure of reliability because this could not be accommodated within the design of the main study. Future research may benefit from including a test-retest component to strengthen the methodology of the study and improve our understanding of the measure.

3.12 CONCLUSION

To advance the field of anger research, the validity and reliability of anger measures must be addressed. The current study is the first to examine the validity and reliability of a measure of anger among regular methamphetamine users. This study supports the use of the STAXI-2 as a measure of anger. Clinicians working with methamphetamine users or a similar population could employ the STAXI-2 for the purpose of screening and assessment. The utility of the STAXI-2 as a prognostic measure is examined in Chapter 4.

CHAPTER 4 TRAIT ANGER AS A PROGNOSTIC INDICATOR FOR METHAMPHETAMINE TREATMENT OUTCOME

4.1 INTRODUCTION

Anger is a central feature of the human emotional experience. Anger can contribute positively to behaviour as a source of motivation to achieve goals and to facilitate physical and emotional energy when faced with adversity (Novaco, 2011). Anger can also lead to aggressive and violent behaviour, and it is the predisposition towards anger rather than an individual's current or immediate experience of anger that predicts how they will express anger (Spielberger, 1999). Pathways that can lead individuals from feeling angry to perpetrating acts of aggression and violence are complex (see section 2.2.5). Whether substance use, and in particular methamphetamine use, can mediate this pathway is complex and poorly understood. While a number of theories seek to explain how some substances are associated with anger and aggression (see section 2.3), few studies have investigated the role of methamphetamine use. Goldstein's model of the relationship between drug use and violence (see section 2.4) (Goldstein, 1985) was supported by Wright and Klee's research into methamphetamine use and violence (2001). Further evidence has been inconsistent (Hoaken & Stewart, 2003) and limited by a relatively small number of studies and a lack of taxonomy to adequately define and measure anger and violence (see section 2.6). Problems associated with methamphetamine use have led to the implementation of methamphetamine treatment outcome studies (Rawson, 2010; Rawson, Gonzales, & Brethen, 2002a). Whether anger mediates treatment outcome for methamphetamine use is yet to be examined. The aims of this study are to investigate whether anger modifies the effect of treatment for methamphetamine use. The first hypothesis is that patients high in trait anger will be

less responsive to methamphetamine treatment. The second hypothesis tests whether higher trait anger is associated with poorer treatment response.

4.2 METHODS

4.2.1 Study design

This thesis presents a sub-study of a randomised controlled trial (RCT) of cognitive behaviour therapy (CBT) for regular methamphetamine users. The main RCT is referred to herein as the Methamphetamine Trial. The thesis focuses specifically on trait anger and treatment outcome and from this point forward that component of the original RCT will be termed the Anger Study. Trait anger was measured with the STAXI-2 (Spielberger, 1999) and this instrument was included in the Methamphetamine Trial four weeks after it commenced. Consequently, fewer patients completed the STAXI-2 and the analysis of anger was conducted on a subgroup of patients in the Methamphetamine Trial. Additional information regarding the Methamphetamine Trial is provided as published papers (Baker, Kay-Lambkin, Lee, Claire, & Jenner, 2003; Baker et al., 2004, 2005a) in Appendices 30-32.

4.2.2 Recruitment

An information flyer advertising the study was placed in the waiting rooms of health centres and legal agencies. Regular liaison with these agencies was conducted by the candidate in New South Wales and by the Brisbane based researchers in Queensland. Patient referral source and recruitment rates by location are reported in Chapter 3 (Table 3.8). Listed on the Information Flyer was a contact name and phone number (of the candidate in Newcastle and the research team in Brisbane) for people to call if they were interested in participating in the study. Health clinicians, welfare workers and legal practitioners could also contact the research team to refer any individuals wishing

to participate in the study. Correspondence describing the aims of the study and including the Information Flyer was written and distributed by the candidate to health, welfare and legal agencies in the Newcastle region. The candidate conducted information sessions for staff from local health, welfare and law enforcement agencies, detailing the study design and treatment protocol. Radio and newspaper interviews were also undertaken by the candidate to generate community awareness of the study and to bolster recruitment rates. The candidate also liaised with local General Practitioners, one of whom provided consultation rooms in both their General Practice and outreach clinic.

4.2.3 Patients

Criteria for inclusion and exclusion

Criteria for inclusion and exclusion have been previously described (Chapter 3.8.3); an additional inclusion criterion for the Anger Study was completion of the STAXI-2 (Spielberger, 1999) at baseline.

4.2.4 Procedure

Recruitment and data collection procedure

The initial point of contact occurred when an individual wishing to participate in the study either phoned the research team or directly approached a member of the research team if they were at an agency (for example, the General Practice rooms). At this point, the clinician described the study's purpose and design, stated that all information remained confidential to the research team who were independent of any treatment agency, and that refusal to participate would not affect an individual's relationship with an agency in any way. Individuals were then provided with a suitable appointment time to conduct the initial interview. Those who satisfied the selection criteria were given a

written description of the study (Information Sheet) and asked to provide written consent.

4.2.5 Data collection settings and locations

Where possible, the assessment interviews and clinical interventions were conducted at the primary research centre (for example, the Centre for Mental Health Studies, Newcastle) or at the site from which patients were referred (for example, General Practice rooms). Three psychologists (including the candidate) and a social worker, all with prior experience in providing clinical interventions to substance users, were employed to conduct the clinical interviews and provide treatment interventions. The candidate is a registered psychologist experienced in providing treatment to adolescents and adults for substance abuse and addiction, psychiatric illness and criminal recidivism. The candidate was employed as the research co-ordinator and managed the study across the two sites (New South Wales and Queensland), contributed to the development of the treatment manual, interviewed the majority of patients from the Newcastle region and provided treatment if allocated. Prior to implementing the study, the clinicians (including the candidate) undertook training specific to the administration of the research intervention. Training was provided by the study's two chief investigators and included administration and scoring of all assessment instruments and clinical skills training in the intervention being investigated.

All patients were asked to complete the assessment interviews on three separate occasions: (i) the first interview (initial baseline assessment) was conducted immediately prior to the randomisation procedure (described below); (ii) the second interview was conducted five weeks after the first interview; and (iii) the final interview was conducted seven months after the first interview. Each interview took

approximately one hour to complete. The Anger Study comprised data from patients who completed the STAXI-2 during their initial baseline assessment and at 7-month follow-up. Follow-up interviews were conducted ‘blind’, that is, by one of the four clinicians who had not conducted the initial assessment and were unaware of group allocation. Where additional support was required, student researchers assisted with collecting follow-up data by administering the assessment via face-to-face or phone interview. The five-week assessment interview was conducted prior to treatment completion and, as the Anger Study focused on treatment outcome, data relating to this assessment were not included in the analyses for this study.

Patients who were assigned to treatment completed the initial interview and the first treatment session at the same time. Treatment sessions 2, 3 and 4 were conducted at weekly intervals. Following completion of the initial assessment all patients regardless of treatment allocation were provided with a self-help booklet titled ‘A Users’ Guide To Speed’ (National Drug and Alcohol Research Centre, 1998), describing methamphetamine related harms and strategies for reducing methamphetamine use.

4.2.6 Measures

The initial interview schedule obtained data on demographic characteristics, drug use and psychiatric history, treatment history, methamphetamine dependence, current drug use, anger and aggression. The instruments used to collect these data are reported in Table 4.1.

Demographic and psychiatric information

Standard demographic questions from the Diagnostic Interview for Psychosis (DIP)

(Jablensky et al., 2000) provided information on age, gender, marital and residential status, education and employment status. Questions relating to psychiatric illness asked

Table 4.1 Assessment instruments included in the Anger Study

Instrument	Domain	Initial	Follow-up
DIP	Demographics	X	
	Psychiatric history	X	
SCID	Methamphetamine dependence	X	
OTI	Substance use	X	X
STAXI-2	Anger	X	X

whether the patient has a history of psychiatric illness or admission to a psychiatric unit, had been diagnosed with a psychiatric illness or were currently taking medication for a psychiatric illness. The reliability and validity of the DIP has been previously established. Castle and colleagues (2006) conducted inter-rater reliability tests of the DIP that produced kappa values ≥ 0.60 in more than half (56%, 18 of 32) of the items examined; and test-retest reliability assessments produced kappa values ≥ 0.60 in 42% (13 of 32) of the items. The level of agreement between the DIP and the SCAN, considered to be the current ‘gold standard’ interview schedule for psychiatric diagnoses (Castle et al., 2006) was considered as good, based on a 9 out of 10 match for diagnoses (Castle et al., 2006). Tests of reliability and validity for the DIP were based on an Australian sample (Castle et al., 2006).

Methamphetamine use

Methamphetamine abuse or dependence during the 6 and 12 months preceding the interview was determined using the Non-Alcohol Psychoactive Substance Use Disorders section of the Structured Clinical Interview for Dependence (SCID-I Research Version). The SCID –I is a diagnostic measure of substance abuse and dependence based on criteria defined by the DSM-IV for symptoms specific to the

disorder. It is a semi-structured interview with an administration time of 5-10 minutes. Extensive measures of the reliability and validity of the DSM-IV have been conducted, for example, by the American Psychiatric Association (American Psychiatric Association, 2002; First et al., 1998) and accordingly apply to the SCID-I.

The reliability of the SCID-I among psychiatric patients (n=151) recently confirmed by Lobbestael and colleagues (2011) produced moderate to excellent inter-rater agreement of AXIS I disorders (kappa values ranging from 0.61 to 0.83, mean kappa of 0.71). In particular, the drug abuse/dependence disorder produced a kappa value of 0.77.

Intraclass correlation coefficient (ICC) values for Axis II disorders ranged from 0.62 to 0.94 (95% CI), with a mean ICC value of 0.82, further confirming the reliability of this instrument (Lobbestael et al., 2011).

The validity of the SCID-I has been established by Basco and colleagues (2000) among residential psychiatric patients (n=210). Validity was determined by accuracy of diagnoses calculated as kappa reliability coefficients (Cohen, 1960) comparing gold standard diagnoses to the routine diagnoses, SCID-I diagnoses, SCID-plus-chart diagnoses. A kappa of 0.76 (SCID plus chart diagnoses) indicates the validity of the SCID-I.

Fennig and colleagues (1996) conducted validity studies of the SCID-I for Psychoactive Substance Use Disorders among first-admission psychiatric patients (n=294). A Kappa coefficient was used to compute the agreement between research and clinical diagnoses; sensitivity was assessed as the proportion of patients without a research diagnosis of PSUD (denominator) identified as such by the clinicians (numerator); specificity was assessed as identifying those without the disorder. The

level of agreement between clinical and research diagnoses was assessed for psychoactive substance use disorder, alcohol abuse/dependence disorder and drug abuse/dependence disorder. Agreement for psychoactive substance use disorder was moderate ($\kappa = 0.49$, sensitivity of 48%, specificity of 95%). Agreement for alcohol abuse/dependence was fair ($\kappa = 0.30$, sensitivity of 27% and specificity of 97%). Finally, agreement for drug abuse/dependence was moderate ($\kappa = 0.43$, sensitivity of 48% and specificity of 95%). Overall, the level of agreement between clinical and research diagnoses was moderate. Diagnosis of drug abuse/dependence was more concordant than that of alcohol abuse. Agreement was better for diagnosis of dependence than for abuse. Criterion variance was the predominant reason for discordance; diagnosing a polydrug use disorder rather than a specific substance disorder.

Patterns of substance use: the Opiate Treatment Index

The Opiate Treatment Index (OTI) (Darke, Hall, Wodak, Heather, & Ward, 1992) is a self-report questionnaire designed to measure drug related behaviour and behaviour change across independent treatment outcome domains. Higher scores indicate higher levels of dysfunction on all scales. This thesis examined responses to the OTI drug use scale and a complete description of the OTI is provided as published works in Appendices 30-32 (Baker, Lee, Claire et al., 2004).

The OTI (Darke et al., 1991) was developed on a cohort of opioid users ($N=290$), most of whom were enrolled in opiate treatment ($n=230$, 80%). Test-retest/inter-rater reliability ($n=50$ opiate users) analyses produced Pearson product moment correlation coefficients for total OTI scores across two occasions that ranged between 0.86 and 0.96 ($n=50$), 0.78 and 0.92 ($n=25$, same interviewer), and 0.81 and 0.99 ($n=25$ different

interviewer), indicating a high degree of reliability (Darke et al., 1992). Validation of the OTI was established by comparing scales designed to measure similar constructs, assessing the degree of concordance between collateral interviews, comparing self-report with urinalysis and with recorded convictions. A sub-sample of participants (n=100) completed both the OTI and the Addiction Severity Index (ASI) (McLellan, Luborsky, O'Brien, & Woody, 1980). A comparison of scores from both scales indicated that, with the exception of the criminality (OTI)/ legal (ASI) section, all other domains correlated significantly ($p < .005$). Collateral interviews produced a high level of concordance across all OTI domains, including drug use (range 82%-100%). Urinalysis results (n=50) produced an overall level of agreement of 88.7% (range 74-98%) for individual drug classes, indicating an acceptable level of concordance. Principle Components Analysis of responses to the OTI (n=205) produced two factors accounting for 33% (Factor 1) and 27% (Factor 2) of the variance, establishing the reliability of the OTI.

Anger and aggression

A full description of the STAXI-2 (Spielberger, 1999) as a measure of anger and aggression has been provided in Chapter 3. Trait anger was selected as a focus of study for the following reasons. Trait anger has been established as a unique emotional dimension of the personality (Spielberger, 1999); a stable feature of temperament that is not usually prone to rapid fluctuation and therefore, a suitable measure of anger over time. Spielberger (1999) argues that it is our predisposition towards anger (that is, trait anger), rather than our current experience of anger (that is, state anger) that predicts how we will express anger, suggesting trait anger's potential relevance to clinical care. Trait anger has remained a core feature of anger measurement for more than three

decades (Spielberger, 1979, 1988, 1999) and has been established as a valid and reliable measure of anger (discussed in section 3.6.2).

4.2.7 Randomisation

A randomisation schedule was generated by a clinical trials researcher independent of the current study and located in Brisbane. Schedules were produced as a series of blocks of nine and stratified according to: (i) location (Brisbane or Newcastle); (ii) gender; and (iii) current receipt of pharmacotherapy treatment for opiate dependence ('MMT' or 'No MMT'). Once a schedule was generated, the clinical trial researcher prepared a set of identical envelopes and divided these into two piles according to pharmacotherapy status. Each envelope was labelled with a unique sequential number to be used for patient identification. The first digit in the sequence identified the location (Brisbane or Newcastle) and the second digit identified pharmacotherapy status. Sealed within each envelope was a folded strip of paper describing a treatment condition: control (no treatment), 2 treatment sessions, or 4 treatment sessions. Immediately after completing the initial assessment, the clinician selected one of two piles of envelopes (labelled as MMT or No MMT) based on the patient's reported pharmacotherapy status. The clinician asked the patient to: (i) select one envelope from the chosen pile; (ii) open the envelope and retrieve the strip of paper contained inside; (iii) read aloud what was written on the strip of paper contained within the envelope; and (iv) place the envelope and its contents on the interview table. The clinician then recorded the unique identifier on the Initial Assessment cover page. This procedure satisfied two conditions: (i) the randomisation schedule and allocation to the study were concealed to all clinicians involved in the recruitment and implementation of the study; and (ii) both the patient and the clinician remained blind to treatment allocation prior to the selection procedure.

On assigning and recording a unique identifier, each patient's personal details were then separated from their completed assessment and stored separately in a secure area as per policy and procedures relating to the Human Research Ethics Committee conditions (Human Research Ethics Committee Approval Number: H-839 1299; and Hunter Area Research Ethics Committee Reference Number: 9912153.19).

The Anger Study examined response data according to two groups, Control and Treatment, by collapsing the 2- and 4-treatment sessions into one treatment group. The purpose of combining the treatment groups was to increase the power to detect change. This strategy was considered reasonable because results from the Methamphetamine Trial showed little difference in treatment outcomes for those assigned to 2- as compared with 4-sessions of treatment.

4.2.8 The Intervention

The intervention was designed by Baker and colleagues and includes contributions made by the candidate. For a detailed account, the reader is referred to the publication (Baker, Kay-Lambkin, Lee, Claire & Jenner, 2003) in Appendix 30. The first treatment session was conducted immediately after completing the Initial Assessment Interview and then at weekly intervals. The candidate conducted the majority of treatment sessions to patients from the Newcastle region. Where possible, treatment was conducted at the site of recruitment. Each treatment session lasted for 1-1.5 hours.

Rationale and principles of treatment

The intervention was based on the rationale and principles of Motivational Enhancement Therapy (MET) (Miller, Zweben, DiClemente, & Rychtarik, 1995). The clinician's task is to construct a set of conditions that aim to facilitate the patient's

motivation toward and a commitment to change. In doing so, the clinician uses the five principles of motivation: (i) express empathy (ii) develop discrepancy (iii) avoid argumentation (iv) roll with resistance and (v) support self-efficacy. Treatment sessions followed the manual developed for the study (described above).

Treatment goals

The main treatment goal was to reduce methamphetamine use. Patients were encouraged to identify specific treatment goals and strategies to achieve them.

Intervention conditions

The Intervention included four sessions of CBT conducted sequentially at weekly intervals. Each session was approximately 1-1½ hours in duration. A brief description of the content of each session follows.

Session 1: Motivational Interviewing

Primary aims: (i) Engagement, establishing rapport, building motivation to change

(ii) Preparation for methamphetamine reduction or cessation

(iii) Introduction to behavioural self-monitoring

Key elements: (i) Building motivation to change

(ii) Strengthening commitment to change

(iii) Self-monitoring behaviour

(iv) Formulation of a treatment plan

(v) Establish a contract

Session 2: Coping with cravings and lapses

Primary aims: (i) Reinforce motivation for methamphetamine reduction or cessation

(ii) Develop coping skills for methamphetamine cravings

(iii) Develop preparation skills for methamphetamine relapse

Key elements: (i) Coping with craving

(ii) Information about cravings

(iii) Strategies to cope with cravings

(iv) Develop a craving plan

(v) Dealing with a lapse

Session 3: Controlling thoughts about using methamphetamine

Primary aims: (i) Introduce the concept that thoughts influence behavior

(ii) Develop achievement plan and pleasurable tasks for the week

(iii) Continue with methamphetamine reduction or cessation

Key elements: (i) Links between thoughts and behavior

(ii) Triggers

(iii) Seemingly irrelevant decisions

(iv) Pleasant event and activity scheduling

Session 4: Coping with cravings and lapses

Primary Aims: (i) Learn and practice methamphetamine refusal skills

(ii) Identify potentially high-risk situations

(iii) Develop a specific relapse prevention plan for high-risk situation

(iv) Learn how to deal with a lapse

Key elements: (i) Methamphetamine refusal skills

(ii) Relapse prevention

(iii) Termination

The control group

Patients assigned to the control arm of the study did not engage in any treatment sessions and were asked to complete all assessment interviews.

4.3 STATISTICAL METHODS

The focus of this thesis is investigating the prognostic value of trait anger in treatment outcome for methamphetamine use. The analysis will seek to test for the presence of a statistical interaction between patient trait anger assessed at baseline and the effectiveness of treatment on study outcome. Statistical analyses were conducted using the Statistical Package for Social Sciences (SPSS) Version 19.

4.3.1 Participant recruitment and follow-up

The number of patients participating in the Methamphetamine Trial, eligible for the Anger Study and providing data at the 7-month follow-up is reported by treatment

group (Treatment or Control) and study location (Newcastle or Brisbane). Entry to the Anger Study required having completed the STAXI-2 at baseline. To investigate any potential bias related to inclusion in the Anger Study baseline characteristics including demographic information, psychiatric illness and substance use were compared for those who did and did not complete the STAXI-2 at baseline, using the chi-square test for categorical variables and the t-test or non-parametric equivalent of the Mann Whitney test for continuous variables.

Baseline characteristics are presented for the treatment (combined 2 and 4 session groups) and control groups using frequency distributions for categorical variables and means and standard deviations for normally distributed continuous variables or median and quartiles for non-normally distributed continuous variables. In keeping with the CONSORT statement (Moher et al., 2010), statistical tests to compare characteristics between treatment and control group at baseline were not undertaken.

To investigate potential attrition bias baseline sociodemographic characteristics, psychiatric illness and substance use were compared for those who provided follow-up data and who were lost to follow-up using the chi-square test for categorical variables and the t-test or the non-parametric Mann Whitney test for continuous variables.

4.3.2 Treatment outcome

Treatment outcome was measured in two ways: (i) change in methamphetamine use and (ii) methamphetamine abstinence at follow-up. Methamphetamine change is a continuous score, calculated by subtracting methamphetamine OTI score at follow-up from methamphetamine OTI score at baseline (that is, over a time interval of 7 months). Methamphetamine abstinence is a binary measure and defined as having a

methamphetamine OTI score of zero at follow-up (Yes or No). Treatment outcome was compared by treatment group: (i) methamphetamine change scores by treatment or control group using t-tests (or Mann-Whitney U non-parametric equivalent) and (ii) methamphetamine abstinence (Yes or No) by treatment or control group using chi-square analysis.

Next, the relationship between trait anger and treatment outcome was examined. Trait anger was measured in two ways: (i) STAXI-2 trait anger score at baseline (that is, a continuous variable) and (ii) high trait anger (Yes or No) at baseline. High trait anger is defined according to Spielberger's (1999) definition of anger warranting clinical intervention: a STAXI-2 scale/subscale score having reached a level corresponding to a 75th percentile score (based on a normative adult population of combined males and females aged ≥ 16 years). Four comparisons were made. Baseline trait anger was compared with: (i) methamphetamine change scores by obtaining the correlation coefficient (or Spearman non-parametric equivalent) and with (ii) methamphetamine abstinence (Yes or No) using t-tests (or Mann Whitney U non-parametric equivalent). Then, high trait anger (Yes or No) was compared with: (iii) methamphetamine change scores using t-tests and with (iv) methamphetamine abstinence using chi-square analysis.

4.3.3 Trait anger as an effect modifier for treatment outcome

A series of regression analyses were conducted to investigate if baseline trait anger modified the effects of treatment on outcomes. Linear regression was undertaken for methamphetamine change scores and logistic regression for methamphetamine abstinence at follow-up. Trait anger, the potential effect modifier of interest, was measured in two ways: as a continuous measure of baseline STAXI-2 trait anger scores

and as a binary measure of high trait anger (as defined above). Thus there were four series of analyses based on the combinations of trait anger and methamphetamine use described above and in Table 4.2. Other potential explanatory and/or confounding variables selected for inclusion in the analysis are also listed in Table 4.2.

A ‘base’ model was constructed for each of the four sets of models, comprising the outcome (methamphetamine change score or methamphetamine abstinence at follow-up) and baseline trait anger (as a continuous, then as a dichotomous measure), location (Brisbane or Newcastle), treatment group status (treatment or control), and baseline methamphetamine use (OTI score). The interaction term comprised treatment group status and baseline trait anger (as a continuous, then as a dichotomous measure).

Additional explanatory/confounding covariates of interest included: demographic characteristics of age, gender, marital and educational status; a history of psychiatric illness; patterns of substance use: alcohol and cannabis use, and pharmacotherapy treatment status.

Selection of these covariates was based on clinical and research findings that indicate the importance of understanding the relationship between treatment outcomes for substance use and demographic characteristics, for example as described by Hillhouse and colleagues (2007); and co-morbid psychiatric illness and drug addiction (Barr et al., 2006). All of these variables were initially included in the model with the ‘base model’ plus additional predictors of interest (described in Table 4.2). All variables specified in the ‘base model’ were retained in all models. Backward stepwise methods were used to remove the additional explanatory/confounding variables, one at a time, if they had a p value ≥ 0.10 on statistical tests assessing the relationship between explanatory variables

and outcome; the t-test was used to assess significance of variables in linear regression and the Wald test used to assess significance of variables in logistic regression.

Table 4.2 Description of variables selected for the general linear models

Variables		GLM Models			
		1	2	3	4
Dependent	Methamphetamine change scores	X	X		
	Methamphetamine abstinence			X	X
Base model+					
Continuous	Methamphetamine use (OTI)	X	X	X	X
	Baseline Trait Anger	X		X	
Categorical	High Trait Anger		X		X
	Treatment status	X	X	X	X
	Location	X	X	X	X
	Treatment status by baseline Trait Anger	X		X	
Interaction term			X		X
Additional explanatory / confounding variables#					
Continuous	Age	X	X	X	X
	Alcohol use	X	X	X	X
	Cannabis use#	X	X	X	X
	Anger Expression Out#	X	X	X	X
	Anger Expression In	X	X	X	X
	Anger Control Out	X	X	X	X
	Anger Control In	X	X	X	X
Categorical	Sex	X	X	X	X
	Marital status	X	X	X	X
	Educational status	X	X	X	X
	Pharmacotherapy treatment status	X	X	X	X
	History psychiatric illness	X	X	X	X

+Base models include all listed variables; #Additional predictor variable in the final level of the model

In order to illustrate the relationship between methamphetamine change scores, treatment group and baseline trait anger, a graph was generated for each model that showed the relationship between baseline trait anger and outcome, separately for each

treatment group. When the interaction term was not statistically significant, a model was generated without this term to assess if the main effects of treatment and/or baseline trait anger were associated with the outcome. These results are not part of the primary study aims and are thus included for completeness only; a brief summary statement is included in the results section, and the final model without the interaction term is presented in an Appendix (see results section).

The fit of the linear model was assessed by examining the histogram of the residuals, a plot of residuals versus predicted values, and the proportion of variance explained by the model (that is, the R^2). The Hosmer Lemeshow goodness of fit statistic was used to assess the fit of the logistic regression models.

4.3.4 Sample size/ power

Post hoc power analyses were conducted based on the sample size of 153 participants followed up for the main RCT (Baker et al., 2005a, 2005b), which demonstrated an (unadjusted) treatment effect odds ratio of approximately 2.5 for the binary outcome of abstinent/ not abstinent at six months and no treatment effect for change in methamphetamine score. The main RCT had 80% power with a 5% significance level to detect a relative risk of abstinence for treatment versus control groups of approximately 2 and difference in mean methamphetamine change score of half a standard deviation. Assuming that there were approximately equal numbers of participants in the high and low baseline anger groups, there would be 80% power to detect an interaction effect which was slightly more than double the log odds or mean difference for overall treatment main effect (Brookes et al., 2004; Brookes et al., 2001).

4.3.5 Ethical approval

Ethical approval was granted in September 2001 (HREC H-839 1299; HAREC 9912153.19) and recruitment to the study commenced in October 2001. Additional ethics approval to include the STAXI-2 (Spielberger, 1999) was granted as a variation in December 2001, and the assessment of anger became routine from that point. The Australian Commonwealth Department of Health and Ageing funded the study.

4.4 RESULTS

4.4.1 Participant flow

Recruitment to the study continued for 11 months (October 2001 - September 2002). Implementation of the clinical intervention also commenced in October 2001 and continued until June 2003, a total of 20 months. A total of 282 individuals sought to participate in the study and were assessed for eligibility. One third of this group were from Newcastle (n=98). A flow of participants through each stage of the study is presented in Figure 4.1.

Sixty-eight individuals (24%) did not enter the study. Fifty-one did not meet criteria for inclusion to the study for the following reasons: reporting current symptomatology for acute psychosis or suicidality (16 of 68, 23%); methamphetamine use below the minimum threshold required for participation (27 of 68, 40%); reported to have acquired cognitive impairment rendering them unable to understand the requirements of the intervention (3 of 68, 4%); or currently in treatment for methamphetamine dependence (5 of 68, 7%). Seventeen persons from the Brisbane region refused to participate in the study for the following reasons: (i) 14 were randomised to the control arm of the study and were seeking treatment (n=14); and (ii) 3 persons wanted either a specific type of treatment (e.g., psychotherapy) or a specific type of clinician

(e.g., indigenous counsellor). The remaining 214 persons comprised the sample for the

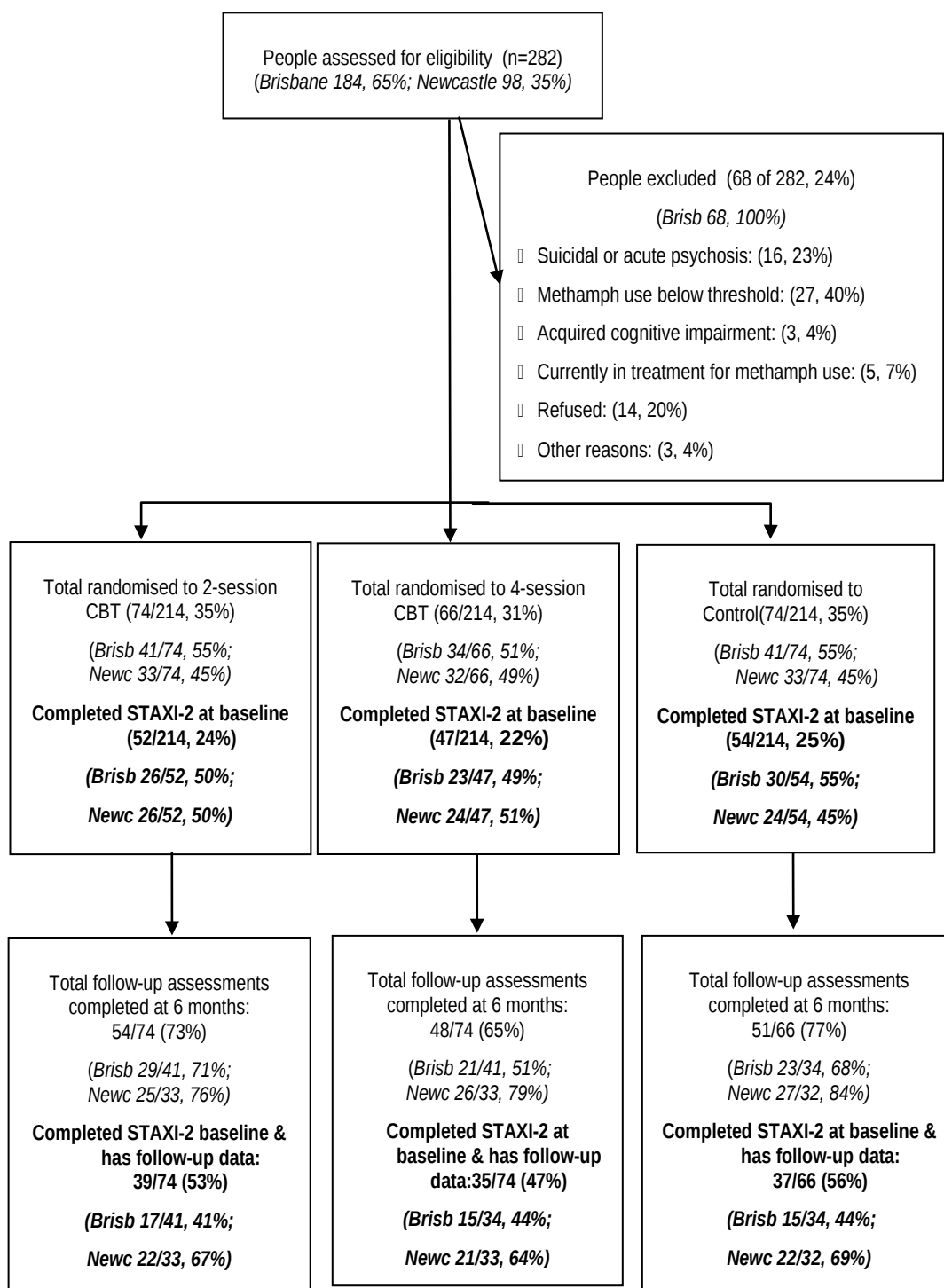


Figure 4.1 Patient flow diagram: recruitment and attrition

Methamphetamine Trial. The candidate's research (that is, the Anger Study) comprised 153 (of 214, 72%) patients who completed the STAXI-2 at baseline. Analyses of

treatment outcome, the focus of the current chapter, included patients who completed the STAXI-2 at both baseline and follow-up (n=111).

4.4.2 Comparisons of those who did and did not complete the STAXI-2 at baseline (153 vs. 61) and baseline characteristics of the Anger Study patients

Characteristics of the 214 Methamphetamine Trial patients and comparisons between those who did and did not complete the STAXI-2 at baseline are reported in Table 4.3. There were no statistically significant differences between the two groups, except for the highest level of education attained ($\chi^2_{(2)} = 9.06$, $p=0.01$). Those who did not complete the STAXI-2 at baseline reported a higher proportion of secondary schooling (25 of 61, 41% vs. 32 of 153, 21%), while those who completed baseline STAXI-2 reported a higher proportion of completing additional qualifications, such as a Trade Certificate (81 of 153, 53% vs. 25 of 61, 41%). Of the 153 patients that completed the STAXI-2 at baseline, almost half were recruited from Newcastle (74 of 153, 48%). Patients reported a mean age of 30.4 years (S.D. 8.2, ranging from 15.70 to 53.07 years); almost two-thirds were male (94, 61%) and most (123, 80%) were not living with someone (i.e. partner or spouse). Just over half of the sample (81, 53%) had finished school and completed additional qualifications (e.g., trade certificate). Many patients reported to have been diagnosed/treated for a mental health problem, excluding substance use, (65, 42%): mostly depression (36 of 65, 55%) or psychotic illness (19 of 65, 29%). The distribution of OTI scores for methamphetamine use was highly skewed and therefore we report the median score for methamphetamine use as 1.0 ranging from 0.14 to 7.50. Reports of mental health problems by patients are presented here as a summary of findings; further details are provided as published works (Baker, Lee, Claire et al., 2004).

Table 4.3 Comparisons between patients who completed the STAX-2 at baseline and those who did not (n=214)

		Completed STAXI-2 at baseline				Total Sample		Test Statistic		
		Yes (n=153)		No (n=61)		N=214		χ^2	df	p
		n	%	N	%	n	%			
Demographics										
Gender	Male	94	61%	40	66%	134	62%	0.32	1	0.50
Marital Status (living with someone)	Yes	30	20%	12	20%	42	20%	0.00	1	0.99
Educational Status	Left school no qualifications	40	26%	11	18%	51	24%	9.06	2	0.01
	Secondary	32	21%	25	41%	57	27%			
	Additional	81	53%	25	41%	106	50%			
Location	Brisbane	79	52%	37	61%	116	54%	1.43	1	0.23
	Newcastle	74	48%	24	39%	98	46%			
Mental Health										
History Psychiatric Illness	Yes	65	42%	33	54%	98	46%	2.37	1	0.124
		Mean	SD	Mean	SD	Mean	SD	t*	df	p
Demographics										
Age		30.4	8.2	29.7	6.7	30.2	8.2	0.56	134.2	0.57
Substance Use (OTI Score)										
Polydrug Use		4.23	1.48	4.52	1.40	4.31	1.46	-1.37	116.79	0.17
	Median	Q1	Q4	Median	Q1	Q4	Median	Q1	Q4	Z**
Methamphetamine Use	1.00	0.35	2.00	1.00	0.50	2.50	1.00	0.40	2.00	-0.98
*Assuming unequal variances; **Mann Whitney Tests because OTI highly right skewed										

*Assuming unequal variances; **Mann Whitney Tests because OTI highly right skewed

The mean age of diagnosis of a mental health problem was reported as 23 years (S.D. 7.8), ranging from 7 to 40 years. Forty patients (26%) had been hospitalised for a psychiatric illness and most admissions occurred during the past two years (28 of 40, 70%). Almost half of the sample (72 of 153, 47%) was taking medication prescribed for a psychiatric illness and more than one third (59 of 153, 39%) was receiving pharmacotherapy treatment (such as Methadone Maintenance Treatment) for opiate addiction.

The mean age reported for initiation to methamphetamine use was 18.7 years (S.D. 5.5) and ranged from 9–40 years. The mean age for regular methamphetamine use was reported as 21 years (S.D. 5.5). Most patients (141 of 153, 92%) reported their usual mode of methamphetamine use was by intravenous injection. The mean age of commencing methamphetamine use by injection was 20.4 years (S.D. 0.51) and ranged from 11–42 years. All patients met diagnostic criteria for methamphetamine dependence disorder (American Psychiatric Association, 2002; First et al., 1998). Cannabis and alcohol were the next highest frequency of drugs used after methamphetamine and their median scores were 1.20 and 0.32, respectively.

4.4.3 Characteristics of the sample based on treatment status

Of the 153 patients eligible for the Anger Study, 99 (65%) had been randomly assigned to receive the study intervention as either 2 sessions (52 of 153, 34%) or 4 sessions (47 of 153, 31%) of CBT. The remaining 54 (35%) patients had been assigned to the control arm of the study. Treatment status was defined as Treatment (n=99) or Control (n=54). Characteristics of patients in the treatment and control groups are shown in Table 4 4. There appeared to be a higher proportion of patients in the control group (15 of 54, 28%), relative to the treatment group (15 of 99, 15%) who were living with someone.

4.4.4 Comparisons of those who completed both the STAXI-2 at baseline and the follow-up assessment (n=111) with those who did not (n=42)

Among patients who completed the STAXI-2 at baseline (n=153), those who went onto complete the final assessment (n=111) were compared with those who did not (n=42) across the selected variables of interest, as described in Table 4.5. The total sample size for completing STAXI-2 at baseline was n=153 and of this group 42 (27%) completed STAXI-2 at baseline only; and 111 (73%) completed the STAXI-2 at both baseline and follow-up. Of those 42 participants who completed the STAXI-2 at baseline only, 9 (21%) were from Newcastle and 33 (79%) were from Brisbane. Forty-two patients were lost to follow-up and among these, most were from the Brisbane patient group (33 vs. 9). This figure reflects a higher proportion of dropouts in Brisbane than in Newcastle among those who had completed the STAXI-2 at baseline only.

There were significant differences in completion of assessment patterns between the locations. A higher proportion of patients from Newcastle (58%, 65 of 74), compared with Brisbane (41%, 46 of 79) completed both assessments ($\chi^2_{(1)} = 16.8$, $p = 0.001$). Most patients who did not complete the final assessment were from Brisbane (33 of 42 vs. 9 of 42 from Newcastle). A higher proportion of those who completed both assessments had attained additional education (58%, 65 of 111 vs. 38%, 16 of 42); however, this was not statistically significant at the 5% level ($\chi^2_{(2)} = 5.2$, $p = 0.075$). The proportion of those completing these assessments was similar across the treatment group components.

Table 4 4 Comparisons of patients who completed baseline STAXI-2 by treatment group (n=153)

		CompletedSTAXI-2 at Baseline				TOTAL SAMPLE		TEST STATISTIC				
		Treatment (n=99)		Control (n=54)		n=153		χ^2	df	P		
		n	%	n	%	n	%					
Demographics												
Gender	Male	59	60%	35	65%	94	61%	0.40	1	0.526		
Marital Status (living with someone)	Yes	15	15%	15	28%	30	20%	3.53	1	0.060		
Educational Status	Left school no qualifications	29	29%	11	20%	40	26%	3.37	2	0.186		
	Secondary	23	23%	9	17%	32	21%					
	Additional	47	47%	34	63%	81	53%					
Location	Brisbane	49	49%	30	55%	79	52%	0.51	1	0.473		
	Newcastle	50	50%	24	44%	74	48%					
Mental Health												
History Psychiatric Illness	Yes	41	41%	24	44%	65	42%	0.13	1	0.717		
		Mean	SD	Mean	SD	Mean	SD	t*	df	P		
Demographics												
Age		30.2	7.8	30.6	8.8	30.4	8.24	0.23	100.21	0.77		
Substance Use (OTI Score)												
Polydrug Use		4.2	1.6	4.3	1.2	4.23	1.48	0.20	136.13	0.84		
		Median	Q1	Q4	Median	Q1	Q4	Median	Q1	Q4	Z**	P
Baseline Methamphetamine Use		1.00	0.40	2.00	1.00	0.29	2.00	1.00	0.35	2.00	-0.113	0.91
*Assuming unequal variances; **Mann Whitney Tests because OTI highly right skewed												

*Assuming unequal variances; **Mann Whitney Tests because OTI highly right skewed

Table 4.5 Description of patients by completion of follow-up assessment

		Completed STAXI-2				TOTAL SAMPLE		TEST STATISTIC				
		Baseline & Follow-Up (n=111)		Baseline Only (n=42)		n=153		χ^2	df	p		
		N	%	n	%	n	%					
Demographics												
Gender	Male	66	59%	28	67%	94	61%	0.668	1	0.414		
Marital Status (living with someone)	Yes	25	22%	5	12%	30	20%	2.179	1	0.140		
Educational Status	Left school no qualifications	26	24%	14	33%	40	26%	5.177	2	0.075		
	Secondary	20	18%	12	29%	32	21%					
	Additional	65	58%	16	38%	81	53%					
Location	Brisbane	46	41%	33	78%	79	52%	16.82	1	<0.001		
	Newcastle	65	58%	9	21%	74	48%					
Mental Health												
History Psychiatric Illness	Yes	47	42%	18	43%	65	42.5%	0.003	1	0.954		
		Mean	SD	Mean	SD	Mean	SD	t*	df	p		
Demographics												
Age		30.0	7.80	32.2	9.15	30.4	8.2	-1.58	64.85	0.122		
Substance Use (OTI Score)												
Polydrug Use		4.14	1.52	4.45	1.4	4.23	1.5	-1.19	80.69	0.235		
		Median	Q1	Q4	Median	Q1	Q4	Median	Q1	Q4	Z**	p
Baseline Methamphetamine Use	1.00	0.39	2.00	0.95	0.33	2.00	1.00	0.355	2.00	-0.006	0.995	
*Assuming unequal variances; **Mann Whitney Tests because OTI highly right skewed												

*Assuming unequal variances; **Mann Whitney Tests because OTI highly right skewed

4.4.5 Treatment outcome and treatment group

Methamphetamine abstinence by treatment group

Among patients who had completed the STAXI-2 at baseline and follow-up (n=111), two thirds had been assigned to treatment (68%, 76 of 111) and more than half reported having been abstinent from methamphetamine use at follow-up (59%, 65 of 111). As

reported in Table 4.6, a higher proportion of patients assigned to treatment (76 of 111, 68%), compared with control (35 of 111, 31%), reported being abstinent at follow-up (36 of 76, 47% vs. 10 of 35, 28%); however, this approached statistical significance at the 5% level ($\chi^2_{(1)} = 3.5$, $p = 0.06$).

Methamphetamine change by treatment group

Methamphetamine change scores, which were approximately normally distributed, compared across treatment groups produced a mean difference of -0.084 (SE 0.34) (equal variances not assumed) between treatment (mean = -0.68 , S.D.= 1.5) and control (mean = -0.77 , S.D.= 1.73) groups. However, differences between the groups were not significant ($t_{(59)} = -0.25$, $p = 0.805$) and are reported in Table 4.6.

Table 4.6 Comparisons between percent abstinent and changes in methamphetamine use by treatment group for patients who completed baseline STAXI-2 and follow-up (n=111)

		Treatment Group				Total Group		Test Statistic		
		Treatment (n=76)		Control (n=35)		n=111		χ^2	df	p
		n	%	n	%	n	%			
Methamphetamine abstinence at follow-up	Yes	36	47%	10	28%	46	41%	3.485	1	0.062
		Mean	SD	Mean	SD	Mean	SD	t*	df	p
Methamphetamine change scores		-0.68	1.51	-0.77	1.73	-0.71	1.57	-0.25	58.76	0.805

*Assuming unequal variances

4.4.6 Baseline trait anger and treatment outcome

Associations between baseline trait anger and treatment outcome were examined by comparing baseline trait anger with methamphetamine change (Table 4.7) and methamphetamine abstinence, high trait anger at baseline with methamphetamine

change and methamphetamine abstinence. Results from these analyses are reported in Tables 4.7 and 4.8.

Baseline trait anger and methamphetamine change

Spearman's non-parametric correlation analysis compared baseline trait anger with methamphetamine change scores. Differences in methamphetamine change scores (Spearman's $\rho = -0.09$, $p = 0.37$) were not significantly associated with baseline trait anger scores.

Table 4.7 Comparisons between high trait anger at baseline and methamphetamine abstinence among patients who completed the STAXI-2 at baseline and follow-up (n=111)

		High Trait Anger at Baseline				Total Group		Test Statistic		
		Yes (n=71)		No (n=40)		n=111		χ^2	df	p
		N	%	n	%	n	%			
Methamphetamine abstinence	Yes	33	46%	13	32%	46	41%	2.06	1	0.15
		Mean	SD	Mean	SD	Mean	SD	t*	df	p
Methamphetamine change scores		-0.77	1.60	-0.60	1.55	-0.71	1.57	-0.52	83.09	0.60
*Assuming unequal variances										

Baseline high trait anger and methamphetamine change

Methamphetamine change scores were similar for those reporting high trait anger at baseline (n=71) and those who did not (n=40): a mean difference -0.16 (SE = 0.31), $t_{(83)} = -0.52$; $p = 0.60$. Those reporting high trait anger at baseline also reported a mean methamphetamine change score of -0.77 (S.D.=1.6) compared with those who did not report high trait anger (mean = -0.60 , S.D.=1.55).

Table 4.8 Comparison of baseline trait anger, methamphetamine abstinence and change in methamphetamine use, among patients who completed the STAXI-2 at baseline and follow-up

Baseline Trait Anger	Methamphetamine Abstinent						Total Sample			Test Statistic	
	Yes (n=46)			No (n=65)			n=111				
	Median	Q1	Q4	Median	Q1	Q4	Median	Q1	Q4		
	26.00	20.0	34.0	22.0	17.0	27.5	23.0	19.0	31.0	Z*	P
										-2.09	0.37

				Methamphetamine Change Scores				Spearman	P
Mean	SD	Min	Max						
-0.7	1.6	-4.5	5.3						
Correlation with Baseline Trait Anger								-0.09	0.37
*Mann Whitney Tests because baseline trait anger is highly skewed									

Baseline trait anger and methamphetamine abstinence

A histogram of baseline trait anger scores indicated responses were highly skewed; the Mann-Whitney U-test (a non-parametric equivalent of the t-test) was chosen as a measure of group differences. The mean rank scores for baseline trait anger for patients who were abstinent (mean=63.57) and were not abstinent (mean=50.65) at follow-up differed significantly (Mann-Whitney U=1147.0, $z = -2.09$, $p = 0.037$).

Baseline high trait anger and methamphetamine abstinence

The proportion of patients reporting abstinence from methamphetamine use at follow-up was similar for those with (33/71, 46%) and without (13/40, 32%) high trait anger at baseline ($\chi^2_{(1)} = 2.06$, $p = 0.15$).

Model 1. Variables in the equation predicting methamphetamine change scores: baseline trait anger, treatment group status and interaction term.

Variables included in the final model for methamphetamine change score were baseline trait anger and interaction term of treatment group status by baseline trait anger. The interaction term was not statistically significant ($t = 0.11$, $p = 0.913$), indicating that

baseline trait anger was not an effect modifier of treatment in this sample, as shown in Table 4.9.

Table 4.9 Parameter estimates for Model 1* variables in the equation predicting methamphetamine change scores

Parameter	B	Std. Error	t	Sig.	95% CI	
					Lower	Upper
Intercept	0.587	0.458	1.282	0.20	-0.32	1.4
[Treatment group=1]	-0.026	0.715	-0.036	0.91	-1.4	1.3
[Treatment group=2]	0 ^a					
[Location=1]	0.208	0.224	0.928	0.35	-0.23	0.65
[Location=2]	0 ^a					
Baseline Trait Anger	-0.055	0.023	-2.423	0.01	-0.10	-0.10
Baseline Anger Expression Out	0.056	0.028	1.999	0.04	0.00	0.11
Baseline methamphetamine use	-0.815	0.081	-10.110	0.001	-0.97	-0.65
Interaction Treat group=1 by Trait Anger	-0.003	-0.028	0.110	0.91	-0.05	0.05
Interaction Treat group=2 by Trait Anger	0 ^a					

^a This parameter is set to zero because it is redundant; *Model 1 Final Step (12)

The additional predictors removed at Step 2 through to Step 11 respectively, were:

alcohol use ($t = -0.003$, $p = 0.998$), age ($t = -0.143$, $p = 0.886$), anger control in ($t = -0.213$, $p = 0.832$), marital status ($t = 0.301$, $p = 0.764$), history of psychiatric illness ($t = -0.354$, $p = 0.724$), anger control out ($t = 0.904$, $p = 0.368$), education status (2) ($t = 0.88$, $p = 0.930$), sex (1) ($t = -1.107$, $p = 0.271$), anger expression in ($t = 1.231$, $p = 0.221$), pharmacotherapy status (1) ($t = -1.413$, $p = 0.161$), cannabis ($t = -1.372$, $p = 0.173$).

Statistical analyses for Model 1 with and without the interaction terms are presented in Appendices 33 and 34, respectively. While the main effect for baseline trait anger was statistically significant ($t = 2.423$, $p = 0.017$), treatment group was not significant ($t = -0.036$, $p = 0.971$).

The other variables significantly associated with methamphetamine change score were: baseline methamphetamine use ($t = -10.11$, $p = 0.001$) and baseline anger expression out

($t = 1.99$, $p = 0.048$). A coefficient estimate of -0.815 (95% CI -0.97 , -0.66) for participants' levels of methamphetamine use at entry to this study indicates that for every 1-unit increase in baseline methamphetamine use, methamphetamine change scores decreased by 0.81 units. For every 1-unit increase in baseline anger expression out score, methamphetamine change scores increased by 0.056 (95% CI -0.001 , -0.112) units of use.

Given that the interaction term of baseline trait anger and treatment group status was not significant ($p = 0.913$) and based on the results from the main effects model, we can conclude that the treatment had no impact on change in methamphetamine use. That is, there is a relationship between baseline trait anger and methamphetamine change score, but this did not impact on treatment status. This result is illustrated in Figure 4.2.

As demonstrated by a non-significant interaction effect, the line of best fit for the relationship between methamphetamine change and baseline trait anger score was very similar for treatment and control groups. As can be seen from the graphs, overall change score declines with decreasing baseline trait anger score. The interaction model had an adjusted R-squared value of 0.51 (from a possible range of 0 to 1, with higher scores denoting a better fit), indicating that this model explains 51% of the variance.

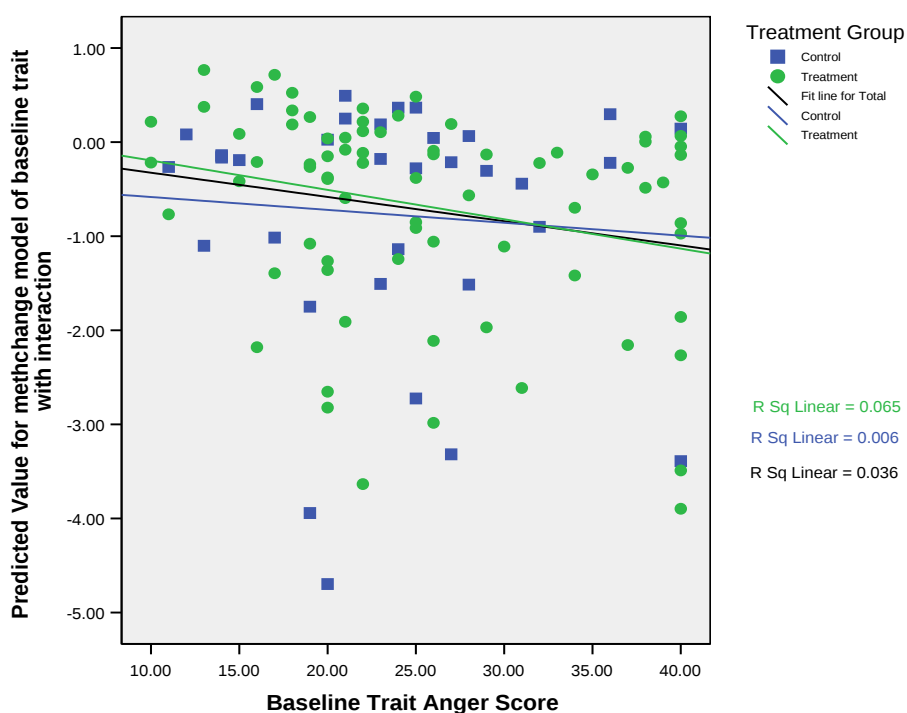


Figure 4.2 Line of best fit for Model 1 variables in the equation predicting methamphetamine change scores

A histogram and normal quantile-quantile plot of the residuals from the final step (12) of Model 1 are shown in Figures 4.3 and 4.4 respectively. These graphs demonstrate that the residuals are skewed to the right and there is one observation with a relatively large residual value (5.20) that fits the model poorly. Removal of this observation would reduce the skewness to a moderate level.

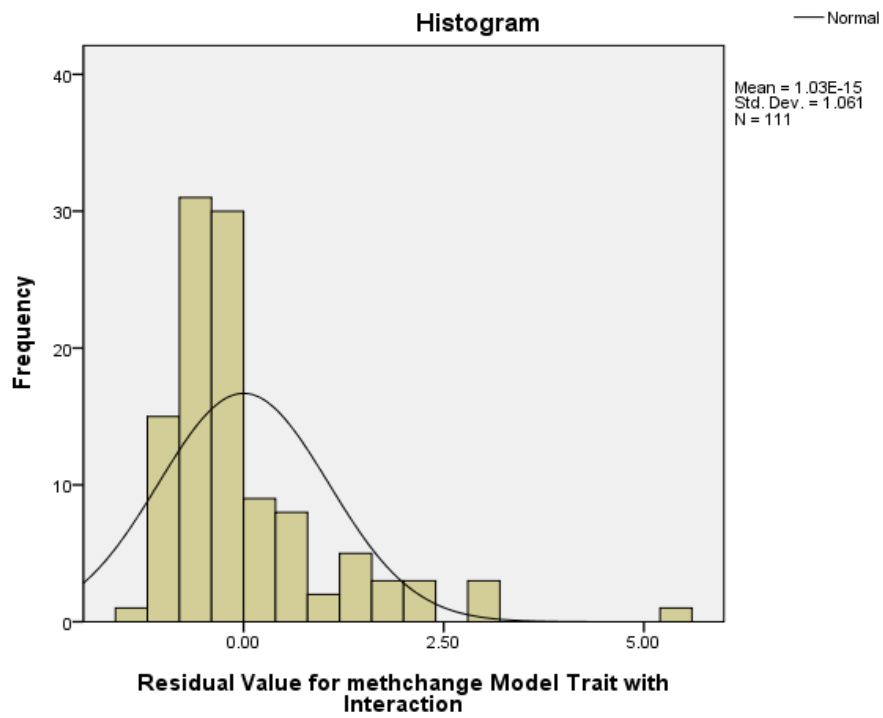


Figure 4.3 Histogram of residual values for Model 1

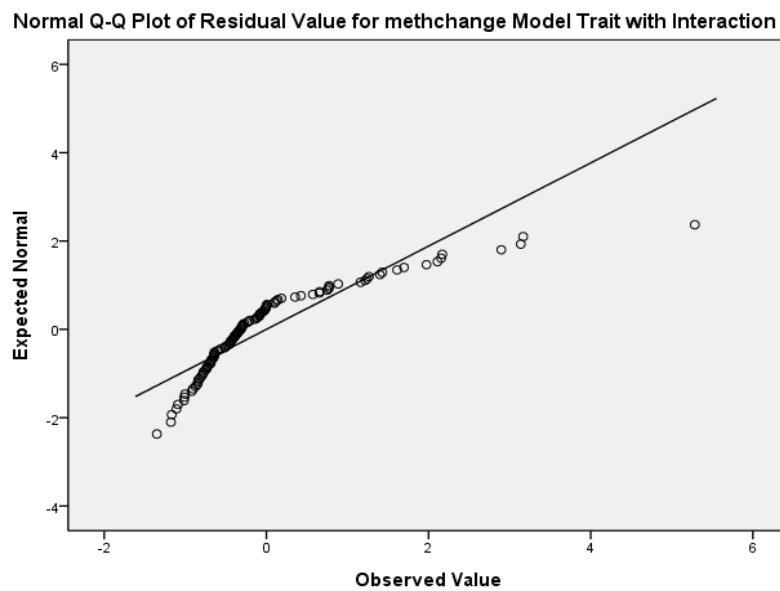


Figure 4.4 Normal quantile-quantile plot of residual values from Model 1

A scatterplot of the residuals versus predicted values for methamphetamine change scores is shown in Figure 4.5. This figure suggests that the residuals take the shape of a random scatter with no noticeable trend, indicating that the assumption of linearity is valid. In addition, the size of the residuals does not appear to change as the predicted values increase, indicating that the assumption of homoscedasticity has been met.

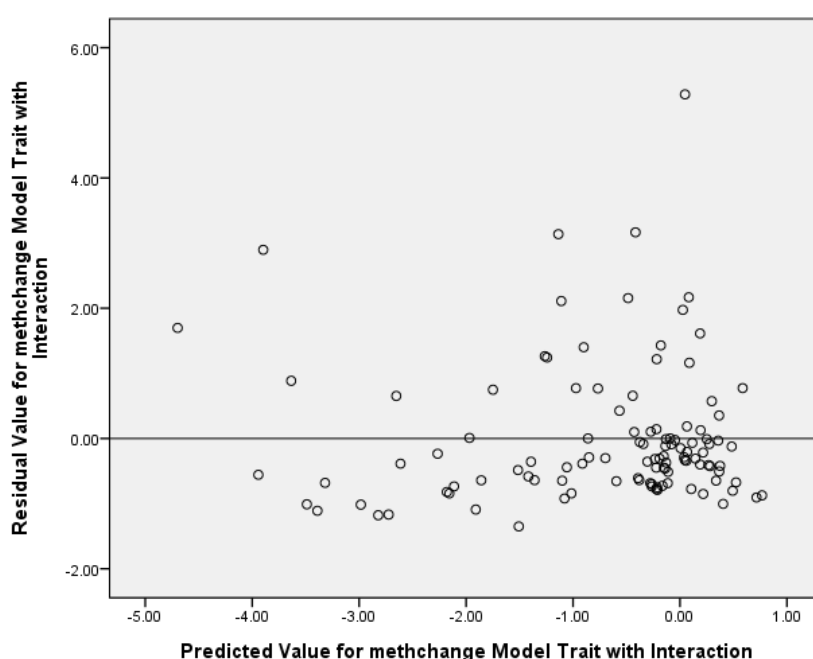


Figure 4.5 Scatterplot of Model 1 standardised residuals against predicted values

Excluding the trait anger by treatment group interaction term produced results that were very similar to those for the interaction model and confirmed that, for everyone 1-unit increase in baseline trait anger, methamphetamine change declined by 0.05 (95% CI: -0.96, -0.12). Methamphetamine change was similar for the two treatment groups.

Model 2. Variables in the equation predicting methamphetamine change scores: high trait anger, treatment group status and interaction term

Model 2 variables comprised high trait anger at baseline, methamphetamine change scores and the interaction term of high trait anger by treatment group status. This interaction term was not statistically significant ($t = -0.286$, $p = 0.77$), indicating that high trait anger was not an effect modifier of treatment, as shown in Table 4.10 and Figure 4.6 below.

Table 4.10 Parameter estimates for Model 2* variables in the equation predicting methamphetamine change scores

Parameter	B	Std. Error	t	Significant	95% CI	
					Lower Bound	Upper Bound
Intercept	0.849	0.313	2.7	0.001	0.22	1.4
Treat group=1	0.126	0.377	0.33	0.73	-0.62	0.87
Treat group=2	0 ^a					
Location=1	0.064	0.234	0.27	0.78	-0.39	0.52
Location=2	0 ^a					
Pharmacotherapy treatment=1	-0.427	0.246	-1.7	0.08	-0.91	0.06
Pharmacotherapy=2	0 ^a					
Baseline High Trait Anger=1	-0.178	0.265	-0.67	0.50	-0.70	0.34
Baseline High Trait Anger=2	0 ^a					
Baseline methamphetamine use	-0.882	0.088	-9.9	0.001	-1.0	-0.70
Baseline cannabis use	-0.020	0.011	-1.8	0.07	-0.04	0.00
Interaction Treat group=1 High Trait Anger=1	-0.136	0.475	-0.28	0.77	-1.0	0.80
Interaction Treat group=1 High Trait Anger=2	0 ^a					
Interaction Treat group=2 High Trait Anger=1	0 ^a					
Interaction Treat group=2 High Trait Anger=2	0 ^a					

^a This parameter is set to zero because it is redundant; *Model 2 Final Step (12)

Neither of the main effects for high trait anger ($t = -0.67$, $p = 0.50$) nor treatment group ($t = 0.33$, $p = 0.73$) were significant. All analyses performed for Model 2 with and without the interaction term are presented in Appendices 35 and 36, respectively.

As with Model 1, baseline methamphetamine use was a significant predictor of methamphetamine change ($t = -9.99$, $p = 0.01$). A coefficient estimate of -0.822 (95% CI -1.05, -0.70) for participants' levels of methamphetamine use at entry to this study

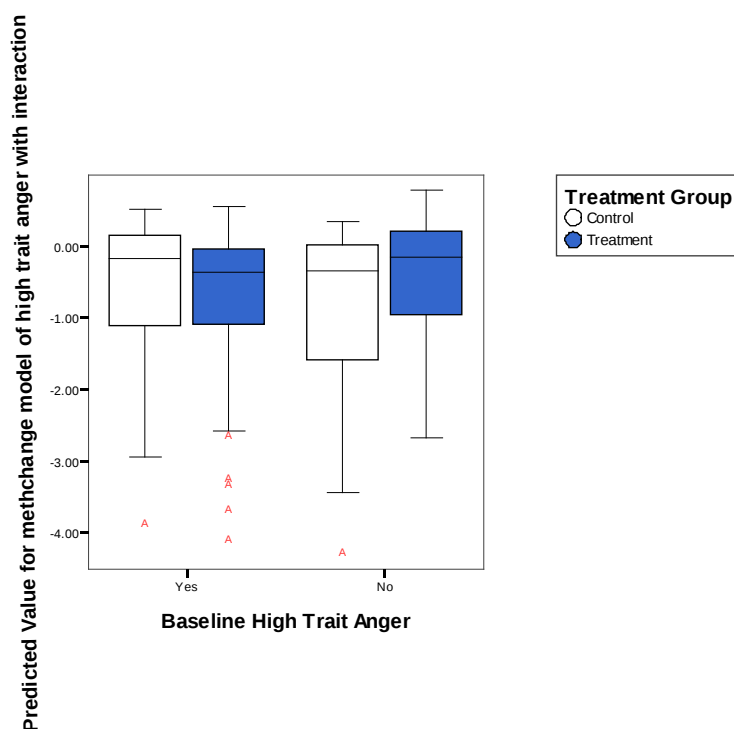


Figure 4.6 Graph of Model 2 variables in the equation predicting methamphetamine change scores

indicates that for every 1-unit increase in baseline methamphetamine use, methamphetamine change scores decreased by 0.82 units: an amount similar to that reported in Model 1 (0.81 units). No other variables were significantly associated with methamphetamine change scores. The additional predictors removed at Step 2 through to Step 11 respectively, were: anger control in ($t = -0.25$, $p = 0.980$), age ($t = 0.069$, $p = 0.945$), alcohol use ($t = -0.098$, $p = 0.922$), marital status (1) ($t = 0.433$, $p = 0.666$), history of psychiatric illness (1) ($t = -1.066$, $p = 0.289$), sex ($t = -1.064$, $p = 0.290$), education status (2) ($t = 0.317$, $p = 0.752$), anger expression in ($t = 0.925$, $p = 0.357$), anger control out ($t = 1.233$, $p = 0.220$), anger expression out ($t = 1.335$, $p = 0.179$).

In summary, the interaction term of baseline high trait anger and treatment group status was not significant ($p = 0.77$), and there were no significant main effects for high trait

anger ($p = 0.50$) or treatment group ($p = 0.73$); baseline methamphetamine use was, however, a prognostic indicator for changes to methamphetamine use ($p = 0.01$).

The Adjusted R-Square value of 0.51 indicates that the proportion of variance estimated by the final model is 51%, a value equal to that gained from Model 1 (51%). Excluding the high trait anger by treatment group interaction term produced results similar to those for the interaction model such that there were no statistically significant main effects for high trait anger ($t = -1.014$, $p = 0.313$) or treatment group ($t = 0.179$, $p = 0.858$). High trait anger produced a coefficient estimate of -0.221 (95% CI $-0.652 - 0.211$), indicating that for every 1-unit increase in high trait anger scores at baseline, methamphetamine change scores decreased by 0.221.

Methamphetamine use at entry to this study is a significant predictor of methamphetamine change ($t = -10.15$, $p = 0.001$). A coefficient estimate of -0.878 (95% CI $-1.049, -0.706$) for participants' levels of methamphetamine use at entry to this study indicates that for every 1-unit increase in baseline methamphetamine use, methamphetamine change scores decreased by 0.87 units, which is a marginally higher rate of methamphetamine reduction, relative to the 0.82 decrease produced by including the interaction term and the 0.81 decrease reported in Model 1.

The same conclusions may be drawn from Model 2, irrespective of the interaction term. High trait anger was not an effect modifier of treatment among this sample; there was no evidence of any main effects; baseline methamphetamine use was a significant predictor for methamphetamine change. Although no evidence of an association between key variables (that is, high trait anger, treatment and methamphetamine change) could be established, baseline methamphetamine use remained a key indicator

of methamphetamine change; decreases in methamphetamine use (methamphetamine change scores) were consistent, irrespective of an interaction term, and are comparable with Model 1.

Model 3. Variables in the equation predicting methamphetamine abstinence: baseline trait anger, treatment group status and interaction term.

After removing additional predictors one at a time, the interaction term in the final Step (12) for Model 3 was not statistically significant (Wald, $\chi^2_{(1)} = 1.185$, $p = 0.276$), indicating that baseline trait anger is not an effect modifier for treatment outcome. The additional predictors removed at Step 2 through to Step 11 respectively, were: anger control in (Wald, $\chi^2_{(1)} = 0.05$, $p = 0.942$), anger expression in (Wald, $\chi^2_{(1)} = 0.151$, $p = 0.698$), history of psychiatric illness (Wald, $\chi^2_{(1)} = 0.146$, $p = 0.703$), education status (1) (Wald, $\chi^2_{(1)} = 0.218$, $p = 0.641$), marital status (1) (Wald, $\chi^2_{(1)} = 0.12$, $p = 0.729$), alcohol use (Wald, $\chi^2_{(1)} = 0.383$, $p = 0.536$), sex (1) (Wald, $\chi^2_{(1)} = 0.76$, $p = 0.383$), anger control out (Wald, $\chi^2_{(1)} = 1.61$, $p = 0.204$), anger expression out (Wald, $\chi^2_{(1)} = 2.491$, $p = 0.115$), and age (Wald, $\chi^2_{(1)} = 3.325$, $p = 0.68$).

Table 4.11 reports the results for this model, including the main effects of baseline trait anger and treatment group, neither of which were statistically significant. Statistical analyses for Model 3 with and without the interaction term are presented in Appendices 37 and 38, respectively. Pharmacotherapy status was the remaining additional variable in this model and, along with all other remaining variables included in the final step, was not significant. The estimates Exp(B) listed in Table 4.11 are the odds ratios and describe the relationship between the remaining predictors and the dependent variable. This relationship is expressed as the relative odds of methamphetamine abstinence

Table 4.11 Model 3* variables in the equation predicting methamphetamine abstinence

Predictors	Wald Test					95% C.I.+		
	B	SE	Z	Df	Sig	Exp(B)	Lower	Upper
Treatment group (1)	2.450	1.642	2.2	1	0.13	11.5	0.46	289.7
Location (1)	0.096	0.445	0.04	1	0.82	1.1	0.46	2.6
Baseline Trait Anger	-0.013	0.029	0.21	1	0.64	0.98	0.93	1.0
Baseline methamphetamine use	0.044	0.164	0.07	1	0.78	1.0	0.75	1.4
Baseline cannabis use	-0.045	0.025	3.2	1	0.07	0.95	0.91	1.0
Interaction Term ^a	-0.068	0.062	1.1	1	0.27	0.93	0.82	1.0
Constant	0.621	0.845	0.53	1	0.46	1.8		

^a Treatment group by baseline trait anger; *Model 3 Final Step (12); +95% C.I. for Exp(B)

(when equal to 1) that could be predicted by a 1-unit increase/decrease in a given predictor, while holding all other predictors constant. In Model 3, baseline trait anger has a value of 0.98 (95% CI 0.93-1.0), therefore, for every 1-unit increase in baseline trait anger, we expect a 0.98 increase in the odds of methamphetamine abstinence, holding all predictors constant, however this is not statistically significantly different to 1 (no difference). In terms of baseline methamphetamine use, for every 1-unit increase in methamphetamine use at baseline, we expect a 1.0 increase (95% CI 0.75-1.4) in the odds of methamphetamine abstinence, holding all predictors constant, but this is not statistically significantly different to 1 (no difference). In terms of cannabis use, for every 1-unit increase in cannabis use, we expect a 0.95 increase (95% CI 0.91-1.0) in the odds of methamphetamine abstinence, holding all predictors constant, which is also not significant.

The Wald Chi-Square and 2-tailed p-values test the null hypothesis that the predictor (coefficient) is zero. Table 4.11 shows that all predictors in Model 3 are not significant and, therefore, the null hypothesis cannot be rejected. The Hosmer and Lemeshow statistics provide a measure of the goodness of fit and percent of cases accurately predicted: values where $p > 0.05$, indicate the model is an adequate/good fit to the data.

In Model 1 (final step) the Hosmer and Lemeshow test for the goodness of fit indicates that the data fit the model well ($\chi^2_{(8)} = 8.394$, $p = 0.396$); the model accurately predicted 64% of cases for which abstinence was achieved; and predicts that for every 1-unit increase in patient baseline trait anger scores, we can expect a 0.98 increase in the likelihood that they will report methamphetamine abstinence at follow-up, while holding all other variables constant.

Model 4. Variables in the equation predicting methamphetamine abstinence: baseline high trait anger, treatment group status and interaction term.

At the final step (12) of Model 4, the interaction term of baseline high trait anger by treatment group was not statistically significant at the 5% level but at the 10% significance level ($\chi^2_{(1)} = 2.65$, $p = 0.10$). This indicates that while baseline high trait anger was not an effect modifier for treatment outcome as reported in Table 4.12, there may be some evidence that it is important. Main effects for baseline high trait anger did not reach statistical significance ($\chi^2_{(1)} = 0.03$, $p = 0.48$); however, treatment group was significant ($\chi^2_{(1)} = 4.31$, $p = 0.03$). An assessment of the overall significance of the model showed it provides an adequate/good fit of the model to the data ($\chi^2_{(8)} = 12.981$, $p = 0.113$) and successfully predicted 65% of cases for which abstinence was correctly predicted by the model.

As shown in Table 4.12 below, treatment group is a significant predictor within this model, as it was in the full model. The interaction term is not significant, indicating that high trait anger is not an effect modifier of treatment outcome when defined as abstinence. Although cannabis use was a significant predictor in the full model, it was replaced by age as the additional predictor in this final model; no other factors were

Table 4.12 Model 4* variables in the equation predicting methamphetamine abstinence

Predictors	Wald Test					95% C.I.+		
	B	SE	Z	Df	Sig	Exp(B)	Lower	Upper
Treatment group (1)	2.345	1.130	4.3	1	0.03	10.4	1.1	95.5
Location (1)	0.116	0.452	0.06	1	0.79	1.1	0.46	2.7
Baseline High Trait Anger	-0.095	0.496	0.03	1	0.84	0.90	0.34	2.4
Age	0.056	0.029	3.6	1	0.05	1.0	0.99	1.1
Baseline methamphetamine use	0.044	0.163	0.07	1	0.78	1.0	0.75	1.4
Interaction term ^a	-2.037	1.250	2.6	1	0.10	0.13	0.01	1.5
Constant	-1.599	0.985	2.6	1	0.10	0.20		

^a Treatment group by baseline high trait anger; *Model 4 Final Step (12); +95% C.I. for Exp(B)

significant in this model. Analyses for Model 4 with and without the interaction term are presented in Appendices 39 and 40.

The estimates Exp(B) listed in Table 4.12 above are the odds ratios and describe the relationship between the remaining predictors and methamphetamine abstinence, expressed as the relative odds of methamphetamine abstinence (when equal to 1) that could be predicted by a 1-unit increase/decrease in a given predictor, while holding all other predictors constant. For a categorical explanatory variable the odds ratio is the odds of the outcome in one group relative to the reference group. For example, the odds of methamphetamine abstinence, holding all other predictors constant, for those with high trait anger, is 0.90 (95% CI 0.34 – 2.4) times that of those without high trait anger. Thus, those with high baseline trait anger have (minimally) lower odds of methamphetamine abstinence at follow-up, but this is not statistically significantly different to 1 (no difference). In terms of age, for every 1-unit increase in age, we expect a 1.0 increase (95% CI 0.99 – 1.0) in the odds of methamphetamine abstinence, holding all predictors constant, which is also not significant.

The additional predictors removed at Step 2 through to Step 11 respectively, were: anger control in (Wald, $\chi^2_{(1)} = 0.005$, $p = 0.94$), history of psychiatric illness (Wald,

$\chi^2_{(1)} = 0.74$, $p = 0.78$), anger expression in (Wald, $\chi^2_{(1)} = 0.07$, $p = 0.79$), education status (1) (Wald, $\chi^2_{(1)} = 0.13$, $p = 0.715$), marital status (1) (Wald, $\chi^2_{(1)} = 0.23$, $p = 0.63$), alcohol use (Wald, $\chi^2_{(1)} = 0.39$, $p = 0.53$), sex (1) (Wald, $\chi^2_{(1)} = 0.77$, $p = 0.38$), anger control out (Wald, $\chi^2_{(1)} = 1.64$, $p = 0.20$), anger expression out (Wald, $\chi^2_{(1)} = 2.01$, $p = 0.15$), cannabis (Wald, $\chi^2_{(1)} = 3.75$, $p = 0.05$). Pharmacotherapy status was the remaining predictor entered into the final model.

In summary, Models 3 and 4 can be assessed in terms of: the fit of each model to the data; the significance level of the overall model; the overall percentage of cases for which the model correctly predicted the outcome; and the relationship of the predictors to the outcome variable. The Hosmer and Lemeshow Test values for Models 3 and 4 (Step 1 then Step 12) indicate the model fits the data. A description of trait anger as a predictor for the final level (Step 12) of each model is reported in Table 4.12.

At Step 1, with all predictors entered into the regression equation, the overall model of methamphetamine abstinence, baseline high trait anger and the interaction term was statistically significant, as indicated by the Omnibus Test of Model Coefficients ($\chi^2_{(18)} = 29.450$, $p = 0.043$). As previously shown in Table 4.12 above, this model was an adequate/good fit of the model to the data ($\chi^2_{(8)} = 4.969$, $p = 0.761$) and successfully predicted 71% of cases for which abstinence was achieved. The interaction term was not significant ($\chi^2_{(1)} = 2.703$, $p = 0.100$), indicating that high trait anger was not an effect modifier of methamphetamine abstinence.

4.5 DISCUSSION

4.5.1 Summary of findings

Trait anger as an effect modifier for treatment outcome among methamphetamine users

Four sets of statistical models were developed to test the hypothesis that trait anger is an effect modifier for treatment. Specifically, it was expected that patients high in trait anger would be less responsive to methamphetamine treatment but no support was found for this hypothesis. Models 1 and 2 examined associations between trait anger assessed at baseline and changes in methamphetamine use measured by an OTI score. Models 3 and 4 examined this association with methamphetamine abstinence as the treatment outcome. Model 4 suggests that the effect may be the opposite of that hypothesised; that is, if anything, patients with high trait anger at baseline fared better in treatment, although this was only significant at the 10% level ($p = 0.10$).

Importantly, all of the models included age, gender, marital and educational status, history of psychiatric illness, patterns of other substance use, and pharmacotherapy treatment status in the initial model, with only variables which were significant at the 10% level included in the final model. The baseline variables that remained significant predictors of reduced methamphetamine use were trait anger, methamphetamine use, cannabis use and anger expressed toward others or the environment. When considering abstinence as the outcome, significant predictors of outcome also included treatment group status and age.

The presence of an association between trait anger and methamphetamine indicated that patients who were high in trait anger at baseline had lower methamphetamine scores at follow-up; this association was not related to treatment. There was an affect of

treatment on methamphetamine use but, contrary to the hypothesis, a patient with high trait anger at baseline did not do worse in treatment. Trait anger predicts methamphetamine use status but is not prognostic of treatment outcome; that is, high trait anger at baseline predicts methamphetamine abstinence but this is not related to treatment. Accordingly, there is no prognostic value of trait anger in relation to treatment effectiveness.

The patients recruited to this treatment were chronic methamphetamine users. All were diagnosed with methamphetamine dependence and most injected this drug. These factors alone indicate a complexity of treatment needs additional to engaging in a methamphetamine treatment program. Previous research indicates an inverse relationship between the severity of methamphetamine dependence and treatment outcome. For example, each route of drug administration carries its own set of risks and associated harms, as discussed in Chapter 1. Injecting methamphetamine, as compared with snorting or swallowing, increases the likelihood of dependence, adverse reactions and contributes to multiple health and social problems (Cunningham, Liu, & Muramoto, 2008; Degenhardt et al., 2010; Domier, 2000; McKetin, Ross, et al., 2008). Treatment response can also differ according to the route of administration (Rawson et al., 2007). Those who injected methamphetamine, as compared with those who snorted or smoked methamphetamine, reported lower levels of both treatment engagement ($B=-0.658$, $p<0.001$) and retention ($B=-3.014$, $p<0.001$), as well as higher levels of in-treatment methamphetamine use ($B=-0.164$, $p<0.001$) and treatment non-completion ($B=-1.278$, $p<0.001$) (Rawson et al., 2007). At one-year post-treatment follow-up, injectors were significantly more likely than non-injectors to test positive for methamphetamine use.

An additional finding by Rawson and colleagues (2007) that is of interest to this thesis, is that baseline levels of hostility, as measured by the Brief Symptom Inventory (Derogatis, 1975), were not significantly different according to route of administration. However, one-year post-treatment, intranasal users reported significantly less hostility than smokers and injectors (Rawson et al., 2007). Future research may benefit from investigating whether methamphetamine and non-methamphetamine users (such as heroin users) report differences in levels of hostility, anger and aggression over time according to route of administration.

Frequency of methamphetamine use has also been associated with treatment outcome. Daily methamphetamine use is indicated as a risk factor for poor treatment engagement (Brecht et al., 2005), highlighting the important role of pre-treatment assessment in guiding treatment goals (Peck, Yang, Reback, Rotheram-Fuller, & Shoptaw, 2005; Simpson, 2004). Rawson and colleagues note that the highest levels of psychological and medical impairment were reported by those who injected methamphetamine, and as a group they were the least likely to provide a methamphetamine-free urine sample, and at 12 month follow-up were using a higher rate of methamphetamine compared with non-injectors. These findings provide further evidence of methamphetamine injecting drug users as a clinically challenging subpopulation. Therefore, treatment strategies may require a considerable degree of modification to improve treatment engagement and response (Rawson et al., 2007) .

Previous studies describe an inverse relationship between the severity of baseline methamphetamine dependence with treatment outcome. McKetin and colleagues, (McKetin, Kelly, McLaren, & Proudfoot, 2008) for example, reported that a higher rate

of methamphetamine dependence at treatment entry was associated with poor physical health.

4.5.2 Epistemological framework

This thesis examines the hypothesis that trait anger is an effect modifier of treatment for methamphetamine addiction, that is, whether patients entering treatment with high levels of trait anger benefit less from treatment than those with relatively low anger at baseline. In this approach, the prognostic value of trait anger could be determined with a view to improving clinical management of methamphetamine patients.

An epidemiological framework (Rothman & Greenland, 2005; Rothman, Greenland, Poole, & Lash, 2008) has been adopted in this thesis; however, alternative epistemological systems are acknowledged. In experimental psychology, *moderators* are individual characteristics that influence the strength or direction of the relationship between independent and dependent variables, while *mediators* are variables that intervene between intervention and outcome, thereby explaining how and why treatment caused change (Kazdin, 2007). In this analysis, an effect modifier is akin to a moderator in experimental psychology, which specifies for whom and under what conditions treatment works (Kraemer, Wilson, Fairburn, & Agras, 2002).

4.5.3 Measurement

Measurement error is a key consideration in the interpretation of null findings. Trait anger, the explanatory variable of primary interest, proved to be a reliable and valid measure in the current sample, as described in Chapter 3. The null findings are therefore unlikely to be a consequence of error in measurement of this variable. The OTI, a self-report measure of substance use, was selected as a measure of treatment outcome based

on previous studies attesting to the reliability and validity of this instrument (Adelekan et al., 1996; Darke et al., 1992; Darke et al., 1991), as previously discussed. In summary, it is unlikely that a failure of measurement explains the null finding.

Statistical considerations

The clinical trial on which this thesis was based (Baker et al., 2005a) was sufficiently powered to detect the main effect of treatment on methamphetamine use outcome. No power estimate was undertaken at the point of designing the clinical trial to detect the interaction between trait anger and treatment. Detecting an interaction effect typically requires a larger sample than is required to detect main effects. Power calculations indicated that only large interaction effects were detectable: double the log odds of abstinence and difference in mean change scores which were detectable in the original planned RCT. The actual study sample was smaller than initially anticipated as not all participants completed the baseline STAXI-2. Thus the detectable effect sizes were even larger than initially estimated. In three of the four final statistical models, the p-values for the interaction terms were 0.91, 0.77 and 0.27. Accordingly, a lack of statistical power is unlikely to explain the failure to find the effect hypothesized. In the fourth model, examining the interaction of baseline high trait anger and treatment, the p-value was smaller (0.10) but the effect was in the opposite direction to that hypothesised (i.e., patients high in trait anger tended to do better in treatment). Studies with larger samples and thus higher power may be warranted to further investigate this.

The choice and application of statistical tests, as well as statistical power, are key considerations in determining whether the null result obtained truly reflects an absence of association between trait anger and treatment outcome. Further consideration may be given as to whether we would expect to have an interaction effect if there is no main

effect. There could be an interaction effect in the absence of a main effect if there was a positive treatment effect for those with high trait anger and a negative treatment effect for those with low trait anger (or vice versa). To ensure that any potential effect was not missed, treatment outcome was carefully examined as both a continuous and a binary measure, and a range of potential confounders were selected and examined in multiple linear (Models 1 and 2) and logistic (Models 3 and 4) regression analyses. Potential confounders included a broad array of appropriately measured demographic variables, anger, drug use and psychiatric illness. The analysis sought to test for the presence of a statistical interaction between a patient's trait anger before entering treatment and the effectiveness of treatment. To assess for potential selection bias, comparisons among those who had and had not completed the STAXI-2 (Spielberger, 1999) at baseline were made for gender, study site and pharmacotherapy status.

To ensure assumptions relevant to specific statistical techniques were not violated, the distributions of response scores from continuous measures were examined for skewness and kurtosis and, where necessary, appropriate non-parametric analyses were performed. Both trait anger and methamphetamine use baseline scores were highly skewed, so median values were reported and Mann-Whitney U-tests (a non-parametric equivalent of the t-test) were performed to assess for group differences. Spearman's non-parametric correlation analysis was used to test for differences in baseline trait anger and methamphetamine change.

4.5.4 Trait anger and treatment for addiction

Careful searches of the literature reveal no other studies examining whether trait anger is prognostic of methamphetamine treatment outcome. In relation to substances other than methamphetamine, some studies show that anger contributes to the onset and

maintenance of use and to the dynamics of relapse (Daley & Marlatt, 1992; De Moja & Spielberger, 1997; Gonzalez-Prendes, 2008; Larimer, Palmer, & Marlatt, 1999; Marlatt, 1985). Levels of anger and violence observed in substance users are far higher than the levels found in the general population (Grisso, Davis, Vesselinov, Applebaum, & Monahan, 2000; Reilly, Clark, Shopshire, Lewis, & Sorensen, 1994; Reilly & Shopshire, 2000; Tivis, Parsons, & Nixon, 1998). Substance users, compared with non-users, typically have higher levels of trait anger, feel less control over their angry feelings and more often express anger towards others or the environment (Aharonovich, Nguyen, & Nunes, 2001; De Moja & Spielberger, 1997; Gonzalez-Prendes, 2008). Substance users who report high trait anger also report higher levels of post treatment drug cravings (Litt, Cooney, & Morse, 2000) and are more likely to use drugs in response to feeling angry (Tafrate, Kassinove, & Dundin, 2002). Criminal recidivists report higher levels of trait anger than first offenders; high trait anger is prognostic of recidivism (Corapcioglu & Erdogan, 2004). Given the apparent centrality of anger in determining cravings for and relapse to drug use, it is surprising that trait anger was not found to be prognostic for treatment of methamphetamine use in the current study.

Despite considerable evidence linking anger, violence and substance use behaviours, treatment programs have tended to focus on one component (for example, anger) to the exclusion of the other (for example, substance abuse) and not on the co-occurrence of anger and substance abuse (Korman et al., 2008). There is research evidence on the prognostic value of trait anger in treatment for alcohol use disorders; trait anger interacts with specific aspects of therapy to facilitate or impede progress in addressing alcohol use (Karno & Longabaugh, 2005b). An interaction effect between moderate to high levels of trait anger at baseline (moderate to high, >50th percentile, Spielberger,

1988) and the use of confrontation and directiveness in treatment was associated with an increase in the number of post-treatment days drinking alcohol and the number of drinks consumed per drinking day. However, for patients reporting low trait anger (<25th percentile), more directive therapy appeared to result in less frequent drinking but not to lower quantity of consumption on drinking days.

In summary, there is no other evidence bearing on the question of whether trait anger is prognostic for methamphetamine treatment outcome. Many studies have found anger is prognostic for treatment outcome for addiction to alcohol (for example, Parrott and Giancola, 2004), opiates (for example, Fals-Stewart, Kashan, O'Farrell and Birchler, 2002; Petry and Bickel, 1999), cocaine (for example, Easton, Mandel, Babuscio et al., 2007; Fals-Stewart, Kashan, O'Farrell and Birchler, 2002) and tobacco (for example, al'Absi 2007; Gilbert 2002; Ward 2001). The findings of this study suggest that high levels of trait anger should not be considered a barrier to the delivery of effective treatment to patients with methamphetamine use disorders.

CHAPTER 5 CONCLUSION

Methamphetamine is a potent and highly addictive stimulant (National Institute on Drug Abuse, 1998) and dependence can lead to life-threatening physical, neurological and psychological disorders (Cadet & Krasnova, 2009; Srisurapanont et al., 2001). The estimated prevalence of methamphetamine use in Australia remains high and the relative ease of methamphetamine production has increased its availability and affordability in Australia.

Anger, aggression and substance use are complex phenomenon that are poorly understood because they arise from an interplay of biological, psychological, social and environmental factors (Ax, 1953; Bandura, 1983; Boles & Miotto, 2003; Dahlberg & Krug, 2002). Added to this is an absence of a unified basis from which anger can be measured accurately, diagnoses can be formulated, and clinical intervention developed, implemented, and evaluated consistently across populations and over time (Kelly-Cohen et al., 2006). Whether substance use, and in particular methamphetamine use, mediates this pathway is poorly understood. Problems associated with methamphetamine use have led to the implementation of methamphetamine treatment outcome studies (Rawson, 2010; Rawson et al., 2002a). Whether anger mediates treatment outcome for methamphetamine use had not been previously investigated.

This study is the first to examine the validity and reliability of a measure of anger, the STAXI-2 (Spielberger, 1999), in a clinical sample of regular methamphetamine users. This study further examined the utility of the STAXI-2 (Spielberger, 1999) as a prognostic measure for methamphetamine treatment outcome investigating whether anger modifies the effect of treatment for methamphetamine use.

Principal Axis Factoring of baseline responses to the 57 items of the STAXI-2 confirmed the construct validity of the scale. Findings from the analysis of the internal consistency of the scale established the reliability of the instrument. Together, these results corroborated the reliability and validity of the STAXI-2 in this population group and suggest that the instrument could be a valuable tool for clinicians working with methamphetamine users.

Four sets of statistical models were developed to test the hypothesis that trait anger is an effect modifier for treatment outcome among methamphetamine users. Models 1 and 2 examined associations between trait anger assessed at baseline and changes in methamphetamine use. Models 3 and 4 examined this association with methamphetamine abstinence as the treatment outcome. Contrary to expectations, Model 4 suggests that patients with high trait anger at baseline fared better in treatment. It was expected that patients high in trait anger at baseline would be less responsive to methamphetamine treatment but no support was found for this hypothesis. However, the lack of a significant association between high trait anger and poor treatment outcomes is actually reassuring for clinicians because it indicates that angry methamphetamine users are as likely to respond to treatment as their less-angry counterparts.

The findings suggest two avenues for further study aimed at improving the treatment of methamphetamine users: examining the therapeutic alliance and investigating cognitive impairment, discussed below. According to Novaco (2011), the core feature of anger is ‘dysregulation – it’s activation, expression, and experience occur without appropriate controls’ (p1). Central to therapeutic gains is the therapeutic alliance (Deffenbacher, 2011; Novaco, 2011) comprising three interdependent parts: tasks to be completed, goals reflecting treatment objectives negotiated between the patient and therapist and

the therapeutic bond (Bordin, 1979; Luborsky, 1976). The quality of the alliance is critical in all therapeutic approaches (Bordin, 1979) however, the variables that mediate this quality will vary in response to the complex interaction between therapist, patient and treatment mode (Horvath & Symonds, 1991; Martin, Garske, & Katherine, 2000). Fundamental to this approach is establishing a quality relationship marked by high empathy and rapport, agreement on therapeutic goals, and agreement on therapeutic means. The intervention developed in this research was based on clinical strategies that are persuasive rather than coercive, and supportive rather than argumentative, with the therapist seeking to create a positive atmosphere that is conducive to change (Miller and Rollnick, 1991).

In this study, the therapist's task was to create a set of conditions to enhance the patient's own motivation and commitment to change by following the five basic motivational principles: express empathy, develop discrepancy, avoid argumentation, roll with resistance, and support self-efficacy. Critical conditions for promoting change are empathy, warmth and genuineness. Therapists' strategies in this intervention were to promote motivation to change by removing barriers to change, decreasing desirability of substance use, practising empathy, providing feedback, clarifying goals, and active helping (Baker et al., 2003).

Deffenbacher (2011) notes that angry patients may make rapport difficult by their tendency toward being abrasive, intimidating and discounting the therapist. Emphasis on establishing a quality relationship, rapport and non-judgmental exploration of consequences is likely to help the patient feel understood. Therapeutic engagement is an essential component of effective treatment with substance users (Broome, Simpson, & Joe, 1999) and maximizes attendance rates (Broome et al., 1999; Melnick, De Leon,

Thomas, Kressel, & Wexler, 2001; Rosen, Hiller, Webster, Staton, & Leukefield, 2004). Higher levels of internal motivation for treatment enhance therapeutic engagement and commitment to treatment (Rosen et al., 2004).

In the intervention studied here, engagement with the patient and building motivation to change was a core feature of treatment. Strengthening commitment to change was encouraged by developing specific goals and by linking thoughts, triggers and urges to use methamphetamine. A case formulation was used to guide an individualized treatment plan.

In this study, developing a coping skills repertoire was a key feature of the intervention. Patients were taught to identify specific cravings, ways to cope with cravings and developed a craving plan. Specific behavioural strategies included delaying the decision to use, distraction through engagement in another non-drug activity and deciding to reaffirm goals. Cognitive strategies included positive self-talk to decatastrophise the experience of cravings. Coping with lapses to methamphetamine use requires formulating a recovery plan and treating a lapse as a learning experience. If, in the process of making changes to methamphetamine use, there is a sense of being overwhelmed and unable to cope, then it is understandable why anger may occur. This is likely to be particularly relevant to the comedown and withdrawal period when symptoms include psychomotor agitation (American Psychiatric Association, 2002). In this study, understanding the link between thoughts, feelings and behaviour was a key strategy for developing coping skills. This included recognising and responding to unhelpful patterns of thinking and monitoring thoughts about triggers and cravings. Identifying achievements and scheduling pleasant (non-drug use) activities as a reward, was equally important to treatment.

Future research

Prolonged substance abuse can lead to serious cognitive impairment (Bates, Pawlak, Tonigan, & Buckman, 2006; Volkow, Fowler, Wang, & Swanson, 2004), which may undermine behavioural changes targeted by treatment, leading to a lack of treatment compliance, increased attrition and relapse to substance use (Bates et al., 2006). This suggests that impaired and unimpaired substance users traverse different pathways to recovery. Chronic methamphetamine use has been linked to deficits in memory, attention, set-shifting, response inhibition and decision making abilities (Simon, Sim, Richardson, Rawson, & Ling, 2000). Research points to dysfunction in the prefrontal cortex in stimulant users (Aron et al 2007), a key area for addiction treatment as it underlies attention, working memory, response inhibition and decision making (Kalivas & Volkow, 2005). Deficits in these functions predict higher dropout rates and poor treatment response (Sofuoglu, 2010). Despite this evidence, the clinical implications of these findings have received little attention. Former methamphetamine users have shown that cognitive impairments were not reversible after short-term abstinence (Sofuoglu, 2010). Longitudinal studies of methamphetamine users in out-patient treatment (Simon, Dacey, Glynn, Rawson, & Ling, 2004) reveal that those who continued to use methamphetamine performed better in cognitive tests, followed by those who had recently relapsed; while the abstinence (6 months post treatment) group performed poorest overall. The clinical implications of these findings suggest that methamphetamine users would benefit from diagnostic screening for cognitive ability prior to entering treatment, tailoring the intervention accordingly and evaluating how to compensate for loss of cognitive function upon cessation of use (Hart & Powell, 2010). Mental flexibility, response inhibition, working memory and abstract reasoning underlie the behavioural changes targeted by treatment (Goldman, 1990; Weinstein & Shaffer,

1993), and the skills necessary to prevent relapse following treatment (Marlatt, 1985; Tiffany, 1990). Neuropsychological assessment to establish the presence and extent of cognitive impairment may be a first step to formulating a case management plan. Additional areas that are often challenging for clinicians are the unexpected and unpredictable angry outbursts that can be symptomatic of methamphetamine withdrawal (Srisurapanont, Ali, & Marsden, 2003; Srisurapanont et al., 1999, 1999b), but may also be a feature of neuropsychological impairment, an area requiring further investigation (Hart & Powell, 2010).

Evidence in support of the therapeutic alliance being positively associated with treatment gains has been reported across a range of treatment populations and modalities (Bordin, 1979; Horvath & Symonds, 1991; Luborsky, 1976; Martin et al., 2000; Pinsoff, 1994) and it has been identified as a predictor of post treatment reductions in violent behaviour (Brown & O'Leary, 2000; Taft, Murphy, Musser, & Remington, 2004). Psychiatric illness such as psychopathic and antisocial traits are often reported by violent offenders (Taft et al., 2004) and contribute towards treatment resistance and/or dropout. As far as the author is aware, there is no published research examining the therapeutic alliance among patients receiving treatment for methamphetamine addiction. There would be benefit from comparing methamphetamine with non-methamphetamine users to examine therapeutic alliance and possible associations with anger, aggression and violence as well as co-morbid psychiatric illness, in relation to treatment outcome. Further studies may seek to establish whether these factors influence the formation of the therapeutic alliance and thereby improve our understanding of treatment resistance.

There may also be benefit in establishing the reliability and validity of a scale that measures therapeutic alliance in the methamphetamine use population, for example, the Helping Alliance Questionnaire (Luborsky, 1976), Working Alliance Inventory (Horvath & Greenberg, 1989) or Working Alliance Inventory-Short Revised (Hatcher & Gillaspay, 2006).

REFERENCES

- Adams, K., Sandy, L., Smith, L., & Triglone, B. (2007). Drug use monitoring in Australia: 2007 annual report on drug use among police detainees *Research and Public Policy*. Canberra: Australian Institute of Criminology.
- Adelekan, M., Green, A., Dasgupta, N., Tallack, F., Stimson, G. V., & Wells, B. (1996). Reliability and validity of the Opiate Treatment Index among a sample of opioid users in the United Kingdom. *Drug & Alcohol Review*, 15, 261-270.
- Aharonovich, E., Nguyen, H. T., & Nunes, E. V. (2001). Anger and depressive states among treatment-seeking drug abusers: Testing the psychopharmacological specificity hypothesis. *American Journal on Addictions*, 10(4), 327-334.
- Aleamoni, L. (1976). The relation of sample size to the number of variables in using factor analysis techniques. *Educational and Psychological Measurement*, 36, 879-883.
- American Educational Research Association Psychological Association & National Council on Measurement in Education. (1999). *Standards for educational and psychological testing*. Washington, DC: American Educational Research Association.
- American Psychiatric Association. (2002). *Diagnostic and statistical manual of mental disorders. Fourth Edition, Text Revision (DSM-IV-TR)* (4 ed.). Washington, DC: American Psychiatric Association.
- Anastasi, A. (1988). *Psychological Testing* (6th ed.). New York: Macmillan Publishing Company.
- Anderson, C. A., & Bushman, B. J. (2002). Human aggression. *Annual Review of Psychology*, 53, 27-51.
- Anggard, E., Jonsson, L., Hogmark, A., & Gunne, L. (1973). Amphetamine metabolism in amphetamine psychosis. *Clinical Pharmacology and Therapeutics*, 14(5), 870-880.
- Anglin, M. D., Burke, C., Perrochet, B., Stamper, E., & Dawud-Noursi, S. (2000). History of the methamphetamine problem. *Journal of Psychoactive Drugs*, 32, 137-140.
- Angrist, B., Corwin, J., Bartlik, B., & Cooper, T. (1987). Early pharmacokinetics and clinical effects of oral D-amphetamine in normal subjects. *Biological Psychiatry*, 22(11), 1357-1368.
- Angrist, B., & Gershon, S. (1969). Amphetamine abuse in New York city - 1966-1968. *Seminars in Psychiatry*, 1, 195-207.
- Arnell, P., & Sim, J. (1993). Measurement validity in physical therapy research. *Physical Therapy*, 73, 102-110.
- Assael, L. A. (2005). Methamphetamine: An Epidemic of Oral Health Neglect, Loss of Access to Care, Abuse, and Violence. *Journal of Oral Maxillofacial Surgery*, 63, 1253-1254.
- Australian Bureau of Criminal Intelligence. (2003). Australian Illicit Drug Report 2001-2002 *Australian Illicit Drug Report* (pp. 44-68). Canberra: Australian Government Australian Bureau of Criminal Intelligence.

- Australian Crime Commission. (2006). Illicit drug data report 2004-2005 Amphetamines *Australian Crime Commission illicit drug data report* (pp. 10-21). Canberra: Australian Crime Commission.
- Australian Institute of Health and Welfare. (2007). Statistics on drug use in Australia 2006 *Drug statistics series No. 18*. Canberra: Department of Health and Ageing.
- Australian Institute of Health and Welfare. (2008a). 2007 National Drug Strategy Household Survey: detailed findings *Drug statistics series*. Canberra: AIHW.
- Australian Institute of Health and Welfare. (2008b). Australia's health 2008. Canberra: AIHW.
- Averill, J. R. (1983). Studies on anger and aggression: Implications for theories of emotion. *American Psychologist*, November, 1145-1160.
- Ax, A. F. (1953). The physiological differentiation between fear and anger in humans. *Psychosomatic Medicine*, 15, 433-422.
- Back, S., Dansky, B., Coffey, S., Saladin, M., Sonne, S., & Brady, K. (2000). Cocaine dependence with and without post-traumatic stress disorder: a comparison of substance use, trauma history, and psychiatric comorbidity. *American Journal of Addiction*, 9, 51-62.
- Bailey, D., & Shaw, R. (1989). Cocaine- and methamphetamine-related deaths in San Diego County (1987): homicides and accidental overdoses. *Journal of Forensic Science*, 34, 407-422.
- Baker, A., Boggs, T., & Lewin, T. (2001a). Characteristics of regular amphetamine users and implications for treatment. *Drug and Alcohol Review*, 20, 49-56.
- Baker, A., Boggs, T., & Lewin, T. (2001b). Randomized controlled trial of brief cognitive-behavioural interventions among regular users of amphetamine. *Addiction*, 96(9), 1279-1287.
- Baker, A., Kay-Lambkin, F., Lee, N., Claire, M., & Jenner, L. (2003). *A brief cognitive behavioural intervention for regular amphetamine users*. Canberra: Australian Government Department of Health and Ageing.
- Baker, A., Lee, N., Claire, M., Lewin, T., Grant, T., Pohlman, S., . . . Carr, V. (2004). Drug use patterns and mental health of regular amphetamine users during a reported 'heroin drought'. *Addiction*, 99(7), 875-884.
- Baker, A., Lee, N., Claire, M., Lewin, T., Grant, T., Pohlman, S., . . . Carr, V. (2005a). Brief cognitive behavioural interventions for regular amphetamine users: a step in the right direction. *Addiction*, 100(3), 367-378.
- Baker, A., Lee, N. K., Claire, M., Lewin, T. J., Grant, T., Pohlman, S., . . . Carr, V. J. (2005b). Brief cognitive behavioural interventions for regular amphetamine users: a step in the right direction. *Addiction*, 100, 367-378.
- Bandura, A. (1973). *Aggression: a social learning theory analysis*. New York: Prentice-Hall.
- Bandura, A. (1983). Psychological mechanisms of aggression. In R. Green & E. Donnerstein (Eds.), *Aggression: Theoretical and empirical views*. (pp. 1-40). New York: Academic Press.

- Bannigan, K., & Watson, R. (2009). Reliability and validity in a nutshell. *Journal of Clinical Nursing, 18*(23), 3237-3243.
- Barbour, K., & Eckhardt, C. (1998). The experience and expression of anger in maritally violent and maritally discordant-nonviolent men. *Behavior Therapy, 29*(2), 173-191.
- Barlow, D. (1991). Disorders of emotion. *Psychological Inquiry, 2*, 58-71.
- Barr, A., Panenka, W., MacEwan, W., Thornton, A., Lang, D., Honer, W., & Lecomte, T. (2006). The need for speed: an update on methamphetamine addiction. *Journal of Psychiatry & Neuroscience, 31*(5), 301-313.
- Barrett, P., & Kline, P. (1981). The observation to variable ratio in factor analysis. *Personality Study and Group Behavior, 1*, 23-33.
- Bartlett, M. (1954). A note on the multiplying factors for various chi square approximations. *Journal of the Royal Statistical Society, 16*(Series B), 296-298.
- Basco, M., Bostic, J., Davies, D., Rush, A., Witte, B., Hendrickse, W., & Barnett, V. (2000). Methods to improve diagnostic accuracy in a community mental health setting. *The American Journal of Psychiatry, 157*(10), 1599-1605.
- Bates, M., Pawlak, A., Tonigan, J., & Buckman, J. (2006). Cognitive impairment influences drinking outcome by altering therapeutic mechanisms of change. *Psychology of Addictive Behaviors, 20*(3), 241-253. doi: DOI: 10.1037/0893-164X.20.3.241
- Berkowitz, L. (1993). *Aggression: It's causes, consequences and control*. New York: McGraw Hill.
- Berman, M., & Coccaro, E. (1998). Neurobiologic correlates of violence: relevance to criminal responsibility. *Behavioral Sciences and the Law, 16*(3 Summer), 303-318.
- Bettencourt, B. A., & Miller, N. (1996). Sex differences in aggression as a function of provocation: a meta-analysis. *Psychological Bulletin, 119*, 422-447.
- Biaggio, M. (1980). Assessment of anger arousal. *Journal of Personality Assessment, 44*(3), 289-298.
- Biaggio, M. (1987). Clinical dimensions of anger management. *Journal of Psychotherapy, 41*, 417-427.
- Biaggio, M., Supplee, K., & Curtis, N. (1981). Reliability and validity of four anger scales. *Journal of Personality Assessment, 45*(6), 639-648.
- Bishop, G., & Quah, S. (1998). Reliability and validity of measures of anger/hostility: Cook and Medley Ho Scale, STAXI, and Buss-Durkee Hostility Inventory. *Personality and Individual Differences, 24*, 867-878.
- Bland, J. M., & Altman, D. G. (2007). Statistics notes: Cronbach's alpha. *British Medical Journal, 314*(February), 572.
- Boles, S., & Miotto, K. (2003). Substance abuse and violence: A review of the literature. *Aggression and Violent Behaviour, 8*, 155-174.
- Bond, A., & Silveira, J. (1993). The combination of alprazolam and alcohol on behavioral aggression. *Journal of Studies on Alcohol, Supplement 11*, 30-39.

- Bordin, E. (1979). The generalizability of the psychoanalytic concept of the working alliance. *Psychotherapy: Theory, Research and Practice*, 16, 252-260.
- Borteyrou, X., Bruchon-Schweitzer, M., & Spielberger, C. (2008). The French adaptation of the STAXI-2. *Encephale-Revue De Psychiatrie Clinique Biologique Et Therapeutique*, 34(3), 249-255.
- Boulet, J., & Boss, M. (1991). Reliability and validity of the Brief Symptom Inventory. *Psychological Assessment*, 3, 433-437.
- Bousman, C., Glatt, S., Everall, I., & Tsuang, M. (2009). Genetic association studies of methamphetamine use disorders: A systematic review and synthesis. *American Journal of Medical Genetics Part B-Neuropsychiatric Genetics*, 150B, 1025-1049.
- Bowman, C., & Cohen, J. (1996). A review of treatment efficacy for individuals with anger problems: conceptual, assessment and methodological issues. *Clinical Psychology Review*, 16(3), 251-275.
- Brecht, M., O'Brien, C., von Mayrhauser, C., & Anglin, M. (2004). Methamphetamine use behaviors and gender differences. *Addictive Behaviours*, 29, 89-106.
- Brecht, M. L., Greenwell, L., & Anglin, M. D. (2005). Methamphetamine treatment: Trends and predictors of retention and completion in a large state treatment system (1992-2002). *Journal of Substance Abuse Treatment*, 29(4), 295-306. doi: 10.1016/j.jsat.2005.08.012
- Brookes, S., Whitely, E., Egger, M., Davey Smith, G., Mulheran, P., & Peters, T. (2004). Subgroup analyses in randomized trials: risks of subgroup-specific analyses; power and sample size for the interaction test. *Journal of Clinical Epidemiology*, 57(3), 229-236.
- Brookes, S., Whitly, E., Peters, T., Mulheran, P., Egger, M., & Davey Smith, G. (2001). Subgroup analyses in randomised controlled trials: quantifying the risks of false-positives and false-negatives. *Health Technology Assessment*, 5(33), 1-4.
- Broome, K., Simpson, D., & Joe, G. (1999). Patient and program attributes related to treatment process indicators in DATOS. *Drug & Alcohol Dependence*, 57(2), 127-135.
- Brown, P., & O'Leary, K. (2000). Therapeutic alliance: Predicting continuance and success in group treatment for spouse abuse. *Journal of Consulting & Clinical Psychology*, 68, 340-345.
- Bryman, A., & Cramer, D. (2004). *Handbook of data analysis*. California: Sage Publications Inc.
- Burns, J. W., Johnson, B. J., Devine, J., Mahoney, N., & Pawl, R. (1998). Anger management style and the prediction of treatment outcome among male and female chronic pain patients. *Behaviour Research and Therapy*, 36(11), 1051-1062.
- Buss, A. (1961). *The psychology of aggression*. New York: John Wiley.
- Buss, A., & Durkee, A. (1957). An inventory for assessing different kinds of hostility. *Journal of Consulting and Clinical Psychology*, 21(4), 343-349.
- Buss, A., & Perry, M. (1992). The Aggression Questionnaire. *Journal of Personality and Social Psychology*, 63(3), 452-459.
- Cadet, J., & Krasnova, I. (2009). Molecular bases of methamphetamine-induced neurodegeneration. *International Review of Neurobiology*, 88, 101-119.

- Campbell, D., & Fiske, D. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 56, 81-105.
- Cartier, J., Farabee, D., & Prendergast, M. L. (2006). Methamphetamine use, self-reported violent crime, and recidivism among offenders in California who abuse substances. *Journal of Interpersonal Violence*, 21, 435-447.
- Cattell, R. (1966). The scree test for number of factors. *Multivariate Behavioral Research*, 1, 245-276.
- Chemtob, C. M., Novaco, R. W., Hamada, R. S., Gross, D. M., & Smith, G. (1997). Anger regulation deficits in combat-related posttraumatic stress disorder. *Journal of Traumatic Stress*, 10(1), 17-36.
- Chermack, S. T., & Giancola, P. (1997). The relationship between alcohol and aggression: an integrated biopsychosocial conceptualisation. *Clinical Psychology Review*, 17, 621-649.
- Child, D. (1990). *The essentials of factor analysis* (2nd ed.). London: Cassell.
- Cho, A., & Melega, W. (2002). Patterns of methamphetamine abuse and their consequences. *Journal of Addictive Diseases*, 21(1), 21-34.
- Cliff, N., & Hamburger, C. (1967). The study of sampling errors in factor analysis by means of artificial experiments. *Psychological Bulletin*, 68, 430-455.
- Cloninger, C. (1999). Genetics of substance abuse. In M. Galanter & H. Kleber (Eds.), *Textbook of substance abuse treatment* (2nd ed.) (2nd ed., pp. 59-66). Washington DC: American Psychiatric Press.
- Coccaro, E., Bergeman, C., & McClearn, G. (1993). Heritability of irritable impulsiveness: a study of twins reared together and apart. *Psychiatry Research*, 48, 229-242.
- Coccaro, E., & Kavoussi, R. (1996). Neurotransmitter correlates of impulsive aggression. In D. Stoff & R. Carins (Eds.), *Aggression and Violence: Genetic, Neurobiological, and Biosocial Perspectives* (pp. 67-85). New Jersey: Lawrence Erlbaum Associates, Inc.
- Cohen, J. (1960). A coefficient of agreement for nominal scales. *Educational and Psychological Measurement*, 20(1), 37-46. doi: 10.1177/001316446002000104
- Cohen, J., Dickow, A., Horner, K., Zweben, J., Balabis, J., Vandersloot, D., & Reiber, C. (2003). Abuse and violence history of men and women in treatment for methamphetamine dependence. *The American Journal On Addictions*, 12, 377-385.
- Cohen, J., Greenberg, R., Uri, J., Halpin, M., & Zweben, J. (2007). Women with methamphetamine dependence: Research on etiology and treatment. *Journal of Psychoactive Drugs*(Supplement 4), 347-351.
- Cohen, R., Hsueh, Y., Russell, K., & Ray, G. (2006). Beyond the individual: A consideration of context for the development of aggression. *Aggression and Violent Behavior*, 11, 341-351.
- Comfrey, A. (1973). *A first course in factor analysis*. New York: Academic Press.
- Comfrey, A., & Lee, H. (1992). *A First Course in Factor Analysis*. Hillsdale, NJ: Lawrence Erlbaum Associates.

- Connor, D., & Steingard, R. (1996). A clinical approach to the pharmacotherapy of aggression in children and adolescents. In C. Ferris & T. Grisso (Eds.), *Understanding aggressive behavior in children* (pp. 290-308). New York: New York Academy of Sciences.
- Cook, C., Jeffcoat, A., Hill, J., Pugh, D., Patetta, P., Sadler, B., . . . Perez-Reyes, M. (1993). Pharmacokinetics of methamphetamine self-administered to human subjects by smoking S-(+)-methamphetamine hydrochloride. *Drug Metabolism and Disposition*, 21(4), 717-723.
- Corapcioglu, A., & Erdogan, S. (2004). A cross-sectional study on expression of anger and factors associated with criminal recidivism in prisoners with prior offences. *Forensic Science International*, 140(2-3), 167-174.
- Cornell, D. G., Peterson, Catherine, S. & Richards, Herbert. (1999). Anger as a predictor of aggression among incarcerated adolescents. *Journal of Consulting and Clinical Psychology*, 67(1), 108-115.
- Cortina, J. M. (1993). What is coefficient alpha? An examination of theory and applications. *Journal of Applied Psychology*, 78(1), 98-104.
- Costello, A. B., & Osborne, J. W. (2005). Best practices in Exploratory Factor Analysis: four recommendations for getting the most from your analysis. *Practice Assessment, Research & Evaluation*, 10(7), 1-9.
- Crean, A., & Pohl, J. (2004). 'Ally McBeal heart?'—drug induced cardiomyopathy in a young woman. *British Journal of Clinical Pharmacology*, 58, 558-559.
- Cronbach, L. (1951). Coefficient alpha and the internal structure of tests. *Psychometrika*, 16, 297-334.
- Cronbach, L., & Meehl, P. (1955). Construct validity in psychological tests. *Psychological Bulletin*, 52, 281-302.
- Cronbach, L., & Shavelson, R. (2004). My current thoughts on coefficient alpha and successor procedures. *Educational and Psychological Measurement*, 64(3), 391-418.
- Cullari, S. (1994). Levels of Anger in Psychiatric-Inpatients and Normal Subjects. *Psychological Reports*, 75(3), 1163-1168.
- Cunningham, J. K., Liu, L. M., & Muramoto, M. (2008). Methamphetamine suppression and route of administration: precursor regulation impacts on snorting, smoking, swallowing and injecting. *Addiction*, 103(7), 1174-1186.
- Dahlberg, L., & Krug, E. (2002). Violence - a global public health problem. In E. G. Krug, Dahlberg, L.L., Mercy, J.A., Zwi, A.B., & Lozano, R. (Ed.), *World report on violence and health* (Vol. Chapter 1, pp. 1-19). Geneva: World Health Organisation.
- Daley, D. C., & Marlatt, G. A. (1992). Relapse prevention: Cognitive and behavioural interventions. In J. Lowinson, P. Ruiz & F. Millman (Eds.), *Substance abuse: a comprehensive textbook* (2nd ed., pp. 533-542). Baltimore: Williams & Wilkins.
- Darke, S., & Hall, W. (1995). Levels and correlates of polydrug use among heroin users. *Drug & Alcohol Dependence*, 39, 231-235.

- Darke, S., Hall, W., Wodak, A., Heather, N., & Ward, J. (1992). Development and validation of a multi-dimensional instrument for assessing outcome of treatment among opiate users: the Opiate Treatment Index. *British Journal of Addiction*, 87, 733-742.
- Darke, S., Kaye, S., & Ross, J. (1999). Transitions between the injection of heroin and amphetamine. *Addiction*, 94, 1795-1803.
- Darke, S., Ward, J., Hall, W., Heather, N., & Wodak, A. (1991). The Opiate Treatment Index (OTI) researcher's manual. *Technical report no. 11* (pp. 1-28). Sydney: National Drug and Alcohol Research Centre.
- Dawe, S., Loxton, N. J., Hides, L., Kavanagh, D. J., & Mattick, R. P. (2002). *Review of diagnostic screening instruments for alcohol and other drug use and other psychiatric disorders* (2nd ed.). Canberra: Commonwealth Department of Health and Ageing Australia.
- Dayrit, F. M., & Dumlao, M. C. (2004). Impurity profiling of methamphetamine hydrochloride drugs seized in the Philippines. *Forensic Science International*, 144, 29-36.
- De Moja, C. A., & Spielberger, C. D. (1997). Anger and drug addiction. *Psychological Reports*, 81, 152-154.
- Dean, A. (2004). Pharmacology of psychostimulants. In A. Baker, N. Lee & L. Jenner (Eds.), *Models of intervention and care for psychostimulant users, 2nd Edition* (2nd ed., Vol. 51, pp. 39-45). Canberra: Australian Government Department of Health and Ageing.
- Dear, G. E., Watt, B. D., & Dockerill, J. (2003). Factor structure of the Spielberger anger expression scales when used with Australian prisoners. *Psychological Reports*, 92, 617-620.
- DeCoster, J. (1998). Overview of factor analysis. Retrieved July, 25th, 2010, from <http://www.stat-help.com/notes.html>
- Deffenbacher, J. (2011). Cognitive-behavioural conceptualisation and treatment of anger. *Cognitive and Behavioral Practice*, 18(2), 212-222.
- Deffenbacher, J., Dahlen, E., Lynch, R., Morris, C., & Gowensmith, W. (2000). An application of Beck's cognitive therapy to general anger reduction. *Cognitive Therapy and Research*, 24(6), 689-697.
- Deffenbacher, J., Lynch, R., Oetting, E., & Kemper, C. (1996). Anger reduction in early adolescents. *Journal of Counseling Psychology*, 43(2), 149-157.
- Deffenbacher, J., Oetting, E., Huff, M., & Thwaites, E. (1995). Fifteen-month follow-up of social skills and cognitive-relaxation approaches to general anger reduction. *Journal of Counselling Psychology*, 42(3), 400-405.
- Deffenbacher, J., Oetting, E., Lynch, R., & Morris, C. (1996). The expression of anger and its consequences. *Behaviour Research and Therapy*, 34(7), 575-590.
- Deffenbacher, J., Oetting, E., Thwaites, G., Lynch, R., Baker, D., Stark, R., . . . Eiswerth-Cox, L. (1996). State-trait anger theory and the utility of the trait anger scale. *Journal of Consulting Psychology*, 43(2), 131-148.

- Degenhardt, L., Coffey, C., Carlin, J., Moran, P., & Patton, G. (2007). Who are the new amphetamine users? A 10-year prospective study of young Australians. *Addiction*, 102(8), 1269-1279.
- Degenhardt, L., Coffey, C., Moran, P., Carlin, J., & Patton, G. (2007). The predictors and consequences of adolescent amphetamine use: findings from the Victoria Adolescent Health Cohort Study. *Addiction*, 102(7), 1076-1084.
- Degenhardt, L., Mathers, B., Guarinieri, M., Panda, S., Phillips, B., Strathdee, S. A., . . . use, t. R. G. t. t. U. N. o. H. a. i. d. (2010). Meth/amphetamine use and associated HIV: Implications for global policy and public health. *International Journal of Drug Policy*, 21, 347-358. doi: 0.1016/j.drugpo.2009.11.007
- Degenhardt, L., & Topp, L. (2003). Crystal meth' use among polydrug users in Sydney's dance party subculture: characteristics, use patterns and associated harms. *International Journal of Drug Policy*, 14, 17-24.
- Del Barrio, V., Aluja, A., & Spielberger, C. (2004). Anger assessment with the STAXI-CA: psychometric properties of a new instrument for children and adolescents. *Personality and Individual Differences*, 37, 227-244.
- Derlet, R., Rice, P., Horowitz, B., & Lord, R. (1989). Amphetamine toxicity: experiences with 127 cases. *Journal of Emergency Medicine*, 7, 157-161.
- Derogatis, L. (1975). *Brief Symptom Inventory*. Baltimore: Clinical Psychometric Research.
- Derogatis, L. (1977). *The SCL-90 Manual I: Scoring, administration and procedures for the SCL-90*. Baltimore: Clinical Psychometric Research.
- Derogatis, L., & Melisaratos, N. (1983). The brief symptom inventory: an introductory report. *Psychological Medicine*, 13, 595-605.
- Derogatis, L., Rickels, K., & Rock, A. (1976). The SCL-90 and the MMPI: A step in the validation of a new self-report scale. *British Journal of Psychiatry*, 128, 280-289.
- DeVon, H., Block, M., Moyle-Wright, P., Ernst, D., Hayden, S., Lazzara, D., . . . Kostas-Polston, E. (2007). A psychometric toolbox for testing validity and reliability. *Journal of Nursing Scholarship*, 39(2), 155-164.
- DiLiberto, L., Katz, R. C., Beauchamp, K. L., Howells, G. N., & DiLiberto, L. (2002). Using Articulated Thoughts in Simulated Situations to Assess Cognitive Activity in Aggressive and Nonaggressive Adolescents. *Journal of Child & Family Studies* (Vol. 11, pp. 179-189).
- Dodge, K. A. (1980). Social cognition and children's aggressive behaviour. *Child Development*, 51, 162-170.
- Dollard, J., Doob, C., Miller, N., Mowrer, O., & Sears, R. (1939). *Frustration and aggression*. New Haven, CT: Yale University Press.
- Domier, C. P., Simon, Sara L., Rawson, Richard A., & Ling, Walter. (2000). A comparison of injecting and noninjecting methamphetamine users. *Journal of psychoactive drugs*, 32(2 Apr-Jun), 229-232.

- Driscoll, H., Zinkivskay, A., Evans, K., & Campbell, A. (2006). Gender differences in social representations of aggression: The phenomenological experience of differences in inhibitory control? *British Journal of Psychology*, 97, 139-153.
- Duncan, R., Saunders, B., Kilpatrick, D., Hanson, R., & Resnick, H. (1996). Childhood physical assault as a risk factor for PTSD, depression, and substance abuse: findings from a national survey. *American Journal of Orthopsychiatry*, 66(3), 437-448.
- Eckhardt, C., Norlander, B., & Deffenbacher, J. (2004). The assessment of anger and hostility: a critical review. *Aggression and Violent Behaviour*, 9, 17-43.
- Ellinwood, E. (1974). The epidemiology of stimulant abuse. In E. Josephson & E. Carroll (Eds.), *Drug Use: Epidemiological and sociological perspectives*. New York: John Wiley & Sons.
- Ellinwood, E. H. (1967). Amphetamine psychosis: I. description of the individuals and process. *Journal of Nervous and Mental Disease*, 144, 273-283.
- Ellinwood, E. H. (1971). Assault and homicide associated with amphetamine abuse. *American Journal of Psychiatry*, 127, 1170-1175.
- Evans, D., & Stangeland, M. (1971). Development of the reaction inventory to measure anger. *Psychological Reports*, 29, 412-414.
- Fabrigar, L., Wegener, D., MacCallum, R., & Strahan, E. (1999). Evaluating the use of exploratory factor analysis in psychological research. *Psychological Methods*, 4(3), 272-299.
- Farrell, M., Marsden, J., Ali, R., & Ling, W. (2002). Editorial: Methamphetamine: drug use and psychoses becomes a major public health issue in the Asia Pacific region. *Addiction*, 97, 771-772.
- Fazel, S., Bains, P., & Doll, H. (2006). Substance abuse and dependence in prisoners: a systematic review. *Addiction*, 101, 181-191.
- Fennig, S., Nalsberg-Fennig, S., Craig, T., Tanenberg-Karant, M., & Bromet, E. (1996). Comparison of clinical and research diagnoses of substance use disorders in first-admission psychotic sample. *The American Journal On Addictions*, 5(1), 40-48. doi: 10.1111/j.1521-0391.1996.tb00282.x
- Ferguson, E., & Cox, T. (1993). Exploratory factor analysis: a users' guide. *International Journal of Selection and Assessment*, 1, 84-93.
- Finley, G., Buffett-Jerrott, S., Stewart, S., & Millington, D. (2002). Effects of midazolam on preoperative anxiety in children. *Canadian Journal of Anesthesia*, 49, A11.
- First, M., Spitzer, R., Gibbon, M., & Williams, J. (1998). *Structured clinical interview for DSM-IV Axis 1 Disorders - Non-patient edition (SCID-1/NP, Version 2.0-8/98 revision)*. New York: Biometric Research Department, New York State Psychiatric Institute.
- Fischman, M., & Haney, M. (1999). Neurobiology in stimulants. In M. Galanter & H. Kleber (Eds.), *Textbook of substance abuse treatment*. (pp. 21-31). Washington, DC: American Psychiatric Press.

- Fishbein, D., Lozovsky, D., & Jaffe, J. (1989). Impulsivity, aggression, and neuroendocrine responses to serotonergic stimulation in substance abusers. *Biological Psychiatry*, 25, 1049-1066.
- Floyd, F., & Widaman, K. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment*, 7(3), 286-299.
- Ford, B. (1991). Anger and irrational beliefs in violent inmates. *Personality and Individual Differences*, 12(3), 211-215.
- Ford, J., MacCallum, R., & Tait, M. (1986). The application of exploratory factor analysis in applied psychology: a critical review and analysis. *Personnel Psychology*, 39, 291-314.
- Forgays, D. G., Kirby Forgays, D., & Spielberger, C. D. (1997). Factor structure of the state-trait anger expression inventory. *Journal of Personality Assessment*, 69(3), 497-507.
- Friedman, A. (1998). Substance use/abuse as a predictor to illegal and violent behaviour: a review of the relevant literature. *Aggression and Violent Behaviour*, 3(4), 339-355.
- Friedman, A., Kramer, S., & Kreisher, C. (1999). Childhood predictors of violent behavior. *Journal of Clinical Psychology*, 55(7), 843-855.
- Frishman, W., Del Vecchio, A., Sanal, S., & Ismail, A. (2003). Cardio-vascular manifestations of substance abuse. Part 2: Alcohol, amphetamines, heroin, cannabis, and caffeine. *Heart Disease*, 5, 253-269.
- Fukunaga, T., Mizoi, Y., & Adachi, J. (1987). Methamphetamine-induced changes of peripheral catecholamines: an animal experiment to elucidate the cause of sudden death oafter methamphetamine abuse. *Japanese Journal of Legal Medicine*, 41(4), 335-341.
- Fukushima, A. (1994). Criminal responsibility in amphetamine psychosis. *Japanese Journal of Psychiatry and Neurology*, 48(Supplement), 1-4.
- Fuqua, D. R., Leonard, E., Masters, M. A., Smith, R. J., Campbell, J. L., & Fischer, P. C. (1991). A structural analysis of the State-Trait Anger Expression Inventory. *Educational and Psychological Measurement*, 51, 439-446.
- Glasner-Edwards, S., Mooney, L., Marinelle-Casey, P., Hillhouse, M., Ang, A., & Rawson, R. (2008). Risk factors for suicide attempts in methamphetamine-dependent patients. *The American Journal On Addictions*, 17, 24-27.
- Glasner-Edwards, S., Mooney, L. J., Marinelli-Casey, P., Hillhouse, M., Ang, A., Rawson, R., & Methamphetamine Treatment, P. (2008). Clinical course and outcomes of methamphetamine-dependent adults with psychosis. *Journal of Substance Abuse Treatment*, 35(4), 445-450. doi: 10.1016/j.jsat.2007.12.004
- Glasner-Edwards, S., Mooney, L. J., Marinelli-Casey, P., Hillhouse, M., Ang, A., Rawson, R. A., & Methamphetamine Treatment, P. (2010). Psychopathology in methamphetamine-dependent adults 3 years after treatment. *Drug and Alcohol Review*, 29(1), 12-20. doi: 10.1111/j.1465-3362.2009.00081.x
- Goldman, M. (1990). Experience-dependent neuropsychological recovery and the treatment of chronic alcoholism. *Neuropsychological Review*, 1, 75-101.
- Goldstein, P. J. (1985). The drugs/violence nexus: a tripartite conceptual framework. *Journal of Drug Issues*, 15(Fall), 493-506.

- Gonzalez-Prendes, A. A. (2008). Anger-Control Group Counseling for Women Recovering From Alcohol or Drug Addiction. *Research on Social Work Practice, 18*(6), 616-625.
- Gorsuch, R. (1988). Exploratory factor analysis. In J. Nesselroade & R. Cattell (Eds.), *Handbook of multivariate experimental psychology* (2nd ed., pp. 231-258). New York: Plenum.
- Gossop, M., Griffiths, P., Powis, B., & Strang, J. (1992). Severity of dependence and route of administration of heroin, cocaine and amphetamines. *British Journal of Addiction, 87*, 1527-1536.
- Gossop, M., Marsden, J., & Stewart, D. (2000). Treatment outcomes of stimulant misusers: one year follow-up results from the national treatment outcome research study (NTORS). *Addictive Behaviours, 25*, 509-522.
- Gothelf, D., Apter, Alan., & van Praag, Herman M. (1997). Measurement of aggression in psychiatric patients. *Psychiatry Research, 71*, 83-95.
- Gould, A. (1994). The issue of measurement validity in health-care research. *British Journal of Therapy and Rehabilitation, 1*, 99-103.
- Granic, I., & Butler, S. (1998). The relation between anger and antisocial beliefs in young offenders. *Personality and Individual Differences, 24*(6), 759-765.
- Green, S., Lissitz, R., & Mulaik, S. (1977). Limitations of coefficient alpha as an index of test unidimensionality. *Educational and Psychological Measurement, 37*, 827-838.
- Greenwell, L., & Brecht, M.-L. (2003). Self-reported health status among treated methamphetamine users. *American Journal of Drug and Alcohol Abuse, 29*, 75-104.
- Grisso, T., Davis, J., Vesselinov, R., Applebaum, P., & Monahan, J. (2000). Violent thoughts and violent behaviour following hospitalisation for mental disorder. *Journal of Consulting & Clinical Psychology, 68*, 388-398.
- Gruenewald, P., Johnson, F., Ponicki, W., Remer, L., & Lascola, E. (2010). Assessing correlates of the growth and extent of methamphetamine abuse and dependence in California. *Substance Use & Misuse, 45*, 1948-1970.
- Guadagnoli, E., & Velicer, W. (1988). The relation of sample size to the stability of component patterns. *Psychological Bulletin, 103*, 265-275.
- Guttman, L. (1954). Some necessary conditions for common-factor analyses. *Psychometrika, 19*, 149-161.
- Haden, S., & Scarpa, A. (2007). The noradrenergic system and its involvement in aggressive behaviors. *Aggression and Violent Behavior, 12*(1), 1-15.
- Haggard-Grann, U., Hallqvist, J., Långström, N., & Möller, J. (2004). The role of alcohol and drugs in triggering criminal violence: a case-crossover study. *Addiction, 101*, 100-108.
- Hair, J., Anderson, R., & Tatham, R. (1987). *Multivariate data analysis*. New York: Macmillan.
- Hall, W., & Hando, J. (1994). Route of administration and adverse effects of amphetamine use among young adults in Sydney, Australia. *Drug & Alcohol review, 13*, 277-284.

- Hall, W., Hando, Julie., Darke, Shane & Ross, Joanna. (1996). Psychological morbidity and route of administration among amphetamine users in Sydney, Australia. *Addiction*, 91(1), 81-87.
- Hart, C., & Powell, A. C. (2010). Determining cognitive deterioration requires multiple tests administered on more than one occasion. *Psychiatry and Clinical Neurosciences*, 64(6), 667-667.
- Haseth, K. (1996). The Norwegian adaptation of the State–Trait Anger Expression Inventory. In C. Spielberger & I. Sarason (Eds.), *Stress and emotion: anxiety, anger, and curiosity* (Vol. 16, pp. 83–106). Washington, DC: Taylor & Francis.
- Hatcher, R., & Gillaspay, J. (2006). Development and validation of a revised short version of the Working Alliance Inventory. *Psychotherapy Research*, 16, 12-25.
- Hayatbakhsh, M. R., Najman, J. M., Bor, W., & Williams, G. M. (2009). Predictors of young adults' amphetamine use and disorders: A prospective study. *Drug and Alcohol Review*, 28(3), 275-283. doi: 10.1111/j.1465-3362.2009.00032.x
- Haynes, S. N., Richard, D. C., & Kubany, E. S. (1995). Content validity in psychological assessment: a functional approach to concepts and methods. *Psychological Assessment*, 7(3).
- Hayton, J., Allen, D., & Scarpello, V. (2004). Factor Retention Decisions in Exploratory Factor Analysis: a Tutorial on Parallel Analysis. *Organizational Research Methods*, 7(2), 191-205.
- Hendrickson, A., & White, P. (1964). Promax: A quick method for rotation to oblique simple structure. *British Journal of Statistical Psychology*, 17(1), 65-70.
- Hiday, V. (1997). Understanding the connection between mental illness and violence. *International Journal of Law and Psychiatry*, 20(4), 399-417.
- Hillhouse, M. P., Marinelli-Casey, P., Gonzales, R., Ang, A., & Rawson, R. A. (2007). Predicting in-treatment performance and post-treatment outcomes in methamphetamine users. *Addiction*, 102, 84-95.
- Hoaken, P., & Stewart, S. (2003). Drugs of abuse and the elicitation of human aggressive behavior. *Addictive Behaviors*, 28, 1533-1554.
- Hong, R., Matsuyama, E., & Nur, K. (1991). Cardiomyopathy associated with the smoking of crystal methamphetamine. *Jama-Journal of the American Medical Association*, 265, 1152-1154.
- Horn, J. (1965). A rationale and test for the number of factors in factor analysis. *Psychometrika*, 32, 179-185.
- Horvath, A., & Symonds, B. (1991). Relation between working alliance and outcome in psychotherapy: a meta-analysis. *Journal of Counseling Psychology*, 38, 139-149.
- Horvath, A. O., & Greenberg, L. (1989). Development and validation of the Working Alliance Inventory. *Journal of Counseling Psychology*, 36, 223-233.
- Howells, K., Day, A., Williamson, P., Bubner, S., Jauncey, S., Parker, A., & Heseltine, K. (2005). Brief anger management programs with offenders: Outcomes and predictors of change. *Journal of Forensic Psychiatry & Psychology*, 16(2), 296-311.

- Huesmann, L. R., & Eron, L.D. (1984). Cognitive processes and the persistence of aggressive behaviour. *Aggressive Behavior*, 10, 243-251.
- Hull, L., Farrin, L., Unwin, C., Everitt, B., Wykes, T., & David, A. S. (2003). Anger, psychopathology and cognitive inhibition: a study of UK servicemen. *Personality and Individual Differences*, 35, 1211-1226.
- Ikeda, M., Ozaki, N., Suzuki, T., Kitajima, T., Yamanouchi, Y., Kinoshita, Y., . . . Iwata, N. (2007). Possible association of beta-arrestin 2 gene with methamphetamine use disorder, but not schizophrenia. *Genes Brain and Behaviour*, 6, 107-112.
- Izard, C. (1971). *The face of emotion*. New York: Apple-Century-Crofts.
- Jablensky, A., McGrath, J., Castele, D., Gureje, O., Evans, M., Carr, V., . . . Harvey, C. (2000). Psychotic disorders in urban areas: an overview of the study on low prevalence disorders. *Australian and New Zealand Journal of Psychiatry*, 34, 221-236.
- Jacobs, L. (1989). Reversible dilated cardiomyopathy induced by methamphetamine. *Clinical Cardiology*, 12, 725-727.
- Jonsson, L., Anggard, E., & Gunne, L. (1971). Blockade of intravenous amphetamine euphoria in man. *Clinical Pharmacology & Therapeutics*, 12(6), 889-896.
- Kaiser, H. (1970). A second generation Little Jiffy. *Psychometrika*, 35, 401-415.
- Kaiser, H. (1974). An index of factorial simplicity. *Psychometrika*, 39, 31-36.
- Kalechstein, A., Newton, T., Longshore, D., Angling, M., van Gorp, W., & Gawin, F. (2000). Psychiatric comorbidity of methamphetamine dependence in a forensic sample. *Journal of Neuropsychiatry & Clinical Neurosciences*, 12, 480-484.
- Kalivas, P., & Volkow, N. (2005). The neural basis of addiction: a pathology of motivation and choice. *American Journal of Psychiatry*, 162, 1403-1413.
- Karch, S. B., Stephens, B. G., & Ho, H. C. (1999). Methamphetamine-related deaths in San Francisco: demographic, pathologic, and toxicological profiles. *Journal of Forensic Science*, 44, 359-368.
- Kass, R. A., & Tinsley, H. E. A. (1979). Factor Analysis. *Journal of Leisure Research*, 11, 120-138.
- Kassinove, H., & Sukhodolsky, D. (1995). Anger disorders: Basic science and practice issues. In H. Kassinove (Ed.), *Anger disorders: Definition, diagnosis, and treatment* (pp. 1-27). Washington, DC: Taylor & Francis.
- Kassinove, H., Sukhodolsky, D., Eckhardt, C., & Tsytsarev, S. (1997). Development of a Russian state-trait anger expression inventory. *Journal of Clinical Psychology*, 53, 543-557.
- Kavoussi, R., Armstead, P., & Coccaro, E. (1997). The neurobiology of impulsive aggression. *The Psychiatric Clinics of North America*, 20(2), 395-403.
- Kaye, S., McKetin, R., Duflou, J., & Darke, S. (2007). Methamphetamine and cardiovascular pathology: a review of the evidence. *Addiction*, 102(8), 1204-1211. doi: 10.1111/j.1360-0443.2007.01874.x

- Kazdin, A. (2007). Mediators and mechanisms of change in psychotherapy research. *Annual Review of Clinical Psychology*, 3, 1-27.
- Kelly, E., McKetin, R., & McLaren, J. (2005). Health service utilisation among regular methamphetamine users. *NDARC Technical Report*. Sydney: National Drug and Alcohol Research Centre.
- Kendler, K., Karkowski, L., Neale, M., & Prescott, C. (2000). Illicit psychoactive substance use, heavy use, abuse, and dependence in a US population-based sample of male twins. *Archives of General Psychiatry*, 57, 261-269.
- Kieffer, K. (1998, 04Nov1998). *Orthogonal versus oblique factor rotation: a review of the literature regarding the pros and cons*. Paper presented at the Annual meeting of the mid-south educational research association, New Orleans.
- Kishimoto, M., Ujike, H., Motohashi, Y., Tanaka, Y., Okahisa, Y., Kotaka, T., . . . Kuroda, S. (2008). The dysbindin gene (DTNBP1) is associated with methamphetamine psychosis. *Biological Psychiatry*, 63, 191-196.
- Klee, H. (1992). A new target for behavioural research - amphetamine misuse. *British Journal of Addiction*, 87, 439-446.
- Klee, H. (1998). The love of speed: an analysis of the enduring attraction of amphetamine sulphate for British youth. *Journal of Drug Issues*, 28(1), 33-56.
- Klee, H. (2001). Amphetamine use: crystal gazing into the new millenium: Part one - what is driving the demand? *Journal of Substance Use*, 6, 22-35.
- Klee, H., & Morris, J. (1994a). Crime and drug misuse: economic and psychological aspects of the criminal activities of heroin and amphetamine injectors. *Addiction Research*, 1(4), 377-386.
- Klee, H., & Morris, J. (1994b). Factors that lead young amphetamine misusers to seek help: implications for drug prevention and harm reduction. *Drugs: Education, Prevention and Policy*, 1, 289-297.
- Kline, P. (1994). *An easy guide to factor analysis*. London: Routledge.
- Klonsky, E. (2007). The functions of deliberate self-injury: A review of the evidence. *Clinical Psychology Review*, 27(2), 226-239.
- Klonsky, E., Oltmanns, T., & Turkheimer, E. (2003). Deliberate self-harm in a nonclinical population. Prevalence and psychological correlates. *American Journal of Psychiatry*, 160, 1501-1508.
- Korman, L., Collins, J., Littman-Sharp, N., Skinner, W., McMain, S., & Mercado, V. (2008). Randomized control trial of an integrated therapy for comorbid anger and gambling. *Psychotherapy Research*, 18(4), 454-465.
- Kosten, T., & Singha, A. (1999). Stimulants. In M. Galanter & H. Kleber (Eds.), *Textbook of substance abuse treatment* (pp. 183-193). Washington, DC: American Psychiatric Press.
- Kraemer, H., Wilson, G., Fairburn, C., & Agras, W. (2002). Mediators and Moderators of Treatment Effects in Randomized Clinical Trials. *Archives of General Psychiatry*, 59(10), 877-883.

- Kramer, J., Fischman, V., & Littlefield, D. (1967). Amphetamine abuse. *Journal of American Medical Association*, 210, 5.
- Kramer, T., Han, X., Leukefekd, C., Booth, B., & Edlund, C. (2009). Childhood conduct problems and other early risk factors in rural adult stimulant users. *The Journal of Rural Health*, 25(1), 50-57.
- Kroner, D. G., & Reddon, J. R. (1995). Anger and psychopathology in prison inmates. *Personality and Individual Differences*, 18(6), 783-788.
- Kuder, G., & Richardson, M. (1937). The theory of estimation of test reliability. *Psychometrika*, 2, 151-160.
- Ladd, G. T., & Petry, N. M. (2003). Antisocial personality in treatment-seeking cocaine abusers: Psychosocial functioning and HIV risk. *Journal of Substance Abuse Treatment*, 24, 323-330.
- LaGasse, L., Wouldes, T., Newman, E., Smith, L., Shah, R., Derauf, C., . . . Lester, B. (2011). Prenatal methamphetamine exposure and neonatal neurobehavioral outcome in the USA and New Zealand. *Neurotoxicology and Teratology*, 33, 166-175.
- Lan, K., Lin, Y., Yu, F., Lin, C., & Chu, P. (1998). Clinical manifestations and prognostic features of acute methamphetamine intoxication. *Journal of the Formosan Medical Association*, 97, 528-533.
- Larimer, M. E., Palmer, R. S., & Marlatt, G. A. (1999). Relapse prevention: an overview of Marlatt's cognitive-behavioural model. *Alcohol Research and Health*, 23, 151-160.
- Leibsohn, M., Oetting, E., & Deffenbacher, J. (1994). Effects of trait anger on alcohol consumption and consequences. *Journal of Child & Adolescent Substance Abuse*, 3(3), 17-32.
- Lench, H. (2004). Anger management: Diagnostic differences and treatment implications. *Journal of Social and Clinical Psychology*, 23(4), 512-531.
- Lindqvist, J. K., Daderman, A. M., & Hellstrom, A. (2003). Swedish adaptations of the Novaco Anger Scale-1998, the Provocation Inventory, and the State-Trait Anger Expression Inventory-2. *Social Behavior and Personality*, 31(8), 773-788.
- Linehan, M. (1993). *Cognitive-behavioral treatment for borderline personality disorder*. New York: Guilford Press.
- Litt, M. D., Cooney, N. L., & Morse, P. (2000). Reactivity to alcohol-related stimuli in the laboratory and in the field: predictors of craving in treated alcoholics. *Addiction*, 95(6), 889-900.
- Lobbestael, J., Leurgans, M., & Arntz, A. (2011). Inter-rater reliability of the structure clinical interview for DSM-IV axis I disorders (SCID I) and axis II (SCID II) disorders. *Clinical Psychology & Psychotherapy*, 18(1), 75-79. doi: 10.1002/cpp.693
- Logan, B. K., Fligner, C. L., & Haddix, T. (1998). Cause and manner of death in fatalities involving methamphetamine. *Journal of Forensic Sciences*, 43(1), 28-34.
- Luborsky, L. (1976). *Helping alliances in psychotherapy*. New York: Brunner, Mazel.

- Magan, I., Sanz, J., & Garcia-Vera, M. P. (2008). Psychometric Properties of a Spanish Version of the Beck Anxiety Inventory (BAI) in General Population. *Spanish Journal of Psychology*, 11(2), 626-640.
- Marlatt, G. A., & Gordon, J.R. (1985). *Relapse prevention: maintenance strategies in the treatment of addictive behaviours*. New York: Guilford Press.
- Martin, D., Garske, J., & Katherine, M. (2000). Relation of the therapeutic alliance with other outcome and other variables: a meta-analytic review. *Journal of Consulting & Clinical Psychology*, 68, 438-450.
- Martin, R. C., & Dahlen, E. R. (2007). Anger response styles and reaction to provocation. *Personality and Individual Differences*, 43(8), 2083-2094.
- Matsumoto, T., Kamijo, A., Miyakawa, T., Endo, K., Yabana, t., Kishimoto, H., Okudaira, K., Sakai, T. & Kosaka, K. (2002). Methamphetamine in Japan: the consequences of methamphetamine abuse as a function of route of administration. *Addiction*, 97, 809-817.
- Maxwell, J. P., Sukhodolsky, D. G., Sit, C. H. P., & Maxwell, J. P. (2009). Preliminary validation of a Chinese version of the State-Trait Anger Expression Inventory-2. *Asian Journal of Social Psychology* (Vol. 12, pp. 1-11).
- McDougall, C., Venables, P., & Roger, D. (1991). Aggression, anger control & emotion control. *Personality and Individual Differences*, 12(6), 625-629.
- McDowell, I., & Newell, C. (1996). *Measuring Health: A Guide to Rating Scales and Questionnaires* (2nd ed.). New York: Oxford University Press Inc.
- McEwan, T., Davis, M., MacKenzie, R., & Mullen, P. (2009). The effects of social desirability response bias on STAXI-2 profiles in a clinical forensic sample. *British Journal of Clinical Psychology*, 48, 431-436. doi: 10.1348/014466509x454886
- McGregor, C., Srisurapanont, M., Jittiwutikarn, J., Laobhripatr, S., Wongtan, T., & White, J. (2005). The nature, time course and severity of methamphetamine withdrawal. *Addiction*, 100, 1320-1329.
- McGregor, K., & Makkai, T. (2003). Self-reported drug use: how prevalent is under-reporting? *Trends and Issues In Crime and Criminal Justice* (pp. 1-6). Canberra: Australian Institute of Criminology.
- McKetin, R., Kelly, E., & McLaren, J. (2006). The relationship between crystalline methamphetamine use and methamphetamine dependence. *Drug & Alcohol Review*, 85, 198-204.
- McKetin, R., Kelly, E., McLaren, J., & Proudfoot, H. (2008). Impaired physical health among methamphetamine users in comparison with the general population: the role of methamphetamine dependence and opioid use. *Drug and Alcohol Review*, 99(1), 1 - 8.
- McKetin, R., McLaren, J., & Kelly, E. (2005). The Sydney methamphetamine market: Patterns of supply, use, personal harms and social consequences *National Drug and Alcohol Research Centre Monograph Series*. Sydney: National Drug and Alcohol Research Centre.

- McKetin, R., McLaren, J., Kelly, E., Hall, W., & Hickman, M. (2005). Estimating the number of regular and dependent methamphetamine users in Australia. Sydney: National Drug and Alcohol Research Centre.
- McKetin, R., McLaren, J., Lubman, D. I., & Hides, L. (2006). The prevalence of psychotic symptoms among methamphetamine users. *Addiction*, 101(10), 1473-1478.
- McKetin, R., Ross, J., Kelly, E., Baker, A., Lee, N., Lubman, D. I., & Mattick, R. (2008). Characteristics and harms associated with injecting versus smoking methamphetamine among methamphetamine treatment entrants. *Drug and Alcohol Review*, 27(3), 277-285.
- McLellan, A. T., Luborsky, L., O'Brien, C. P., & Woody, G. E. (1980). An improved diagnostic instrument for substance abuse patients: The Addiction Severity Index. *Journal of Nervous and Mental Disease*, 168, 26-33.
- McMurran, M., Egan, V., Richardson, C., Street, H., Ahmadi, S., & Cooper, G. (2000). Referrals for anger and aggression in forensic psychology outpatient services. *Journal of Forensic Psychiatry*, 11(1), 206-213.
- Melnick, G., De Leon, G., Thomas, G., Kressel, D., & Wexler, H. (2001). Treatment process in prison therapeutic communities: motivation, participation and outcome. *American Journal of Drug and Alcohol Abuse*, 27(4), 633-650.
- Mercy, J. A., Butchart, A., Farrington, D., & Cerda, M. (2002). Youth violence. In E. G. Krug, Dahlberg, L.L., Mercy, J.A., Zwi, A.B., & Lozano, R. (Eds.), *World report on violence and health* (Vol. Chapter 2, pp. 25-56). Geneva: World Health Organisation.
- Meyer, R. A., & Gordon, S. (1991). Epidemiology of hepatitis C virus infection in a suburban Detroit community. *American Journal of Gastroenterology*, 86, 1224-1226.
- Miczek, K., Fish, E., de Bold, J., & de Almeida, R. (2002). Social and neural determinants of aggressive behaviour: pharmacotherapeutic targets at serotonin, dopamine and γ -aminobutyric acid systems. *Psychopharmacology*, 163, 434-458.
- Miczek, K., & Tidey, J. (1989). Amphetamines: aggressive and social behaviour. In K. Asghar & E. De Souza (Eds.), *Pharmacology and toxicology of amphetamine and related designer drugs NIDA Research Monograph Series* (Vol. 94, pp. 68-100). Rockville, MD: National Institute for Drug Abuse (NIDA).
- Miller, M. (1997). History and epidemiology of amphetamine abuse in the United States. In H. Klee (Ed.), *Amphetamine misuse international perspectives on current trends* (pp. 113-134). Reading, UK: Harwood Academic Publishers.
- Miller, N. (1941). The frustration-aggression hypothesis. *Psychological Review*, 48, 337-342.
- Miller, W., Zweben, A., DiClemente, C., & Rychtarik, R. (1995). *Motivation enhancement therapy manual*. Rockville, Maryland: US Department of Health and Human Services.
- Milovchevich, D., Howells, K., Drew, N., & Day, A. (2001). Sex and gender role differences in anger: an Australian community study. *Personality and Individual Differences*, 31, 117-127.
- Mischel, W. (1973). Toward a cognitive social learning reconceptualization of personality. *Psychological Review*, 80, 252-283.

- Mischel, W., & Shoda, Y. (1995). A cognitive-affective system theory of personality: reconceptualizing situations, dispositions, dynamics and invariance in personality structure. *Psychological Review*, 102, 246-268.
- Miura, H., Fujiki, M., Shibata, A., & Ishikawa, K. (2006). Prevalence and profile of methamphetamine users in adolescents at a juvenile classification home. *Psychiatry and Clinical Neurosciences*, 60(3), 352-357.
- Moher, D., Hopewell, S., Schulz, K., Montori, V., Gotzsche, P., Devereaux, P., . . . Altman, D. (2010). CONSORT 2010 Explanaton and Elaboration: updated guidelines for reporting parallel group randomised trials. *Journal of Clinical Epidemiology*, 63, e1-e37. doi: doi: 10.1016/j.jclinepi.2010.03.004
- Moore, T., & Stuart, G. (2005). A review of the literature on marijuana and interpersonal violence. *Aggression and Violent Behavior*, 10(2), 171-192.
- Moore, T., Stuart, G., Meehan, J., Rhatigan, D., Hellmuth, J., & Keen, S. (2008). Drug abuse and aggression between intimate partners: a meta-analytic review. *Clinical Psychology Review*, 28(2), 247-274.
- Morgan, P. B., Jerome, E. (1997). The legacy and the paradox: Hidden contexts of methamphetamine use in the United States. In H. Klee (Ed.), *Amphetamine misuse international perspectives on current trends* (pp. 135-162). Reading, UK: Harwood Academic Publishers.
- Mueser, K., Drake, R., & Wallach, M. (1998). Dual diagnosis: a review of etiological theories. *Addictive Behaviors*, 23(6), 717-734.
- Mulvey, E. P. (1994). Assessing the evidence of a link between mental illness and violence. *Hospital and Community Psychiatry*, 45, 663-668.
- Murphy, C. M., Taft, C. T., & Eckhardt, C. I. (2007). Anger problem profiles among partner violent men: differences in clinical presentation and treatment outcome. *Journal of Counselling Psychology*, 54(2), 189-200.
- National Drug and Alcohol Research Center. (2001). *Amphetamine booklet*. Sydney: National Drug and Alcohol Research Centre, University of New South Wales.
- National Drug and Alcohol Research Centre, A. (1998). *A users' guide to speed*. Sydney, N.S.W.: National Drug and Alcohol Research Centre, University of New South Wales.
- National Institute on Drug Abuse. (1998). Methamphetamine abuse and addiction *National Institute on Drug Abuse Research Report Series* (pp. 1-8): United States Department of Health and Human Services. National Institute of Health.
- Nicholas, R. (2006). The current amphetamine situation in Australasia - implications for policy. In Commissioner's Drugs Committee: Australasian Centre for Policing Research (Ed.), (pp. 1-24). Adelaide: Australasian Centre for Policing Research: Commonwealth of Australia.
- Nickel, C., Lahmann, C., Tritt, K., Loew, T. H., Rother, W. K., & Nickel, M. K. (2005). Stressed aggressive adolescents benefit from progressive muscle relaxation: A random, prospective, controlled trial. *Stress and Health*, 21, 169-175.

- Nordahl, T., Salo, R., & Leamon, M. (2003). Neuropsychological effects of chronic methamphetamine use on neurotransmitters and cognition: a review. *Journal of Neuropsychiatry & Clinical Neurosciences*, 15, 317–325.
- Norlander, B. E., Christopher. (2005). Anger, hostility and male perpetrators of intimate partner violence: A meta-analytic review. *Clinical Psychology Review*, 25, 119-152.
- Novaco, R. (1975). *Anger control : the development and evaluation of an experimental treatment*. Lexington, Mass.: Lexington Books.
- Novaco, R. (1976). The functions and regulation of the arousal of anger. *American Journal of Psychiatry*, 133(10), 1124-1128.
- Novaco, R. (1979). The cognitive regulation of anger and stress. In P. Kendall & S. Hollon (Eds.), *Cognitive behavioral interventions: Theory research and procedures* (pp. 205-237). New York: Academic Press.
- Novaco, R. (1986). Anger as a clinical and social problem. In R. Blanchard & D. Blanchard (Eds.), *Advances in the study of aggression* (pp. 1-60). New York: Academic.
- Novaco, R. (1995). Anger as a risk factor for violence among the mentally disordered. In J. S. Monohan, H. (Ed.), *Violence and mental disorder: Developments in risk assessment*. Chicago: University of Chicago Press.
- Novaco, R. (1996). Anger treatment and its special challenges. *National Center for Post Traumatic Stress Disorder Clinical Quarterly*, 6(3), 56, 58-60.
- Novaco, R. (2011). Perspectives on anger treatment: discussion and commentary. *Cognitive and Behavioral Practice*, in press. doi: 10.1016/j.cbpra.2010.11.002
- Novick, M. (1966). The axioms and principal results of classical test theory. *Journal of Mathematical Psychology*, 3(1), 1-18.
- Nunnally, J. (1978). *Psychometric theory*. New York: McGraw-Hill.
- O'Reilly, R. (2007). Domestic violence against women in their childbearing years: A review of the literature. *Contemporary Nurse*, 25(1-2), 13-21.
- Osborne, J., & Costello, A. (2004). Sample size and subject to item ratio in principal components analysis. *Practical Assessment, Research & Evaluation*, 9(11), 1-14.
- Pallant, J. (2001). *SPSS Survival Manual*. Sydney: Allen & Unwin.
- Parker, R., & Auerhahn, K. (1998). Alcohol, drugs and violence. *Annual Review of Sociology*, 24, 291-311.
- Parrott, D., & Giancola, P. (2007). Addressing "The criterion problem" in the assessment of aggressive behaviour: Development of a new taxonomic system. *Aggression and Violent Behaviour*, 12(3), 280-299.
- Peck, J., Yang, X., Reback, C., Rotheram-Fuller, E., & Shoptaw, S. (2005). Sustained reductions in drug use and depression symptoms from treatment for drug abuse in methamphetamine-dependent gay and bisexual men. *Journal of Urban Health-Bulletin of the New York Academy of Medicine*, 2(1 Supplement), i100-i108.

- Pennell, R. (1968). Iterated communalities, convergence, and the number of common factors. *Educational and Psychological Measurement*, 28(3), 793-802.
- Pernanen, K. (1981). Theoretical aspects of the relationships between alcohol and crime. In J. Collins (Ed.), *Drinking and crime: Perspectives on the relationship between alcohol consumption and crime behavior* (pp. 1-69). New York: Guilford Press.
- Pett, M., Lackey, N., & Sullivan, J. (2003). *Making sense of factor analysis: the use of factor analysis for instrument development in health care research*. Thousand Oaks, California: Sage Publications, Inc.
- Piersma, H. L., Boes, J. L., & Reaume, W. M. (1994). Unidimensionality of the Brief Symptom Inventory (BSI) in adult and adolescent inpatients. *Journal of Personality Assessment*, 63(2), 338-344.
- Pihl, R., & Hoaken, P. (2002). Biological bases to addiction and aggression in close relationships. In C. Wekerle & W. AM (Eds.), *The violence and addiction equation: Theoretical and clinical issues in substance abuse and relationship violence* (pp. 25-43). Philadelphia, PA: Brunner Mazel.
- Pihl, R., Peterson, J., & Lau, M. (1993). A biosocial model of the alcohol-aggression relationship. *Journal of Studies On Alcohol*, 11(September, Supplement), 128-139.
- Pinsoff, W. (1994). *An integrative systems perspective on the therapeutic alliance: Theoretical, clinical and research implications*. New York: John Wiley.
- Puthaviriyakorn, V., Siriviriyasomboon, N., Phorachata, J., Pan-ox, W., Sasaki, T., & Tanaka, K. (2002). Identification of impurities and statistical classification of methamphetamine tablets (Ya-Ba) seized in Thailand. *Forensic Science International*, 126, 105-113.
- Qi, Y., Evans, I. D., & McCluskey, A. (2006). Australian federal police seizures of illicit crystalline methamphetamine ('ice') 1998-2002: impurity analysis. *Forensic Science International*, 164, 201-210.
- Qi, Y., Evans, I. D., & McCluskey, A. (2007). New impurity profiles of recent Australian imported 'ice': Methamphetamine impurity profiling and the identification of (pseudo)ephedrine and Leuckart specific marker compounds. *Forensic Science International*, 169(2-3), 173-180.
- Rawson, R. (2010). Addictive disorders: Treatment of methamphetamine addiction: A global perspective. *International Journal of Neuropsychopharmacology*, 13, 7.
- Rawson, R., Gonzales, R., & Brethen, P. (2002a). Treatment of methamphetamine use disorders: an update. *Journal of Substance Abuse Treatment*, 23(2), 145-150.
- Rawson, R., Gonzales, R., Obert, J., McCann, M., & Brethen, P. (2005). Methamphetamine use among treatment-seeking adolescents in Southern California: Participant characteristics and treatment response. *Journal of Substance Abuse Treatment*, 29, 67-74.
- Rawson, R. A., Gonzales, R., & Brethen, P. (2002b). Treatment of methamphetamine use disorders: an update. *Journal of Substance Abuse Treatment*, 23(2), 145-150.
- Rawson, R. A., Gonzales, R., Marinelli-Casey, P., & Ang, A. (2007). Methamphetamine dependence: A closer look at treatment response and clinical characteristics associated with route of administration in outpatient treatment. *American Journal on Addictions*, 16(4), 291-299.

- Reber, A. (1988). *The penguin dictionary of psychology*. London: Penguin Group.
- Reilly, P. M., Clark, H. W., Shopshire, M. S., Lewis, E. W., & Sorensen, D. J. (1994). Anger Management and Temper Control - Critical Components of Posttraumatic-Stress-Disorder and Substance-Abuse Treatment. *Journal of Psychoactive Drugs*, 26(4), 401-407.
- Reilly, P. M., & Shopshire, M. S. (2000). Anger management group treatment for cocaine dependence: Preliminary outcomes. *American Journal of Drug and Alcohol Abuse*, 26(2), 161-177.
- Reiss, A. J., & Roth, J.A. (1993). Alcohol, other psychoactive drugs and violence. In A. J. Reiss, & Roth, J.A. (Ed.), *Understanding and preventing violence* (pp. 182-220). Washington, DC: National Academy Press.
- Reppucci, N. D., Woolard, J.L., & Fried, C.S. (1999). Social, community and preventive interventions. *Annual Review of Psychology*, 50, 387-418.
- Ressler, K., & Nemeroff, C. (1999). Role of norepinephrine in the pathophysiology and treatment of mood disorders. *Biological Psychiatry*, 46(9), 1219–1233.
- Reyes, L. R., Meininger, J. C., Liehr, P., Chan, W., & Mueller, W. H. (2003). Anger in Adolescents: Sex, Ethnicity, Age Differences, and Psychometric Properties. *Nursing Research*, 52(1), 2-11.
- Richards, J., MacLachlan, A., Scott, W., & Gregory, R. (2004). Understanding male domestic partner abusers. In D. T. Makkai (Ed.), *Trends & Issues In Crime and Criminal Justice* (pp. 1-6). Canberra: Australian Institute of Criminology.
- Riggs, N., Chou, C., & Pentz, M. (2009). Preventing growth in amphetamine use: long-term effects of the Midwestern Prevention Project (MPP) from early adolescence to early adulthood. *Addiction*, 104, 1691-1699.
- Rosen, M., Hiller, M., Webster, J., Staton, M., & Leukefield, C. (2004). Treatment motivation and therapeutic engagement in prison-based substance use treatment. *Journal of Psychoactive Drugs*, 36(3), 387-396.
- Roth, J. (1994). Psychoactive substances and violence. *National Institute of Justice, Office of Justice Programs*. Washington, DC.: National Institute of Justice.
- Rothman, K. J., & Greenland, S. (2005). Causation and causal inference in epidemiology. *American Journal of Public Health*, 95, S144-S150.
- Rothman, K. J., Greenland, S., Poole, C., & Lash, T. (2008). *Causation and causal inference* (3rd ed.). Philadelphia: Wolters Kluwer Health/Lippincott Williams & Wilkins.
- Rothschild, A. J. (1992). Disinhibition, amnestic reactions, and other adverse reactions secondary to triazolam: A review of the literature. *Journal of Clinical Psychiatry*, 53(Supplement 12), 69-79.
- Russell, K., Dryden, D., Liang, Y., Friesen, C., O'Gorman, K., Durec, T., . . . Klassen, P. (2008). Risk factors for methamphetamine use in youth: a systematic review. *British Journal of Pediatrics*, 8(48), 1-10. doi: 10.1186/1471-2431-8-48

- Salo, R., Flower, K., Kleistein, A., Leamon, M., Nordahl, T., & Galloway, G. (2011). Psychiatric comorbidity in methamphetamine dependence. *Psychiatry Research*, 186(2-3), 356-361.
- Saxena, P. (1995). Serotonin receptors: subtypes, functional responses and therapeutic relevance. *Pharmacology and Therapeutics*, 66(2), 339-368.
- Schindler, C. W., Gilman, J. P., Graczyk, Z., Wang, G. F., & Gee, W. L. (2003). Reduced cardiovascular effects of methamphetamine following treatment with selegiline. *Drug and Alcohol Dependence*, 72(2), 133-139.
- Schuckit, M. A. (1994). The treatment of stimulant dependence. *Addiction*, 89, 1559-1563.
- Sekine, Y., Ouchi, Y., Takei, N., Yoshikawa, E., Nakamura, K., Futatsubashi, M., . . . Mori, N. (2006). Brain serotonin transporter density and aggression in abstinent methamphetamine abusers. *Archives of General Psychiatry*, 63(1), 90-100.
- Senjo, S. (2005). Trafficking in meth: An analysis of the differences between males and female dealers. *Journal of Drug Education*, 35(1), 59-77.
- Sherman, S. G., Gann, D., German, D., Siroj, B., Thompson, N., Aramrattana, A., & Celentano, D. (2008). A qualitative study of sexual behaviours among methamphetamine users in Chiang Mai, Thailand: a typology of risk. *Drug and Alcohol Review*, 27(3), 263 - 269.
- Siegmán, A. W. (1994). From Type A to hostility and anger: Reflections on the history of coronary-prone behaviour. In A. W. Siegmán, Smith, T.W. (Ed.), *Anger, hostility and the heart*. (pp. 1-21). Hillsdale, New Jersey: Erlbaum.
- Simon, S. L., Dacey, J., Glynn, S., Rawson, R., & Ling, W. (2004). The effect of relapse on cognition in abstinent methamphetamine abusers. *Journal of Substance Abuse Treatment*, 27(1), 59-66.
- Simon, S. L., Sim, T., Richardson, K., Rawson, R., & Ling, W. (2000). Methamphetamine abuse: Associations with early academic performance. *Journal of Addictive Diseases*, 19(2), 151-151.
- Simonds, J., & Kashani, J. (1979). Drug abuse and criminal behaviour in delinquent boys committed to a training school. *American Journal of Psychiatry*, 136, 1444-1448.
- Simpson, D. (2004). A conceptual framework for drug treatment process and outcomes. *Journal of Substance Abuse Treatment*, 27, 99-121.
- Sinha, R., & Schottenfeld, R. (2001). The role of comorbidity in relapse and recovery. In F. M. Tims, C. G. Leukefield & J. J. Platt (Eds.), *Relapse and recovery in addictions* (pp. 172-207). London: Yale University Press.
- Smith, L., LaGasse, L., Derauf, C., Grant, P., Shah, R., Arria, A., . . . Lester, B. (2008). Prenatal methamphetamine use and neonatal neurobehavioral outcome. *Neurotoxicology and Teratology*, 30, 20-28.
- Smith, L., LaGasse, L., Derauf, C., Newman, E., Shah, R., Haning, W., . . . Lester, B. (2011). Motor and cognitive outcomes through three years of age in children exposed to prenatal methamphetamine. *Neurotoxicology and Teratology*, 33, 176-184.

- Sofuoglu, M. (2010). Cognitive enhancement as a pharmacotherapy target for stimulant addiction. *Addiction*, 105(1), 38-48. doi: 10.1111/j.1360-0443.2009.02791.x
- Soloff, P., Lis, J., Kelly, T., Cornelius, J., & Ulrich, R. (1994). Self-mutilation and suicidal behavior in borderline personality disorder. *Journal of Personality Disorders*, 8, 257-267.
- Sommers, I., & Baskin, D. (2006). Methamphetamine use and violence. *Journal of Drug Issues*, 36(1), 77-96.
- Spielberger, C. (1979). *Preliminary manual for the State-Trait Personality Inventory (STPI)*. Unpublished manuscript. University of South Florida, Tampa.
- Spielberger, C. (1988). *Manual for the State-Trait Anger Expression Inventory (STAXI)*. Odessa, Florida: Psychological Assessment Resources.
- Spielberger, C. (1996). *Manual for the State-Trait Anger Expression Inventory*. Odessa: Psychological Assessment Resources Inc.
- Spielberger, C. (1999). *STAXI-2 State-trait anger expression inventory-2 professional manual*. Odessa, Florida: Psychological Assessment Resources, Inc.
- Spielberger, C., Buena-Casal, G., Agudelo, D., Carretero-Dios, H., & Santolaya, F. (2005). Analysis of convergent and discriminant validity of the Spanish experimental version of the State-Trait Depression Questionnaire (ST-DEP). *Actas Espanolas De Psiquiatria*, 33(6), 374-382.
- Spielberger, C., Jacobs, G., Russell, S., & Crane, R. (1983). Assessment of anger: The state-trait anger scale. In J. Butcher & C. Spielberger (Eds.), *Advances in personality assessment* (Vol. 2, pp. 159-187). Hillsdale, New Jersey.: Erlbaum.
- Spielberger, C., Johnson, E., Russell, S., Crane, R., Jacobs, G., & Worden, T. (1985). The experience and expression of anger: construction and validation of an anger expression scale. In M. Chesney & R. Rosenman (Eds.), *Anger and hostility in cardiovascular and behavioural disorders*. (pp. 5-30). New York: Hemisphere.
- Spielberger, C., Krasner, S., & Solomon, E. (1988). The experience, expression and control of anger. In M. Janisse (Ed.), *Health psychology: individual differences and stress*. (pp. 89-108). New York: Springer.
- Spielberger, C., Reheiser, E., & Sydeman, S. (1995a). Measuring the experience, expression and control of anger. In H. Kassirer (Ed.), *Anger disorders: Definition, diagnosis, and treatment*, (Vol. Chapter 3, pp. 49-67). Washington, DC: Taylor & Francis.
- Spielberger, C., Reheiser, E., & Sydeman, S. (1995b). Measuring the experience, expression and control of anger. *Issues in Comprehensive Nursing*, 18, 132-207.
- Spielberger, C., Ritterband, L., Sydeman, S., Reheiser, E., & Unger, K. (1995). Assessment of emotional states and personality traits: measuring psychological vital signs. In J. Butcher (Ed.), *Clinical personality assessment: practical approaches*. (pp. 42-58). New York.: Oxford University Press.
- Spielberger, C., & Sydeman, S. (1994). State-trait anxiety inventory and state-trait anger expression inventory. In M. Maruish (Ed.), *The use of psychological testing for treatment planning and outcome* (pp. 292-321.). New Jersey: Lawrence Erlbaum Associates.

- Srisurapanont, M., Ali, R., & Marsden, J. e. a. (2003). Psychotic symptoms in methamphetamine psychotic in-patients. *International Journal of Neuropsychopharmacology*, 6(4), 347-352.
- Srisurapanont, M., Jarusuraisin, N., & Jittiwutikan, J. (1999). Amphetamine withdrawal: I. reliability, validity and factor structure of a measure. *Australian & New Zealand Journal of Psychiatry*, 1999a(33), 89-93.
- Srisurapanont, M., Jarusuraisin, N., & Jittiwutikan, J. (1999b). Amphetamine withdrawal: II. A placebo-controlled, randomised, double-blind study of amineptine treatment. *Australian & New Zealand Journal of Psychiatry*, 33, 94-98.
- Srisurapanont, M., Jarusuraisin, N., & Kittirattanapaiboon, P. (2001). Systematic review of amphetamine-related disorders *Management of substance dependance review series* (pp. 1-33). Geneva: World Health Organisation Department of Mental Health and Substance Dependence.
- Stafford, J., Sindicich, N., & Burns, L. (2009). Australian Drug Trends 2008: Findings from the Illicit Drug Reporting System (IDRS) *Australian Drug Trends*. Sydney: National Drug and Alcohol Research Centre.
- Stoner, S. B. (2001). Undergraduate marijuana use and anger. *The Journal of Psychology*, 122(4), 343-347.
- Streiner, D. (1994). Figuring out factors: the use and misuse of factor analysis. *Canadian Journal of Psychiatry*, 39, 135-140.
- Streiner, D., & Norman, G. (1995). *Health measurement scales: a practical guide to their development and use* (2nd ed.). New York: Oxford University Press.
- Stuckless, N., Ford, B., & Vitelli, R. (1995). Vengeance, anger and irrational beliefs in inmates: a caveat regarding social desirability. *Personality and Individual Differences*, 18(1), 1-6.
- Suris, A., Lind, L., Emmett, G., Borman, P., Kashner, M., & Barratt, E. (2004). Measures of aggressive behaviour: Overview of clinical and research instruments. *Aggression and Violent Behavior*, 9, 165-227.
- Suter, J., Byrne, M., Byrne, S., Howells, K., & Day, A. (2002). Anger in prisoners: women are different from men. *Personality and Individual Differences*, 32(6), 1087-1100.
- Suter, J. M., Byrne, Mitchell K., Byrne, Stuart., Howells, Kevin., & Day, Andrew. (2002). Anger in prisoners: women are different from men. *Personality and individual differences*, 32, 1087-1100.
- Suwaki, H., Fukui, Susumu & Konuma, Kyohei. (1997). Methamphetamine abuse in Japan: Its 45 year history and the current situation. In H. Klee (Ed.), *Amphetamine misuse international perspectives on current trends* (pp. 199-214). Reading: Harwood Academic Publishers.
- Swaffer, T., & Epps, K. (1999). The psychometric assessment of anger in male and female adolescents resident at a secure youth treatment centre. *Journal of Adolescence*, 22, 419-422.
- Swaffer, T., & Hollin, C. R. (2001). Anger and general health in young offenders. *The Journal of Forensic Psychiatry*, 12(1), 90-103.

- Szuster, R. (1990). Methamphetamine in psychiatric emergencies. *Hawaii Medical Journal*, 49, 389-391.
- Tabachnick, B., & Fidell, L. (1996). *Using multivariate statistics* (3rd ed.). New York: Harper Collins.
- Tafate, R., Kassinove, H., & Dundin, L. (2002). Anger episodes in high- and low-trait anger community adults. *Journal of Clinical Psychology*, 58(12), 1573-1590.
- Taft, C., Murphy, C., Musser, P., & Remington, N. (2004). Personality, interpersonal and motivational predictors of the working alliance in group cognitive-behavioral therapy for partner violent men. *Journal of Consulting & Clinical Psychology*, 72(2). doi: 10.1037/0022-006X.72.2.349
- Taylor, J. (2002). A review of the assessment and treatment of anger and aggression in offenders with intellectual disability. *Journal of Intellectual Disability Research*, 46, 57-73.
- Taylor, J., Novaco, R., Guinan, C., & Street, N. (2004). Development of an imaginal provocation test to evaluate treatment for anger problems in people with intellectual disabilities. *Clinical Psychology & Psychotherapy*, 11(4), 233-246.
- Thorne, F. (1953). The frustration-anger-hostility states: a new diagnostic classification. *Journal of Clinical Psychology*, 9, 334-339.
- Thurstone, L. (1931). *Multiple factor analysis*. Chicago: University of Chicago Press.
- Tiffany, S. (1990). A cognitive model of drug-use behaviour: role of automatic and nonautomatic processes. *Psychological Review*, 97, 147-168.
- Tinsley, H. E. A., & Tinsley, D. J. (1987). Uses of Factor-Analysis in Counseling Psychology Research. *Journal of Counseling Psychology*, 34(4), 414-424.
- Tivis, L. J., Parsons, O. A., & Nixon, S. J. (1998). Anger in an inpatient treatment sample of chronic alcoholics. *Alcoholism-Clinical and Experimental Research*, 22(4), 902-907.
- Topp, L., & Churchill, A. (2002). Australia's dynamic methamphetamine market *Illicit Drug Reporting System Drug Trends Bulletin* (pp. 1-4). Canberra: Australian Government Commonwealth Department of Health and Ageing and the National Drug Law Enforcement Research Fund.
- Topp, L., Day, C., & Degenhardt, L. (2003). Changes in patterns of drug injection concurrent with a sustained reduction in the availability of heroin in Australia. *Drug & Alcohol Dependence*, 70, 275-286.
- Topp, L., Degenhardt, L., Kaye, S., & Darke, S. (2002). The emergence of potent forms of methamphetamine in Sydney, Australia: a case study of the IDRS as a strategic early warning system. *Drug & Alcohol Review*, 21, 341-348.
- Turnipseed, S., Richards, J., Kirk, J., Diercks, D., & Amsterdam, E. (2003). Frequency of acute coronary syndrome in patients presenting to the Emergency Department with chest pain after methamphetamine use. *Journal of Emergency Medicine*, 24(369-373).
- United Nations Office on Drugs and Crime. (2006). Patterns and trends of amphetamine-type-stimulants (ATS) and other drugs of abuse in East Asia and the Pacific 2005. In

- (UNODC) (Ed.), *(UNODC) Regional Centre for East Asia and the Pacific*. Vienna: United Nations Publications New York.
- United Nations Office on Drugs and Crime. (2007). Chapter 1 Trends in world drug markets *World drug report 2007* (Vol. 1: Analysis). Geneva, Switzerland: United Nations Publications.
- United Nations Office on Drugs and Crime. (2008). Amphetamine-types stimulants market *World Drug Report* (Vol. 1.5, pp. 124-125). Geneva, Switzerland: United Nations Office on Drugs and Crime.
- United Nations Office on Drugs and Crime. (2010). Transnational drug market analysis. In United Nations Office On Drugs and Crime (Ed.), *World Drug Report 2010* (pp. 95-119). New York: United Nations Office on Drugs and Crime.
- Vallone, D., Picetti, R., & Borrelli, E. (2000). Structure and function of dopamine receptors. *Neuroscience and Biobehavioral Reviews*, 24(1), 125-132.
- van der Ploeg, H. (1988). The factor structure of the State–Trait Anger Scale. *Psychological Reports*, 63, 978-983.
- Velicer, W., & Fava, J. (1998). Effects of variable and subject sampling on factor pattern recovery. *Psychological Methods*, 3(2), 231-251.
- Volavka, J. (1997). Genetic and neurochemical correlates of violence. *Psychiatric Annals*, 27(10), 679-682.
- Volavka, J. (1999). The neurobiology of violence: An update. *Journal of Neuropsychiatry & Clinical Neurosciences*, 11(3), 307-314.
- Volavka, J. (2002). *Neurobiology of violence* (2nd ed.). Washington: American Psychiatric Publishing Inc.
- Volkow, N. D., Fowler, J. S., Wang, G. J., & Swanson, J. M. (2004). Dopamine in drug abuse and addiction: results from imaging studies and treatment implications. *Molecular Psychiatry*, 9(6), 557-569.
- Waltz, C., Strickland, O., & Lenz, E. (2005). *Measurement in nursing and health research* (3rd ed.). New York: Springer.
- Watson, R. (1998). Publishing the results of factor analysis: interpretation and presentation. *Journal of Advanced Nursing*, 28, 1361-1363.
- Watson, R., & Thompson, D. (2005). Use of factor analysis in Journal of Advanced Nursing: literature review: Integrative literature reviews and meta-analyses. *Journal of Advanced Nursing*, 55(3), 330-341.
- Webb, L., Oyefeso, A., Schifao, F., Cheeta, S., Pollard, M., & Ghodse, A. (2003). Cause and manner of death in drug related fatality: an analysis of drug-related deaths recorded by coroners in England and Wales 2000. *Drug & Alcohol Dependence*, 72, 67-74.
- Weinstein, C., & Shaffer, H. (1993). Neurocognitive aspects of substance abuse treatment: a psychotherapist's primer. *Psychotherapy*, 30, 317-333.

- Widaman, K. (1993). Common factor analysis versus principal component analysis: differential bias in representing model parameters? *Multivariate Behavioral Research*, 28(3), 263-311.
- Wijetunga, M., Seto, T., Lindsay, J., & Schatz, I. (2003). Crystal methamphetamine-associated cardiomyopathy: tip of the iceberg? *Journal of Toxicology: Clinical Toxicology*, 41, 981-986.
- Wilkins, C., & Sweetsur, P. (2010). The association between spending on methamphetamine/amphetamine and cannabis for personal use and earnings from acquisitive crime among police detainees in New Zealand. *Addiction*, 106, 789-797.
- World Drug Report. (2006). *World Drug Report 2006*.
- World Health Organization. (2002). World report on violence and health: summary. Geneva: World Health Organisation.
- Wright, S., & Klee, H. (2001). Violent crime, aggression and amphetamine: what are the implications for drug treatment services? *Drugs: Education, Prevention and Policy*, 8(1), 73-90.
- Wright, S., Klee, H., & Reid, P. (1999). Attitudes of amphetamine users towards treatment services. *Drugs: education, prevention and policy*, 6, 71-86.
- Wu, L., Pilowsky, D., Schlenger, W., & Galvin, D. (2007). Misuse of methamphetamine and prescription stimulants among youths and young adults in the community. *Drug & Alcohol Dependence*, 89, 195-205.
- Yen, C., & Chong, C. (2006). Comorbid psychiatric disorders, sex and methamphetamine use in adolescents: a case-control study. *Comprehensive Psychiatry*, 47, 215-220.
- Yu, Q., Larson, D., & Watson, R. (2003). Heart disease, methamphetamine and AIDS. *Life Sci* 2003; 73: 129-40. *Life Science*, 73, 129-140.
- Zelin, M., Adler, G., & Myerson, P. (1972). Anger self-report: An objective questionnaire for the measurement of aggression. *Journal of Consulting & Clinical Psychology*, 39, 340.
- Zhu, B., Oritani, S., Shimotouge, K., Ishida, K., Quan, L., & Fujita, M. (2000). Methamphetamine-related fatalities in forensic autopsy during 5 years in the southern half of Osaka city and surrounding areas. *Forensic Science International*, 113, 4430447.
- Zweben, J., Cohen, J., Christian, D., & al., e. (2004). Psychiatric symptoms in methamphetamine users. *The American Journal on Addictions*, 13, 181-190.

GLOSSARY

A priori: Latin for from what comes before. Contrast with a posteriori.

A posteriori: Latin for from what comes after. Contrast with a priori.

Aggression: the verbal and/or physical expression of hostility that includes the intent to cause harm.

Anger: a series of distinct domains involving subjective, cognitive and behavioural reactions.

Anger Control-In: attempts to control angry feelings by calming down, cooling off.

Anger Control-Out: controls the outward expression of angry feelings.

Anger Expression-In: angry feelings are experienced but not expressed (suppressed).

Anger Expression-Out: angry feelings expressed by verbal or physical aggression.

Anger Expression Index: a general index of anger expression based on responses to the anger expression and anger control scales.

Bartlett's test of sphericity: statistical technique to measure sampling adequacy by indicating the overall significance of all correlations within a correlation matrix.

Common factor analysis: statistical technique that uses the correlations between observed variables to estimate common factors and the structural relationships linking factors to observed variables.

Common variance: the variance within a variable that is shared with common factors. Factor analysis assumes that a variable's variance is composed of three components: common, specific and error.

Communality: the percentage of variance in a given variable that is shared by all other variables. Final communality estimates are the sum of squared loadings for a variable in an orthogonal factor matrix.

Complex variable: A variable that loads on two or more factors.

Comorbidity: Psychiatric disorders that co-exist.

Confirmatory Factor Analysis: a statistical technique used to confirm hypotheses relating to the construct of an instrument. Is also a procedure used to examine convergent and discriminant validity.

Content validity: is designed to assess the content of a test (scale) as to how accurately the test items represent the domain being measured. Includes Face validity.

Correlation: The product-moment correlation coefficient.

Correlation matrix: Table showing the inter-correlations among all variables.

Construct validity: is the extent to which an instrument measures the theoretical construct for which it is designed to measure. Includes convergent and discriminant validity as well as divergent and factorial validity.

Convergent validity: examines the degree with which the items that make up an instrument relate to the theoretical construct it aims to measure. Compare with discriminant validity.

Corrected Item-Total Correlation: is an indicator of scale reliability.

Correlation: measures the strength and direction of the relationship between two items.

Criterion validity: is the effectiveness of a test in predicting performance on a set task.

Includes concurrent and predictive validity.

Cronbach's alpha: is a mathematical formula designed to define the relationship between items. In factor analysis the value of alpha represents the proportion of the test score variance that is attributable to the construct variable. Cronbach's alpha is also a measure of scale reliability. This value indicates the degree and direction of the relationship between two items and is applied when item response options use a Likert scale.

Cross loadings: items that load onto more than one factor.

Discriminant validity: examines the degree with which the items that make up an instrument do not relate to the theoretical construct it aims to measure. Compare with convergent validity.

Eigenvalue: is the column sum of squared loadings for a factor. It conceptually represents that amount of variance accounted for by a factor.

Error variance: Unreliable and inexplicable variation in a variable. Error variance is assumed to be independent of common variance, and a component of the unique variance of a variable.

Exploratory factor analysis: a factor analysis technique used to identify the underlying structure of a collection of observed variables in relation to a specific theoretical construct.

Face validity: see Content validity.

Factor: Linear combination of the original variables. Factors represent the underlying dimensions (constructs) that summarise or account for the original set of observed variables.

Factor analysis: is a statistical technique designed to estimate factors, or to reduce the dimensionality of a large number of variables to a fewer number of factors. See Exploratory Factor Analysis and Confirmatory Factor Analysis

Factor loadings: are the correlation coefficients between the items and factors.

Factor matrix: is a table displaying the factor loadings of all variables on each factor. Factors are presented as columns and the variables are presented as rows.

Factor rotation: A process of adjusting the factor axes to simplify and identify the structure of the data. Data are rotated to maximize the variance within a factor by increasing high loadings and decreasing low loadings, whilst not changing the amount of variance extracted from the items. See orthogonal rotation, oblique rotation.

Factor score: Composite measure created for each observation (case) on each factor extracted in the factor analysis. Factor weights are used in conjunction with the original variable values to calculate each observation's score. The factor scores are standardised to according to a z-score.

Hostility: an attitudinal construct based on cognitive sets of cynicism, mistrust and denigration of others.

Internal consistency: the degree with which the items that make up a scale are all measuring the same underlying attribute. See Cronbach's alpha and Kuder-Richardson coefficient (item-total correlations) as measures of internal consistency.

Kaiser-Meyer-Olkin (KMO): measure of sampling adequacy and used as an indicator of the suitability of data to undergo factor analysis.

Kuder-Richardson coefficient: measure of internal consistency of a specific scale when item responses are dichotomous. The correlation coefficient indicates the degree and direction of the relationship between two items.

Kurtosis: indicates the peak of a distribution.

Latent factor: A theoretical underlying factor hypothesised to influence a number of observed variables. Common factor analysis assumes latent variables are linearly related to observed variables.

Measure of sampling adequacy (MSA): Measures calculated both for the entire correlation matrix and each individual variable evaluating the appropriateness of applying factor analysis. See Bartlett's Test of Sphericity.

Methamphetamine: an illicit drug that acts as a central nervous system stimulant.

Oblique factor rotation: rotates the data to allow factors to correlate with one another. An oblique solution identifies the extent to which each of the factors are correlated by identifying variables that form "clusters" which represent the factors in the analysis. Compare with Orthogonal factor rotation.

Orthogonal factor rotation: rotates the data so that the factors remain perfectly uncorrelated with one another. Each factor is therefore independent of, or orthogonal to, all other factors. The correlation between the factors is determined to be zero. Compare with Oblique factor rotation.

Principal Axis Factoring (PAF): A method of factor analysis in which the factors are based on a reduced correlation matrix using a priori communality estimates. That is, communalities are inserted in the diagonal of the correlation matrix, and the extracted factors are based only on the common variance, with specific and error variances excluded.

Principal component analysis (PC or PCA): (1) The factors are based on the total variance. Unities (1s) are used in the diagonal of the correlation matrix; this procedure computationally implies that all the variance is common or shared. (2) a method of factoring a correlation matrix directly, without estimating communalities. Linear combinations of variables are estimated which explain the maximum amount of variance in the variables. The first component accounts for the most variance in the variables. The second component accounts for the most variance in the variables residualised for the first component, and so on.

Scale validity: is the degree with which a scale measures the domain that it has been designed to measure.

Scale reliability: describes the consistency of scores from one condition to another. See test-retest reliability, internal consistency.

Scree test: A graphical method for determining the number of factors to retain for factor analysis. Eigenvalues obtained for each factor are graphed. The point at which the shape (curve) of the graph becomes horizontal (plateaus) signifies a cut-off point; the number of factors preceding the plateau are retained for factor analysis.

Simple structure: A pattern of factor loading results such that each variable loads highly onto one and only one factor.

Skewness: indicates the symmetry of a distribution.

Specific variance: (1) Variance of each variable unique to that variable and not explained or associated with other variables in the factor analysis. (2) The component of unique variance that is reliable but not explained by common factors.

Split-half reliability: examines the overall consistency of a test on a single occasion. Test items are divided into equal halves, scores obtained from each test half are correlated to produce a coefficient of reliability (Cronbach's alpha or Kuder-Richardson coefficient).

State Anger: describes the intensity of angry feelings and the extent to which a person feels like expressing anger at a particular time.

STAXI: State-Trait Anger Expression Scale is a 44-item questionnaire designed to measure the experience and expression of anger. See STAXI-2.

STAXI-2: State-Trait Anger Expression Scale-2 is the revised version of the STAXI and includes 57-items designed to measure the experience and expression of anger. See STAXI.

Test re-test reliability: is administering a test to the same people on two occasions and calculating the correlation between the two sets of scores. High re-test correlations indicate a reliable scale.

Trait Anger: describes how often angry feelings are experienced over time.

Unique variance: The proportion of a variable's variance that is not shared with a factor structure. Unique variance is composed of specific and error variance.

Varimax: The most commonly used factor rotation method; an orthogonal rotation criterion which maximizes the variance of the squared elements in the columns of a factor matrix.

Violence: is the intentional use of force or power, threatened or actual, against oneself, another person, group or community, that results in or has the high likelihood of resulting in injury, death, psychological harm, maldevelopment or deprivation.

Appendices

Appendix 1 Diagnostic criteria for amphetamine withdrawal

A. Cessation of (or reduction in) amphetamine (or a related substance) use that has been heavy and prolonged.

B. Dysphoric mood and two (or more) of the following physiological changes, developing within a few hours to several days after

- Criterion A:
1. fatigue
 2. vivid, unpleasant dreams
 3. insomnia or hypersomnia
 4. increased appetite
 5. psychomotor retardation or agitation

C. The symptoms in Criterion B cause clinically significant distress or impairment in social, occupational, or other important areas of functioning.

D. The symptoms are not due to a general medical condition and are not better accounted for by another mental disorder.

The essential feature of Amphetamine Withdrawal is the presence of a characteristic withdrawal syndrome that develops within a few hours to several days after cessation of (or reduction in) heavy and prolonged amphetamine use (Criteria A and B). The symptoms of withdrawal are, in general, the opposite of those seen during intoxication. The withdrawal syndrome is characterized by the development of dysphoric mood and two or more of the following physiological changes: fatigue, vivid and unpleasant dreams, insomnia or hypersomnia, increased appetite, and psychomotor retardation or agitation. Anhedonia and drug craving can also be present but are not part of the diagnostic criteria. The symptoms cause clinically significant distress or impairment in social, occupational, or other important areas of functioning (Criterion C). The symptoms must not be due to a general medical condition and are not better accounted for by another mental disorder. Marked withdrawal symptoms ("crashing") often follow an episode of intense, high-dose use (a "speed run"). This "crash" is characterized by intense and unpleasant feelings of lassitude and depression, generally requiring several days of rest and recuperation. Weight loss commonly occurs during heavy stimulant use, whereas a marked increase in appetite with rapid weight gain is often observed during withdrawal. Depressive symptoms may last several days to weeks and may be accompanied by suicidal ideation. The vast majority of individuals with Amphetamine Dependence have experienced a withdrawal syndrome at some point in their lives, and virtually all report tolerance.

Appendix 2 Spielberg's (1999) factor loadings eight-factor solution normal adults ages 16 years and older by gender STAXI-2 57 items

[illegible]

[illegible]

Appendix 3 Spielberger STAXI-2 Cronbach alpha coefficients

Spielberger's (1999, pp10-11) descriptive statistics and Cronbach alpha coefficients for the STAXI-2 scales and subscales for normal adults and psychiatric patients by gender.

STAXI-2 scale/ subscale		Normal adults		Psychiatric patients		F		
		Female	Male	Female	Male	Group	Gender	Group x Gender
State Anger (S-Ang)	M	17.90	19.25	24.05	22.71	110.29***	0.00	8.62**
	SD	5.26	6.89	10.64	8.49			
	N	962	651	94	154			
	A	0.92	0.94	0.95	0.94			
Feeling Angry (S-Ang/F)	M	6.66	7.06	9.59	9.16	169.58**	0.00	4.56*
	SD	2.51	2.81	4.15	3.97			
	N	973	662	103	171			
	A	0.87	0.88	0.91	0.91			
Feel like expressing anger Verbally (S-Ang/V)	M	5.93	6.39	8.12	7.73	96.04*	0.04	5.61*
	SD	2.20	2.66	4.24	3.55			
	N	973	667	100	166			
	A	0.88	0.87	0.93	0.90			
Feel like expressing anger Physically (S-Ang/P)	M	5.34	5.82	6.45	5.96	25.59***	0.00	15.36***
	SD	1.26	2.13	3.19	2.09			
	N	977	663	100	164			
	A	0.85	0.88	0.90	0.86			
Trait Anger (T-Ang)	M	17.89	18.40	19.79	20.14	25.70***	1.40	0.05
	SD	4.94	5.42	6.23	5.86			
	N	947	653	102	162			
	A	0.84	0.86	0.87	0.87			
Angry Temperament (T-Ang/T)	M	6.17	6.38	6.93	6.88	13.98***	0.22	0.64
	SD	2.34	2.53	3.07	2.92			
	N	972	662	105	171			
	A	0.85	0.87	0.89	0.90			
Angry Reaction (T-Ang/R)	M	8.70	8.67	9.27	9.61	17.15***	0.75	1.04
	SD	2.64	2.61	3.07	3.17			
	N	962	659	104	168			
	A	0.76	0.73	0.82	0.84			
Note F = Analysis of Variance. *p<.05. **p<.01				**p<.001				

STAXI-2 scale/ subscale		Normal adults		Psychiatric patients		F		
		Female	Male	Female	Male	Group	Gender	Group x Gender
Anger Expression Out (AX-O)	M	14.69	15.42	15.13	15.68	1.82	6.07*	0.13
	SD	3.70	3.74	4.24	4.16			
	N	971	661	97	166			
	A	0.74	0.73	0.78	0.80			
Anger Expression In (AX-I)	M	15.86	16.35	18.79	18.26	68.38**	0.01	3.05
	SD	4.36	3.99	5.04	4.68			
	N	966	657	100	170			
	A	0.78	0.74	0.82	0.80			
Anger Control Out (AC-O)	M	23.21	23.53	22.31	21.06	23.23**	1.76	5.02*
	SD	5.11	5.01	5.12	5.23+			
	N	955	667	98	164			
	A	0.85	0.84	0.84	0.87			
Anger Control In (AC-I)	M	23.28	22.60	22.69	21.39	5.13*	6.24*	0.59
	SD	5.92	5.82	5.94	6.13			
	N	966	659	103	171			
	A	0.93	0.91	0.91	0.91			
Note F = Analysis of Variance. *p<.05. **p<.01				**p<.001				

Specify: _____

8. Has anyone in your immediate family attempted or completed suicide?

0=No

1=Yes

9. Are you currently seeing a GP/Psychiatrist/Counsellor for any emotional or health concerns?

0=No

1=Yes

10. Do you ever hear or see things that other people cannot hear or see?

0=No

1=Yes

11. Have there been times that you thought anything strange or unexplainable was going on?

0=No

1=Yes

12. Have you ever been in a major accident in which you sustained a head injury with resulting memory problems?

0=No

1=Yes

Appendix 6 Written consent

CONSENT FORM

Counselling for Amphetamine Users

1. I, _____, agree to participate as a subject in the study described above;
2. I understand that this is a study of the effectiveness of counselling among regular users of amphetamines;
3. I understand that all the information that I give in this study is completely confidential and will not be passed on to any other person, except as required by law;
4. I acknowledge that I have read the above statement, which explains the nature and aims of the study, and the statement has been explained to my satisfaction. Before signing this document I have been given the opportunity to ask any questions relating to any emotional harm that I may suffer as a result of my participation and have received satisfactory answers. I am aware that I will not necessarily personally benefit from participation in this study. I understand that I can withdraw from this study at any time without notice and do not have to give my reasons for withdrawing and this will not affect either my current or future treatment. I agree that research data gathered during the course of this study may be published providing that the name or identifying information is not used.

CONSENT BY PARTICIPANT

I hereby certify that I have read and understood all the information provided that I have been allowed to ask questions. I agree to take part in the counselling for amphetamine use study described in this consent form.

Date

Signature by Participant

Date

If required, Signature by Parent or Guardian#

#For adolescents aged 15-17 years residing with parent or guardian who is aware of their amphetamine use.

CONSENT BY RESEARCHER

I hereby certify that I have disclosed the relevant information and risks that may be involved, in terms readily understood by the patient.

Date

Signature by Investigator

Appendix 7 Frequency distributions of scores to each STAXI-2 scale and subscale

Baseline STAXI2 Item 1 Am furious

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	135	88.2	88.2	88.2
	sometimes	14	9.2	9.2	97.4
	often	2	1.3	1.3	98.7
	almost always	2	1.3	1.3	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 2 Feel irritated

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	79	51.6	51.6	51.6
	sometimes	58	37.9	37.9	89.5
	often	12	7.8	7.8	97.4
	almost always	4	2.6	2.6	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 3 Feel angry

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	109	71.2	71.2	71.2
	sometimes	33	21.6	21.6	92.8
	often	6	3.9	3.9	96.7
	almost always	5	3.3	3.3	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 4 Feel like yelling

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	114	74.5	74.5	74.5
	sometimes	24	15.7	15.7	90.2
	often	7	4.6	4.6	94.8
	almost always	8	5.2	5.2	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 5 Feel like breaking things

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	129	84.3	84.3	84.3
	sometimes	14	9.2	9.2	93.5
	often	5	3.3	3.3	96.7
	almost always	5	3.3	3.3	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 6 Am mad

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	125	81.7	81.7	81.7
	sometimes	16	10.5	10.5	92.2
	often	6	3.9	3.9	96.1
	almost always	6	3.9	3.9	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 7 Feel like banging on table

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	141	92.2	92.2	92.2
	sometimes	9	5.9	5.9	98.0
	often	1	.7	.7	98.7
	almost always	2	1.3	1.3	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 8 Feel like hitting someone

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	141	92.2	92.2	92.2
	sometimes	6	3.9	3.9	96.1
	often	2	1.3	1.3	97.4
	almost always	4	2.6	2.6	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 9 Feel like swearing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	113	73.9	73.9	73.9
	sometimes	24	15.7	15.7	89.5
	often	7	4.6	4.6	94.1
	almost always	9	5.9	5.9	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 10 Feel annoyed

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	89	58.2	58.2	58.2
	sometimes	42	27.5	27.5	85.6
	often	12	7.8	7.8	93.5
	almost always	10	6.5	6.5	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 11 Feel like kicking somebody

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	144	94.1	94.1	94.1
	sometimes	3	2.0	2.0	96.1
	often	4	2.6	2.6	98.7
	almost always	2	1.3	1.3	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 12 Feel like cursing

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	129	84.3	84.3	84.3
	sometimes	11	7.2	7.2	91.5
	often	5	3.3	3.3	94.8
	almost always	8	5.2	5.2	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 13 Feel like screaming

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	120	78.4	78.4	78.4
	sometimes	20	13.1	13.1	91.5
	often	7	4.6	4.6	96.1
	almost always	6	3.9	3.9	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 14 Feel like pounding somebody

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	141	92.2	92.2	92.2
	sometimes	7	4.6	4.6	96.7
	often	2	1.3	1.3	98.0
	almost always	3	2.0	2.0	100.0

Baseline STAXI2 Item 15 Feel like shouting

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	118	77.1	77.1	77.1
	sometimes	20	13.1	13.1	90.2
	often	7	4.6	4.6	94.8
	almost always	8	5.2	5.2	100.0
	Total	153	100.0	100.0	
Total		153	100.0	100.0	

Baseline STAXI2 Item 16 Am quick tempered

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	34	22.2	22.2	22.2
	sometimes	60	39.2	39.2	61.4
	often	28	18.3	18.3	79.7
	almost always	31	20.3	20.3	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 17 Have fiery temper

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	40	26.1	26.1	26.1
	sometimes	50	32.7	32.7	58.8
	often	24	15.7	15.7	74.5
	almost always	39	25.5	25.5	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 18 Am hotheaded person

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	54	35.3	35.3	35.3
	sometimes	49	32.0	32.0	67.3
	often	17	11.1	11.1	78.4
	almost always	33	21.6	21.6	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 19 Angry when slowed by other's mistakes

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	22	14.4	14.4	14.4
	sometimes	48	31.4	31.4	45.8
	often	44	28.8	28.8	74.5
	almost always	39	25.5	25.5	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 20 Annoyed when not given recognition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	21	13.7	13.7	13.7
	sometimes	62	40.5	40.5	54.2
	often	31	20.3	20.3	74.5
	almost always	39	25.5	25.5	100.0

Baseline STAXI2 Item 20 Annoyed when not given recognition

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	21	13.7	13.7	13.7
	sometimes	62	40.5	40.5	54.2
	often	31	20.3	20.3	74.5
	almost always	39	25.5	25.5	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 21 Fly off handle

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	48	31.4	31.4	31.4
	sometimes	57	37.3	37.3	68.6
	often	23	15.0	15.0	83.7
	almost always	25	16.3	16.3	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 22 Say nasty things

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	32	20.9	20.9	20.9
	sometimes	46	30.1	30.1	51.0
	often	29	19.0	19.0	69.9
	almost always	46	30.1	30.1	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 23 Furious when criticised in front of others

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	16	10.5	10.5	10.5
	sometimes	42	27.5	27.5	37.9
	often	33	21.6	21.6	59.5
	almost always	62	40.5	40.5	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 24 Feel like hitting someone when frustrated

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	61	39.9	39.9	39.9
	sometimes	38	24.8	24.8	64.7
	often	22	14.4	14.4	79.1
	almost always	32	20.9	20.9	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 25 Feel furious when good job but bad evaluation

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	22	14.4	14.4	14.4
	sometimes	49	32.0	32.0	46.4
	often	36	23.5	23.5	69.9
	almost always	46	30.1	30.1	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 26 Control temper

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	29	19.0	19.0	19.0
	sometimes	54	35.3	35.3	54.2
	often	34	22.2	22.2	76.5
	almost always	36	23.5	23.5	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 27 Express anger

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	21	13.7	13.7	13.7
	sometimes	49	32.0	32.0	45.8
	often	38	24.8	24.8	70.6
	almost always	45	29.4	29.4	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 28 Take deep breath and relax

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	55	35.9	35.9	35.9
	sometimes	62	40.5	40.5	76.5
	often	22	14.4	14.4	90.8
	almost always	14	9.2	9.2	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 29 Keep things in

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	11	7.2	7.2	7.2
	sometimes	45	29.4	29.4	36.6
	often	46	30.1	30.1	66.7
	almost always	51	33.3	33.3	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 30 Am patient with others

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	20	13.1	13.1	13.1
	sometimes	64	41.8	41.8	54.9
	often	33	21.6	21.6	76.5
	almost always	36	23.5	23.5	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 31 If annoyed usually tell how I feel

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	25	16.3	16.3	16.3
	sometimes	39	25.5	25.5	41.8
	often	38	24.8	24.8	66.7
	almost always	51	33.3	33.3	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 32 Calm myself as soon as possible

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	20	13.1	13.1	13.1
	sometimes	65	42.5	42.5	55.6
	often	36	23.5	23.5	79.1
	almost always	32	20.9	20.9	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 33 Pout or sulk

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	57	37.3	37.3	37.3
	sometimes	52	34.0	34.0	71.2
	often	26	17.0	17.0	88.2
	almost always	18	11.8	11.8	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 34 Control urge to express angry feelings

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	23	15.0	15.0	15.0
	sometimes	70	45.8	45.8	60.8
	often	30	19.6	19.6	80.4
	almost always	30	19.6	19.6	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 35 Lose my temper

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	38	24.8	24.8	24.8
	sometimes	57	37.3	37.3	62.1
	often	24	15.7	15.7	77.8
	almost always	34	22.2	22.2	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 36 Try to simmer down

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	12	7.8	7.8	7.8
	sometimes	68	44.4	44.4	52.3
	often	37	24.2	24.2	76.5
	almost always	36	23.5	23.5	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 37 Withdraw from people

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	18	11.8	11.8	11.8
	sometimes	46	30.1	30.1	41.8
	often	46	30.1	30.1	71.9
	almost always	43	28.1	28.1	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 38 Keep my cool

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	22	14.4	14.4	14.4
	sometimes	65	42.5	42.5	56.9
	often	37	24.2	24.2	81.0
	almost always	29	19.0	19.0	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 39 Make sarcastic remarks to others

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	38	24.8	24.8	24.8
	sometimes	45	29.4	29.4	54.2
	often	31	20.3	20.3	74.5
	almost always	39	25.5	25.5	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 40 Soothe angry feelings

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	24	15.7	15.7	15.7
	sometimes	73	47.7	47.7	63.4
	often	28	18.3	18.3	81.7
	almost always	28	18.3	18.3	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 41 Boil inside but don't show it

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	26	17.0	17.0	17.0
	sometimes	46	30.1	30.1	47.1
	often	43	28.1	28.1	75.2
	almost always	38	24.8	24.8	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 42 Can control behaviour

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	18	11.8	11.8	11.8
	sometimes	60	39.2	39.2	51.0
	often	37	24.2	24.2	75.2
	almost always	38	24.8	24.8	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 43 Slam doors

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	47	30.7	30.7	30.7
	sometimes	39	25.5	25.5	56.2
	often	24	15.7	15.7	71.9
	almost always	43	28.1	28.1	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 44 Try to become calm again

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	8	5.2	5.2	5.2
	sometimes	63	41.2	41.2	46.4
	often	48	31.4	31.4	77.8
	almost always	34	22.2	22.2	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 45 Harbour grudges

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	50	32.7	32.7	32.7
	sometimes	45	29.4	29.4	62.1
	often	26	17.0	17.0	79.1
	almost always	32	20.9	20.9	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 46 Can stop self from losing temper

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	11	7.2	7.2	7.2
	sometimes	75	49.0	49.0	56.2
	often	26	17.0	17.0	73.2
	almost always	41	26.8	26.8	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 47 Argue with others

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	26	17.0	17.0	17.0
	sometimes	55	35.9	35.9	52.9
	often	39	25.5	25.5	78.4
	almost always	33	21.6	21.6	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 48 Reduce anger as soon as possible

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	16	10.5	10.5	10.5
	sometimes	68	44.4	44.4	54.9
	often	31	20.3	20.3	75.2
	almost always	38	24.8	24.8	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 49 Am secretly critical of others

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	46	30.1	30.1	30.1
	sometimes	46	30.1	30.1	60.1
	often	35	22.9	22.9	83.0
	almost always	26	17.0	17.0	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 50 Am tolerant and understanding

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	11	7.2	7.2	7.2
	sometimes	52	34.0	34.0	41.2
	often	41	26.8	26.8	68.0
	almost always	49	32.0	32.0	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 51 I strike out at what infuriates me

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	62	40.5	40.5	40.5
	sometimes	44	28.8	28.8	69.3
	often	20	13.1	13.1	82.4
	almost always	27	17.6	17.6	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 52 Do something relaxing to calm down

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	40	26.1	26.1	26.1
	sometimes	68	44.4	44.4	70.6
	often	24	15.7	15.7	86.3
	almost always	21	13.7	13.7	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 53 Am angrier than I am willing to admit

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	27	17.6	17.6	17.6
	sometimes	53	34.6	34.6	52.3
	often	36	23.5	23.5	75.8
	almost always	37	24.2	24.2	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 54 Can control my angry feelings

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	16	10.5	10.5	10.5
	sometimes	74	48.4	48.4	58.8
	often	25	16.3	16.3	75.2
	almost always	38	24.8	24.8	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 55 Say nasty things

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	45	29.4	29.4	29.4
	sometimes	55	35.9	35.9	65.4
	often	24	15.7	15.7	81.0
	almost always	29	19.0	19.0	100.0
	Total	153	100.0	100.0	

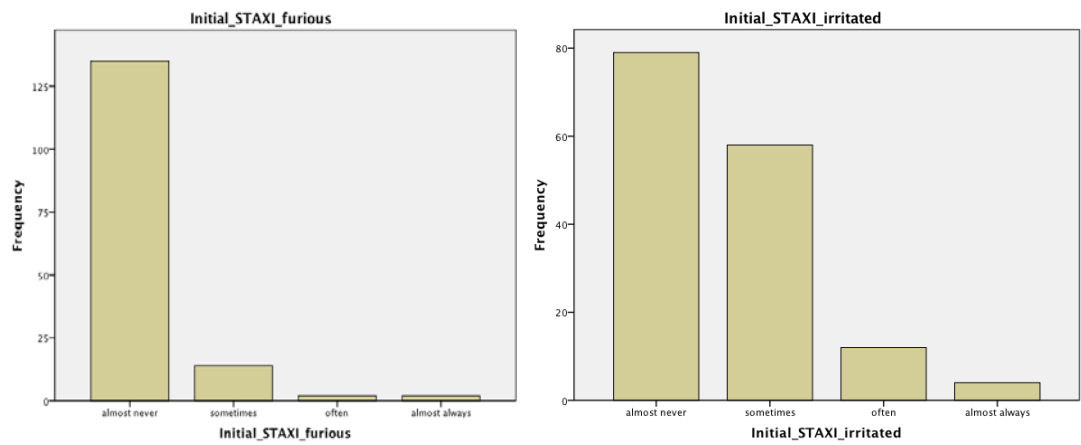
Baseline STAXI2 Item 56 Try to relax

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	13	8.5	8.5	8.5
	sometimes	79	51.6	51.6	60.1
	often	32	20.9	20.9	81.0
	almost always	29	19.0	19.0	100.0
	Total	153	100.0	100.0	

Baseline STAXI2 Item 57 Am irritated more than people are aware

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	almost never	17	11.1	11.1	11.1
	sometimes	35	22.9	22.9	34.0
	often	44	28.8	28.8	62.7
	almost always	57	37.3	37.3	100.0
	Total	153	100.0	100.0	

Appendix 8. Histograms of baseline responses to the 57 items of the STAXI-2

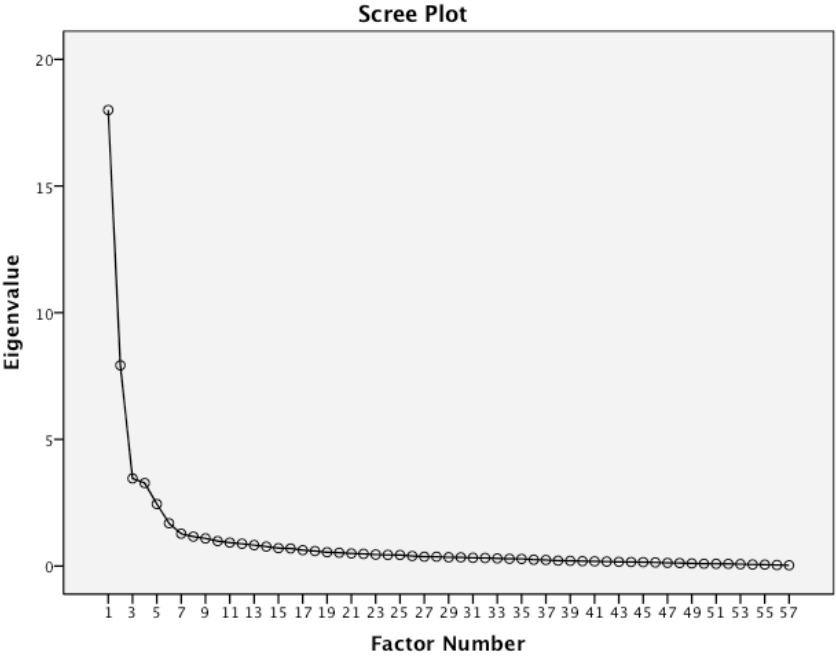


Appendix 9 Sampling adequacy: KMO Index and Bartlett's Test of Sphericity

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.87
Bartlett's Test of Sphericity	Approx. Chi-Square	7457.977
	df	1596
	Sig.	.000

Appendix 10 Construct validity: Cattell's Scree test from the PAF initial solution of nine factors without rotation



Appendix 11 Item communalities: PAF initial solution of nine factors without rotation

	Initial	Extraction
Item 1 Am furious	.743	.535
Item 2 Feel irritated	.714	.673
Item 3 Feel angry	.812	.764
Item 4 Feel like yelling	.868	.788
Item 5 Feel like breaking things	.864	.715
Item 6 Am mad	.846	.710
Item 7 Feel like banging on table	.727	.711
Item 8 Feel like hitting someone	.913	.784
Item 9 Feel like swearing	.848	.737
Item 10 Feel annoyed	.848	.728
Item 11 Feel like kicking somebody	.885	.826
Item 12 Feel like cursing	.812	.722
Item 13 Feel like screaming	.828	.799
Item 14 Feel like pounding somebody	.935	.891
Item 15 Feel like shouting	.742	.666
Item 16 Am quick tempered	.871	.800
Item 17 Have fiery temper	.861	.733
Item 18 Am hotheaded person	.889	.805
Item 19 Angry when slowed by other's mistakes	.734	.632
Item 20 Annoyed when not given recognition	.727	.574
Item 21 Fly off handle	.885	.829
Item 22 Say nasty things	.762	.608
Item 23 Furious when criticised in front of others	.694	.584
Item 24 Feel like hitting someone when frustrated	.765	.659
Item 25 Feel furious when good job bad evaluation	.659	.540
Item 26 Control temper	.806	.649
Item 27 Express anger	.689	.547
Item 28 Take deep breath and relax	.681	.502
Item 29 Keep things in	.587	.430
Item 30 Am patient with others	.734	.580
Item 31 If annoyed usually tell how I feel	.652	.523
Item 32 Calm myself as soon as possible	.836	.703
Item 33 Pout or sulk	.636	.592
Item 34 Control urge to express angry feelings	.695	.547
Item 35 Lose my temper	.873	.779
Item 36 Try to simmer down	.723	.577
Item 37 Withdraw from people	.606	.402
Item 38 Keep my cool	.807	.689
Item 39 Make sarcastic remarks to others	.653	.537
Item 40 Soothe angry feelings	.721	.632
Item 41 Boil inside but don't show it	.744	.639
Item 42 Can control behaviour	.730	.654
Item 43 Slam doors	.722	.565
Item 44 Try to become calm again	.840	.730
Item 45 Harbour grudges	.651	.514
Item 46 Can stop self from losing temper	.796	.701
Item 47 Argue with others	.756	.594
Item 48 Reduce anger as soon as possible	.804	.745
Item 49 Am secretly critical of others	.605	.442
Item 50 Am tolerant and understanding	.778	.603
Item 51 I strike out at what infuriates me	.826	.757
Item 52 Do something relaxing to calm down	.673	.450
Item 53 Am angrier than I am willing to admit	.652	.526
Item 54 Can control my angry feelings	.809	.742
Item 55 Say nasty things	.791	.727
Item 56 Try to relax	.795	.666
Item 57 Am irritated more than people are aware	.675	.623

Appendix 12 Total variance explained: PAF initial solution of nine factors without rotation

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	17.999	31.578	31.578	17.668	30.997	30.997
2	7.924	13.902	45.480	7.634	13.393	44.390
3	3.457	6.065	51.544	3.066	5.379	49.769
4	3.276	5.747	57.291	2.910	5.106	54.875
5	2.450	4.299	61.590	2.171	3.809	58.684
6	1.689	2.963	64.554	1.303	2.285	60.970
7	1.275	2.236	66.790	.911	1.598	62.568
8	1.163	2.040	68.830	.774	1.358	63.925
9	1.091	1.913	70.743	.746	1.308	65.234
10	.984	1.727	72.470			
11	.926	1.625	74.095			
12	.880	1.544	75.639			
13	.825	1.448	77.087			
14	.767	1.346	78.433			
15	.707	1.241	79.674			
16	.695	1.219	80.893			
17	.627	1.100	81.993			
18	.592	1.038	83.031			
19	.544	.954	83.986			
20	.525	.921	84.907			
21	.500	.877	85.783			
22	.480	.843	86.626			
23	.454	.797	87.422			
24	.440	.772	88.195			
25	.435	.763	88.958			
26	.397	.697	89.655			
27	.369	.647	90.302			
28	.367	.644	90.946			
29	.346	.606	91.552			
30	.341	.598	92.150			
31	.326	.571	92.721			
32	.318	.557	93.279			
33	.301	.529	93.807			
34	.287	.503	94.310			
35	.283	.497	94.807			
36	.251	.441	95.248			
37	.239	.419	95.666			
38	.213	.374	96.041			
39	.206	.362	96.403			
40	.192	.336	96.739			
41	.185	.324	97.063			
42	.177	.310	97.373			
43	.167	.292	97.665			
44	.160	.280	97.946			
45	.153	.268	98.213			
46	.141	.247	98.461			
47	.126	.222	98.683			
48	.120	.211	98.894			
49	.104	.182	99.076			
50	.092	.161	99.237			
51	.087	.153	99.390			
52	.083	.146	99.536			
53	.075	.131	99.667			
54	.061	.108	99.775			
55	.056	.098	99.874			
56	.042	.073	99.947			
57	.030	.053	100.000			

Extraction Method: Principal Axis Factoring.

Appendix 13 Factor matrix of PAF initial solution of nine factors without rotation

	1	2	3	4	5	6	7	8	9
Item 1 Am furious	.278	.452	.157	-.164	-.308	-.081	.163	.030	-.271
Item 2 Feel irritated	.426	.368	.146	.030	-.432	-.206	.245	.023	-.210
Item 3 Feel angry	.418	.515	.237	-.131	-.426	-.075	.238	.085	-.015
Item 4 Feel like yelling	.538	.553	.278	-.164	-.288	-.036	.028	.042	.041
Item 5 Feel like breaking things	.444	.603	.125	-.145	-.119	.051	-.209	-.188	.147
Item 6 Am mad	.286	.671	.183	-.208	-.286	.007	-.068	-.105	.062
Item 7 Feel like banging table	.289	.466	.205	-.153	-.107	-.008	-.461	-.287	-.198
Item 8 Feel like hitting someone	.262	.619	-.006	-.134	.522	.191	.040	-.005	-.053
Item 9 Feel like swearing	.439	.676	.086	-.139	.106	-.016	-.141	.036	.169
Item 10 Feel annoyed	.444	.651	.168	-.093	-.199	-.010	.066	.118	.113
Item 11 Feel like kicking	.201	.624	-.124	-.121	.567	.155	.125	.045	-.054
Item 12 Feel like cursing	.257	.780	-.007	-.117	.109	.020	-.056	.075	.112
Item 13 Feel like screaming	.484	.652	.057	-.178	.193	-.115	-.001	.108	.204
Item 14 Feel like pounding	.236	.676	-.022	-.217	.491	.142	.176	.035	-.195
Item 15 Feel like shouting	.396	.697	.082	-.060	.054	.036	-.066	.017	-.066
Item 16 Am quick tempered	.785	-.195	.291	.155	.095	.012	.118	-.108	.046
Item 17 Have fiery temper	.694	-.145	.345	.218	.126	.037	.180	-.107	-.039
Item 18 Am hotheaded person	.780	-.222	.263	.207	.035	-.043	.116	-.114	-.072
Item 19 Angry slowed other's mistakes	.679	-.027	.068	.320	.220	-.092	-.016	.035	-.066
Item 20 Annoyed no recognition	.609	.023	-.011	.260	.033	-.344	-.052	.102	-.053
Item 21 Fly off handle	.814	-.206	.227	.164	.118	-.109	.060	-.045	.121
Item 22 Say nasty things	.713	-.038	.046	.240	-.037	.183	-.008	.039	.052
Item 23 Furious criticised front others	.597	.189	-.005	.352	-.015	-.247	.038	.044	.059
Item 24 Feel hitting when frustrated	.635	.006	.009	.359	.267	-.165	-.056	.038	-.155
Item 25 Furious good job bad evaluate	.619	.057	-.030	.248	.048	-.240	.004	.127	-.122
Item 26 Control temper	-.724	.299	-.031	.102	.035	-.108	-.050	.087	-.026
Item 27 Express anger	.516	-.335	.383	.120	-.001	-.037	-.061	-.046	-.036
Item 28 Take deep breath relax	-.596	.151	.179	.132	.085	.030	.060	.232	-.098
Item 29 Keep things in	-.188	.260	-.480	.242	-.006	-.024	.141	-.097	.089
Item 30 Am patient with others	-.671	.268	.127	.147	.034	-.054	.007	.126	-.012
Item 31 If annoyed tell how I feel	.298	-.307	.555	-.018	.026	-.043	-.085	.146	-.012
Item 32 Calm myself soon possible	-.680	.125	.274	.248	.123	.207	.127	-.121	-.001
Item 33 Pout or sulk	.315	.051	-.401	.244	-.311	.319	.072	.237	.102
Item 34 Control urge express anger	-.564	.311	-.068	.310	-.037	-.116	-.127	.023	.006
Item 35 Lose my temper	.796	-.287	.179	.095	.089	.037	.063	-.056	.067
Item 36 Try to simmer down	-.632	.092	.280	.243	-.086	.059	-.087	-.068	.091
Item 37 Withdraw from people	-.020	.301	-.262	.183	-.268	.175	.242	-.187	.112
Item 38 Keep my cool	-.714	.233	.163	.153	-.017	-.148	-.147	.144	-.105
Item 39 Make sarcastic remarks others	.472	.067	-.145	.263	-.205	.329	-.196	.161	-.063
Item 40 Soothe angry feelings	-.537	.118	.252	.392	-.149	.144	-.060	-.114	-.233
Item 41 Boil inside don't show it	.040	.417	-.418	.467	.145	-.170	.031	-.136	-.014
Item 42 Can control behaviour	-.718	.243	.038	.178	-.010	-.131	.101	.115	-.076
Item 43 Slam doors	.712	-.076	.004	.156	-.046	.009	-.017	.062	.145
Item 44 Try become calm again	-.679	.215	.376	.259	.024	.073	-.005	-.082	.031
Item 45 Harbour grudges	.488	.133	-.185	.275	-.149	.259	-.139	.083	-.182
Item 46 Can stop from losing temper	-.697	.274	-.026	.271	.000	-.201	-.037	.093	.126
Item 47 Argue with others	.674	-.247	.101	.117	.072	-.043	-.023	.112	.187
Item 48 Reduce anger soon possible	-.655	.248	.344	.281	.018	.069	.108	-.006	.200
Item 49 Secretly critical others	.384	.242	-.224	.309	.001	.241	-.044	.070	-.159
Item 50 Am tolerant understanding	-.616	.226	.263	.238	-.025	.127	.103	-.095	.104
Item 51 Strike out what infuriates me	.729	-.264	.290	.141	.176	.109	-.081	-.005	.057
Item 52 Do relaxing to calm	-.467	.167	.307	.246	.059	.178	.113	.033	.009
Item 53 Angrier willing to admit	.350	.323	-.354	.316	.056	-.153	-.133	-.171	.029
Item 54 Can control anger	-.729	.255	.059	.197	.064	-.230	-.131	.104	.134
Item 55 Say nasty things	.685	-.011	-.009	.283	-.156	.280	-.158	.205	.084
Item 56 Try to relax	-.634	.216	.350	.253	.080	.129	-.062	-.061	-.012
Item 57 Irritated more people aware	.413	.343	-.324	.354	-.128	-.089	.082	-.269	.032

Appendix 14 Construct validity: PAF initial solution of nine factors with promax oblique rotation

Total Variance Explained	
Factor	Rotation Sums of Squared Loadings ^a
	Total
1	14.983
2	13.594
3	9.388
4	5.725
5	4.745
6	8.756
7	2.132
8	2.714
9	3.357

Extraction Method: Principal Axis Factoring.

a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Appendix 15 Factor correlation matrix: PAF initial solution of nine factors with promax oblique rotation

Factor Correlation Matrix

Factor	1	2	3	4	5	6	7	8	9
1	1.000	-.659	.269	.068	.005	.511	-.118	.226	.098
2	-.659	1.000	-.226	-.078	-.045	-.452	.158	-.115	-.117
3	.269	-.226	1.000	.451	.365	.366	.204	.259	.524
4	.068	-.078	.451	1.000	.299	.155	.185	.271	.350
5	.005	-.045	.365	.299	1.000	.411	.420	-.043	.227
6	.511	-.452	.366	.155	.411	1.000	.051	.148	.181
7	-.118	.158	.204	.185	.420	.051	1.000	-.087	.219
8	.226	-.115	.259	.271	-.043	.148	-.087	1.000	.175
9	.098	-.117	.524	.350	.227	.181	.219	.175	1.000

Extraction Method: Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization.

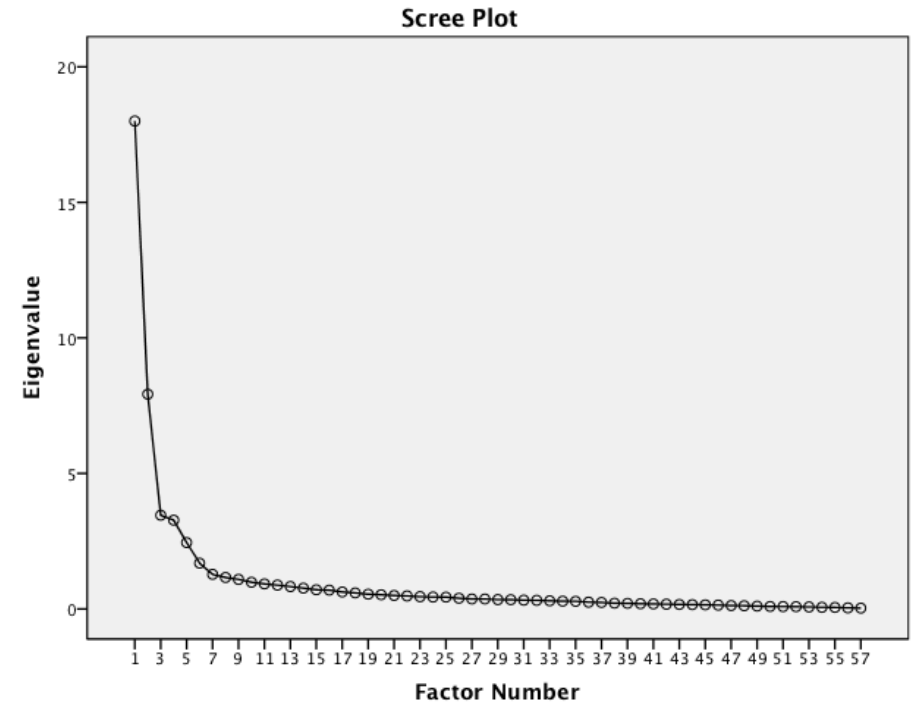
Appendix 16 Structure matrix: PAF initial solution nine factors promax oblique rotation

	1	2	3	4	5	6	7	8	9
Item 16 Am quick tempered	.889	-.561	.266			.396	-.104	.182	
Item 21 Fly off handle	.889	-.608	.282			.397		.134	.191
Item 18 Am hotheaded person	.883	-.562	.237			.415		.187	
Item 35 Lose my temper	.873	-.651	.196			.431	-.129	.148	.106
Item 51 I strike at what infuriates	.842	-.529	.154		-.109	.426		.244	.162
Item 17 Have fiery temper	.828	-.432	.235	.131		.351		.165	
Item 26 Control temper	-.728	.711	-.168			-.404	.266	-.160	
Item 47 Argue with others	.712	-.555	.189			.405			.230
Item 22 Say nasty things	.709	-.502	.319	.120	.182	.632		.153	.177
Item 19 Angry slowed mistakes	.700	-.442	.242	.221	.254	.470	.241	.145	.146
Item 43 Slam doors	.681	-.560	.333		.176	.535			.248
Item 27 Express anger	.673	-.363		-.145	-.215	.215		.204	
Item 24 Feel like hitting frustrated	.637	-.405	.209	.251	.322	.449	.355	.159	.110
Item 20 Annoyed not recognition	.554	-.431	.326		.318	.388	.404		.159
Item 25 Furious job bad evaluation	.554	-.437	.333	.163	.318	.442	.356		.109
Item 23 Furious when criticised	.536	-.337	.451	.161	.454	.451	.351		.244
Item 31 If annoyed tell how I feel	.476	-.161		-.153	-.454			.138	
Item 44 Try to become calm again	-.494	.841	-.180		-.104	-.414			-.101
Item 48 Reduce anger soon	-.481	.830	-.112			-.390		-.174	
Item 56 Try to relax	-.461	.797	-.190		-.107	-.351			
Item 32 Calm myself soon	-.476	.787	-.310		-.112	-.399			-.201
Item 54 Can control angry feelings	-.685	.763	-.172			-.454	.365	-.185	
Item 38 Keep my cool	-.657	.759	-.178			-.409	.322		-.104
Item 50 Am tolerant understanding	-.466	.749	-.133			-.341		-.102	
Item 46 Can stop losing temper	-.667	.738	-.149	-.102	.177	-.370	.345	-.257	
Item 42 Can control behaviour	-.673	.734	-.189			-.414	.254	-.267	-.180
Item 36 Try to simmer down	-.464	.728	-.221	-.225	-.116	-.347			
Item 30 Am patient with others	-.616	.727	-.142			-.379	.221	-.168	
Item 40 Soothe angry feelings	-.368	.693	-.221	-.175		-.158			-.328
Item 28 Take deep breath relax	-.508	.647	-.206		-.135	-.320	.175	-.207	-.158
Item 34 Control urge anger	-.563	.637			.253	-.199	.325		
Item 52 Do relaxing to calm down	-.308	.629	-.127			-.223			-.108
Item 4 Feel like yelling	.363	-.271	.858	.354	.173	.341		.323	.362
Item 10 Feel annoyed	.242	-.170	.845	.441	.286	.349	.152	.206	.438
Item 3 Feel angry	.255	-.190	.803	.236	.184	.274		.115	.166
Item 6 Am mad			.787	.373	.229	.200		.400	.386
Item 13 Feel like screaming	.254	-.258	.770	.664	.330	.241	.285	.215	.635
Item 9 Feel like swearing	.218	-.190	.760	.617	.321	.293	.231	.359	.628
Item 5 Feel like breaking things	.253	-.210	.748	.437	.290	.313		.517	.532
Item 12 Feel like cursing			.718	.669	.390	.238	.262	.258	.555
Item 15 Feel like shouting	.187	-.127	.717	.630	.354	.333	.231	.377	.404
Item 2 Feel irritated	.299	-.223	.644	.114	.271	.290	.145		
Item 1 Am furious	.119	-.129	.595	.266	.141	.173		.197	
Item 14 Feel like pounding			.475	.934	.269	.109	.169	.227	.272
Item 11 Feel like kicking somebody			.386	.898	.337	.134	.197	.153	.370
Item 8 Feel like hitting someone	.102		.437	.877	.272	.164	.147	.285	.400
Item 41 Boil inside but don't show it		.103	.168	.288	.767	.238	.422		.151
Item 57 Am irritated more	.275	-.243	.404	.198	.717	.453	.161	.102	.165
Item 53 Am angrier than admit	.196	-.213	.309	.253	.662	.395	.324	.164	.277
Item 29 Keep things in	-.304	.156			.535		.137	-.229	
Item 37 Withdraw from people	-.108		.216		.431	.211	-.144	-.107	
Item 55 Say nasty things	.643	-.471	.345		.179	.783		.150	.251
Item 39 Make sarcastic remarks	.387	-.324	.254		.233	.725		.174	.125
Item 45 Harbour grudges	.384	-.332	.272	.156	.328	.697		.208	
Item 33 Pout or sulk	.182	-.288	.193		.344	.663		-.202	
Item 49 Am secretly critical others	.277	-.212	.255	.292	.417	.604	.125	.132	
Item 7 Feel like banging on table	.152	-.105	.511	.321	.131	.185		.766	.273

Appendix 17 Pattern Matrix: PAF initial solution nine factors promax oblique rotation

	1	2	3	4	5	6	7	8	9
Item 17 Have fiery temper	.999	.190		.115					-.118
Item 16 Am quick tempered	.956					-.103			
Item 21 Fly off handle	.932					-.140	.101		.105
Item 18 Am hotheaded person	.931								-.150
Item 51 I strike out what infuriates me	.846		-.168		-.167				.150
Item 35 Lose my temper	.813	-.135							
Item 27 Express anger	.758			-.166	-.186		.129	.104	
Item 19 Angry slowed mistakes	.735		-.139	.138	.118		.274		
Item 24 Feel like hitting if frustrated	.676		-.200	.167	.170		.391		
Item 47 Argue with others	.631	-.145					.123	-.133	.225
Item 31 If annoyed tell how I feel	.621	.191	.102	-.113	-.537		.232		
Item 23 Furious criticised front others	.553		.204		.294		.254		
Item 22 Say nasty things	.543					.340			
Item 43 Slam doors	.495	-.146				.171			.144
Item 20 Annoyed no recognition	.493	-.178		-.106	.146		.440		
Item 25 Furious good job bad evaluat	.452	-.162	.103		.105		.388		-.127
Item 26 Control temper	-.440	.388					.131		
Item 48 Reduce anger soon possible	.160	.941					-.152	-.144	.124
Item 44 Try to become calm again	.110	.907							
Item 56 Try to relax		.873						.105	
Item 32 Calm myself soon possible	.128	.861	-.147	.156			-.232		
Item 50 Am tolerant understanding		.820					-.225		
Item 40 Soothe angry feelings		.798		-.121		.192		.208	-.281
Item 52 Do relaxing to calm down	.172	.792		.133			-.112	-.104	
Item 36 Try to simmer down		.747		-.196					
Item 30 Am patient with others	-.238	.556					.111		
Item 28 Take deep breath and relax	-.158	.544		.160	-.252	.119	.150	-.149	-.105
Item 38 Keep my cool	-.314	.518			-.139		.284		
Item 46 Can stop self losing temper	-.253	.511		-.125	.178		.155		.127
Item 54 Can control angry feelings	-.252	.505		-.114		-.127	.224		.198
Item 42 Can control behaviour	-.287	.488					.131	-.125	-.149
Item 34 Control urge express anger	-.273	.469		-.111	.229		.145		
Item 3 Feel angry			1.071					-.103	-.319
Item 2 Feel irritated	.123		.926	-.154					-.529
Item 4 Feel like yelling	.100		.919		-.135				-.109
Item 1 Am furious	-.124		.852						-.494
Item 6 Am mad	-.166		.841				-.140	.229	
Item 10 Feel annoyed			.824	.102					
Item 5 Feel like breaking things			.542		.123		-.145	.331	.185
Item 15 Feel like shouting			.495	.347		.100		.160	
Item 13 Feel like screaming		-.112	.461	.370		-.125			.253
Item 12 Feel like cursing	-.165		.460	.380					.170
Item 9 Feel like swearing			.448	.280				.120	.260
Item 14 Feel like pounding somebody			.155	.927					-.113
Item 11 Feel like kicking somebody				.900					
Item 8 Feel like hitting someone				.835					.113
Item 57 Am irritated more than aware	.192		.145		.759		-.122		
Item 41 Boil inside but don't show it		.121	-.180	.123	.757		.102		
Item 53 Am angrier than willing admit		-.122			.625		.103	.171	.111
Item 29 Keep things in	-.282		-.130		.606		-.155	-.143	
Item 37 Withdraw from people	-.148	.155	.253		.515	.119	-.441	-.124	
Item 39 Make sarcastic remarks						.751			
Item 33 Pout or sulk	-.228				.106	.729	-.184	-.276	
Item 55 Say nasty things	.327				-.127	.669			.144
Item 45 Harbour grudges						.637		.122	-.132
Item 49 Am secretly critical of others				.207	.175	.537			-.106
Item 7 Feel like banging on table	-.113		.369					.721	

Appendix 18 Construct validity: Cattell's Scree test PAF of six factor extraction without rotation



Appendix 19 Kaiser-Meyer-Olkin measure of sampling adequacy and Bartlett's test of sphericity: PAF of six factor extraction without rotation

KMO and Bartlett's Test		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.874
Bartlett's Test of Sphericity	Approx. Chi-Square	7457.977
	df	1596
	Sig.	.000

Appendix 20 Item Communalities: PAF six factor extraction without rotation

	Initial	Extraction
Item 1 Am furious	.743	.416
Item 2 Feel irritated	.714	.534
Item 3 Feel angry	.812	.689
Item 4 Feel like yelling	.868	.797
Item 5 Feel like breaking things	.864	.601
Item 6 Am mad	.846	.695
Item 7 Feel like banging on table	.727	.337
Item 8 Feel like hitting someone	.913	.793
Item 9 Feel like swearing	.848	.683
Item 10 Feel annoyed	.848	.699
Item 11 Feel like kicking somebody	.885	.807
Item 12 Feel like cursing	.812	.701
Item 13 Feel like screaming	.828	.739
Item 14 Feel like pounding somebody	.935	.792
Item 15 Feel like shouting	.742	.660
Item 16 Am quick tempered	.871	.770
Item 17 Have fiery temper	.861	.681
Item 18 Am hotheaded person	.889	.770
Item 19 Angry when slowed by other's mistakes	.734	.629
Item 20 Annoyed when not given recognition	.727	.562
Item 21 Fly off handle	.885	.807
Item 22 Say nasty things	.762	.607
Item 23 Furious when criticised in front of others	.694	.581
Item 24 Feel like hitting someone when frustrated	.765	.627
Item 25 Feel furious when good job but bad evaluation	.659	.507
Item 26 Control temper	.806	.640
Item 27 Express anger	.689	.542
Item 28 Take deep breath and relax	.681	.430
Item 29 Keep things in	.587	.388
Item 30 Am patient with others	.734	.565
Item 31 If annoyed usually tell how I feel	.652	.492
Item 32 Calm myself as soon as possible	.836	.670
Item 33 Pout or sulk	.636	.491
Item 34 Control urge to express angry feelings	.695	.531
Item 35 Lose my temper	.873	.768
Item 36 Try to simmer down	.723	.556
Item 37 Withdraw from people	.606	.278
Item 38 Keep my cool	.807	.631
Item 39 Make sarcastic remarks to others	.653	.452
Item 40 Soothe angry feelings	.721	.547
Item 41 Boil inside but don't show it	.744	.619
Item 42 Can control behaviour	.730	.623
Item 43 Slam doors	.722	.540
Item 44 Try to become calm again	.840	.724
Item 45 Harbour grudges	.651	.447
Item 46 Can stop self from losing temper	.796	.675
Item 47 Argue with others	.756	.543
Item 48 Reduce anger as soon as possible	.804	.685
Item 49 Am secretly critical of others	.605	.410
Item 50 Am tolerant and understanding	.778	.571
Item 51 I strike out at what infuriates me	.826	.749
Item 52 Do something relaxing to calm down	.673	.437
Item 53 Am angrier than I am willing to admit	.652	.470
Item 54 Can control my angry feelings	.809	.692
Item 55 Say nasty things	.791	.636
Item 56 Try to relax	.795	.661
Item 57 Am irritated more than people are aware	.675	.525

Appendix 21 Total variance explained: PAF six factor extraction without rotation

Factor	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	17.999	31.578	31.578	17.632	30.933	30.933
2	7.924	13.902	45.480	7.583	13.304	44.237
3	3.457	6.065	51.544	3.022	5.302	49.539
4	3.276	5.747	57.291	2.866	5.028	54.567
5	2.450	4.299	61.590	2.115	3.710	58.277
6	1.689	2.963	64.554	1.253	2.199	60.476
7	1.275	2.236	66.790			
8	1.163	2.040	68.830			
9	1.091	1.913	70.743			
10	.984	1.727	72.470			
11	.926	1.625	74.095			
12	.880	1.544	75.639			
13	.825	1.448	77.087			
14	.767	1.346	78.433			
15	.707	1.241	79.674			
16	.695	1.219	80.893			
17	.627	1.100	81.993			
18	.592	1.038	83.031			
19	.544	.954	83.986			
20	.525	.921	84.907			
21	.500	.877	85.783			
22	.480	.843	86.626			
23	.454	.797	87.422			
24	.440	.772	88.195			
25	.435	.763	88.958			
26	.397	.697	89.655			
27	.369	.647	90.302			
28	.367	.644	90.946			
29	.346	.606	91.552			
30	.341	.598	92.150			
31	.326	.571	92.721			
32	.318	.557	93.279			
33	.301	.529	93.807			
34	.287	.503	94.310			
35	.283	.497	94.807			
36	.251	.441	95.248			
37	.239	.419	95.666			
38	.213	.374	96.041			
39	.206	.362	96.403			
40	.192	.336	96.739			
41	.185	.324	97.063			
42	.177	.310	97.373			
43	.167	.292	97.665			
44	.160	.280	97.946			
45	.153	.268	98.213			
46	.141	.247	98.461			
47	.126	.222	98.683			
48	.120	.211	98.894			
49	.104	.182	99.076			
50	.092	.161	99.237			
51	.087	.153	99.390			
52	.083	.146	99.536			
53	.075	.131	99.667			
54	.061	.108	99.775			
55	.056	.098	99.874			
56	.042	.073	99.947			
57	.030	.053	100.000			

Extraction Method: Principal Axis Factoring. a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Appendix 22 Factor Matrix: PAF six factor extraction without rotation

	1	2	3	4	5	6
Item 21 Fly off handle	.814	-.205	.238	.147	.115	-.109
Item 35 Lose my temper	.797	-.286	.186			
Item 16 Am quick tempered	.785	-.194	.300	.133		
Item 18 Am hotheaded person	.780	-.220	.275	.187		
Item 51 I strike out at what infuriates me	.729	-.263	.301	.120	.176	.108
Item 54 Can control my angry feelings	-.728	.254		.192		-.229
Item 26 Control temper	-.725	.299		.105		-.111
Item 42 Can control behaviour	-.717	.241		.174		-.129
Item 22 Say nasty things	.713			.236		.189
Item 43 Slam doors	.712			.155		
Item 38 Keep my cool	-.712	.230	.171	.139		-.148
Item 46 Can stop self from losing temper	-.697	.273		.272		-.202
Item 17 Have fiery temper	.693	-.143	.357	.190	.122	
Item 55 Say nasty things	.682			.273	-.156	.267
Item 19 Angry when slowed by other's mistakes	.680			.319	.218	
Item 44 Try to become calm again	-.680	.215	.397	.230		
Item 32 Calm myself as soon as possible	-.679	.124	.292	.225	.122	.206
Item 47 Argue with others	.673	-.245	.108	.109		
Item 30 Am patient with others	-.671	.267	.139	.137		
Item 48 Reduce anger as soon as possible	-.654	.246	.361	.249		
Item 56 Try to relax	-.635	.215	.371	.227		.130
Item 24 Feel like hitting someone when frustrated	.634			.359	.260	-.162
Item 36 Try to simmer down	-.632		.298	.220		
Item 25 Feel furious good job bad evaluation	.619			.250		-.237
Item 50 Am tolerant and understanding	-.615	.224	.280	.215		.129
Item 20 Annoyed when not given recognition	.609			.263		-.347
Item 23 Furious when criticised in front of others	.597	.191		.354		-.248
Item 28 Take deep breath and relax	-.594	.149	.186	.116		
Item 34 Control urge to express angry feelings	-.564	.311		.315		-.114
Item 40 Soothe angry feelings	-.535	.116	.273	.362	-.147	.142
Item 27 Express anger	.516	-.335	.392			
Item 45 Harbour grudges	.486	.133	-.162	.282	-.150	.255
Item 39 Make sarcastic remarks to others	.470		-.123	.265	-.202	.317
Item 52 Do something relaxing to calm down	-.467	.166	.327	.222		.180
Item 2 Feel irritated	.423	.363	.142		-.412	-.182
Item 57 Am irritated more than people are aware	.411	.340	-.290	.367	-.130	
Item 49 Am secretly critical of others	.384	.243	-.200	.322		.245
Item 53 Am angrier than I am willing to admit	.349	.323	-.326	.340		-.142
Item 12 Feel like cursing	.257	.781		-.117	.105	
Item 15 Feel like shouting	.396	.699				
Item 9 Feel like swearing	.437	.674		-.144	.102	
Item 6 Am mad	.285	.671	.168	-.226	-.289	
Item 14 Feel like pounding somebody	.234	.670		-.207	.476	.130
Item 10 Feel annoyed	.443	.651	.163	-.109	-.202	
Item 13 Feel like screaming	.483	.650		-.179	.187	-.118
Item 11 Feel like kicking somebody	.201	.626	-.130	-.109	.569	.152
Item 8 Feel like hitting someone	.262	.623		-.132	.531	.191
Item 5 Feel like breaking things	.441	.597	.111	-.151	-.116	
Item 4 Feel like yelling	.539	.556	.269	-.191	-.295	
Item 3 Feel angry	.416	.512	.224	-.152	-.419	
Item 1 Am furious	.276	.446	.139	-.173	-.294	
Item 7 Feel like banging on table	.283	.444	.171	-.149		
Item 37 Withdraw from people		.297	-.237	.192	-.258	.171
Item 31 If annoyed usually tell how I feel	.298	-.307	.550			
Item 29 Keep things in	-.188	.260	-.457	.275		
Item 33 Pout or sulk	.314		-.371	.261	-.304	.304
Item 41 Boil inside but don't show it		.418	-.383	.501	.138	-.160

Appendix 23 Construct validity: Total Variance Explained from PAF six factor extraction without rotation

Total Variance Explained

Factor	Rotation Sums of Squared Loadings ^a
	Total
1	14.887
2	13.752
3	9.401
4	5.992
5	7.601
6	4.596

Extraction Method: Principal Axis Factoring. a. When factors are correlated, sums of squared loadings cannot be added to obtain a total variance.

Appendix 24 Factor correlation matrix: PAF six factor extraction with oblique rotation

Factor	1	2	3	4	5	6
1	1.000	-.650	.296	.096	.448	.058
2	-.650	1.000	-.236	-.117	-.469	-.045
3	.296	-.236	1.000	.468	.287	.331
4	.096	-.117	.468	1.000	.149	.302
5	.448	-.469	.287	.149	1.000	.179
6	.058	-.045	.331	.302	.179	1.000

Extraction Method: Principal Axis Factoring. Rotation Method: Promax with Kaiser Normalization.

Appendix 25 Structure matrix: PAF six factor extraction with oblique rotation

	1	2	3	4	5	6
Item 21 Fly off handle	.889	-.619	.276		.348	.135
Item 16 Am quick tempered	.877	-.567	.280	.109	.388	
Item 18 Am hotheaded person	.874	-.567	.267		.394	
Item 35 Lose my temper	.864	-.656	.201		.422	
Item 51 I strike out at what infuriates me	.851	-.536	.167	.119	.376	
Item 17 Have fiery temper	.814	-.438	.260	.127	.344	
Item 47 Argue with others	.720	-.564	.160		.339	
Item 19 Angry when slowed by other's mistakes	.717	-.454	.242	.228	.357	.352
Item 22 Say nasty things	.704	-.509	.313	.155	.605	.169
Item 27 Express anger	.686	-.364		-.134	.172	-.134
Item 43 Slam doors	.681	-.570	.308	.101	.486	.200
Item 24 Feel like hitting someone when frustrated	.660	-.418	.217	.244	.308	.439
Item 20 Annoyed when not given recognition	.584	-.445	.318		.233	.459
Item 25 Feel furious when good job but bad evaluation	.578	-.449	.330	.149	.304	.431
Item 23 Furious when criticised in front of others	.548	-.354	.427	.172	.337	.539
Item 31 If annoyed usually tell how I feel	.512	-.163		-.149		-.310
Item 44 Try to become calm again	-.487	.843	-.165		-.403	-.101
Item 48 Reduce anger as soon as possible	-.480	.822	-.136		-.370	
Item 56 Try to relax	-.450	.800	-.169		-.352	-.102
Item 32 Calm myself as soon as possible	-.489	.791	-.297		-.332	-.160
Item 38 Keep my cool	-.614	.755	-.170	-.130	-.501	
Item 54 Can control my angry feelings	-.650	.754	-.207		-.535	.149
Item 50 Am tolerant and understanding	-.477	.749	-.137		-.285	
Item 42 Can control behaviour	-.654	.733	-.200	-.113	-.448	
Item 46 Can stop self from losing temper	-.645	.730	-.191	-.111	-.431	.225
Item 36 Try to simmer down	-.458	.730	-.216	-.220	-.333	-.123
Item 30 Am patient with others	-.593	.725	-.152		-.426	
Item 26 Control temper	-.707	.709	-.182		-.450	.107
Item 40 Soothe angry feelings	-.366	.693	-.167	-.214	-.154	
Item 28 Take deep breath and relax	-.477	.644	-.208		-.376	
Item 34 Control urge to express angry feelings	-.545	.632	-.107		-.260	.273
Item 52 Do something relaxing to calm down	-.305	.631	-.124		-.208	
Item 4 Feel like yelling	.370	-.281	.878	.367	.292	.187
Item 10 Feel annoyed	.250	-.183	.830	.460	.287	.298
Item 6 Am mad			.809	.399	.192	.188
Item 3 Feel angry	.252	-.196	.807	.217	.260	.178
Item 5 Feel like breaking things	.246	-.222	.753	.497	.292	.248
Item 9 Feel like swearing	.234	-.208	.739	.666	.203	.354
Item 15 Feel like shouting	.200	-.139	.733	.639	.251	.370
Item 13 Feel like screaming	.271	-.278	.728	.699	.143	.395
Item 2 Feel irritated	.296	-.227	.662		.260	.281
Item 1 Am furious	.123	-.129	.632	.215	.150	.145
Item 7 Feel like banging on table	.165	-.110	.568	.345	.128	.137
Item 11 Feel like kicking somebody			.368	.890		.340
Item 8 Feel like hitting someone	.105		.435	.888	.120	.274
Item 14 Feel like pounding somebody			.487	.881		.278
Item 12 Feel like cursing			.695	.699	.159	.401
Item 55 Say nasty things	.649	-.480	.327	.111	.697	.171
Item 33 Pout or sulk	.164	-.289	.140		.658	.228
Item 39 Make sarcastic remarks to others	.391	-.327	.255		.657	.183
Item 45 Harbour grudges	.384	-.335	.290	.164	.636	.277
Item 49 Am secretly critical of others	.274	-.217	.258	.291	.556	.365
Item 37 Withdraw from people	-.159		.187		.321	.249
Item 41 Boil inside but don't show it			.133	.286	.189	.742
Item 53 Am angrier than I am willing to admit	.187	-.226	.289	.285	.339	.634
Item 57 Am irritated more than people are aware	.238	-.252	.386	.217	.470	.611
Item 29 Keep things in	-.335	.152			.124	.429

Appendix 26 Pattern matrix: PAF six factor extraction with oblique rotation

	1	2	3	4	5	6
Item 17 Have fiery temper	.914	.166				
Item 51 I strike out at what infuriates me	.895		-.120	.118		
Item 16 Am quick tempered	.877					
Item 18 Am hotheaded person	.869					
Item 21 Fly off handle	.864	-.102			-.103	.104
Item 27 Express anger	.810			-.160	-.109	-.116
Item 35 Lose my temper	.770	-.159				
Item 31 If annoyed usually tell how I feel	.764	.203	.110	-.120	-.274	-.296
Item 19 Angry when slowed by other's mistakes	.744		-.136	.128		.317
Item 24 Feel like hitting someone when frustrated	.703		-.181	.141		.425
Item 47 Argue with others	.630	-.179				
Item 22 Say nasty things	.550				.348	
Item 20 Annoyed when not given recognition	.510	-.163		-.139	-.159	.464
Item 23 Furious when criticised in front of others	.487		.173	-.101		.484
Item 43 Slam doors	.478	-.170			.159	.133
Item 25 Feel furious when good job but bad evaluation	.476	-.139				.403
Item 29 Keep things in	-.460		-.168		.277	.447
Item 26 Control temper	-.406	.403			-.111	.160
Item 44 Try to become calm again	.105	.909				
Item 56 Try to relax	.121	.891				
Item 48 Reduce anger as soon as possible		.889				
Item 32 Calm myself as soon as possible		.845	-.166	.144		-.129
Item 40 Soothe angry feelings		.841		-.166	.219	
Item 50 Am tolerant and understanding		.791				
Item 52 Do something relaxing to calm down	.166	.786				-.111
Item 36 Try to simmer down		.746		-.134		
Item 30 Am patient with others	-.198	.564				
Item 38 Keep my cool	-.190	.560			-.180	
Item 28 Take deep breath and relax		.558				
Item 54 Can control my angry feelings	-.227	.500			-.231	.245
Item 46 Can stop self from losing temper	-.276	.497			-.110	.319
Item 42 Can control behaviour	-.289	.497			-.109	.169
Item 34 Control urge to express angry feelings	-.256	.489				.325
Item 3 Feel angry			.913	-.193		
Item 4 Feel like yelling	.109		.893			-.107
Item 6 Am mad	-.178		.875			-.110
Item 10 Feel annoyed			.775			
Item 2 Feel irritated			.736	-.324		.124
Item 1 Am furious	-.101		.718			
Item 5 Feel like breaking things			.653	.191		
Item 7 Feel like banging on table			.544	.118		
Item 15 Feel like shouting			.531	.366		
Item 9 Feel like swearing			.526	.401		
Item 12 Feel like cursing	-.162		.499	.449		.108
Item 13 Feel like screaming		-.153	.478	.441	-.182	.126
Item 11 Feel like kicking somebody				.899		
Item 8 Feel like hitting someone				.880		
Item 14 Feel like pounding somebody			.130	.834		
Item 33 Pout or sulk	-.214	-.113		-.145	.696	.158
Item 39 Make sarcastic remarks to others	.146				.599	
Item 45 Harbour grudges	.134				.547	.157
Item 49 Am secretly critical of others		.104		.170	.507	.239
Item 55 Say nasty things	.441				.504	
Item 37 Withdraw from people	-.350	.103	.168		.462	.161
Item 41 Boil inside but don't show it	-.109	.117	-.170	.140	.190	.734
Item 53 Am angrier than I am willing to admit		-.114			.176	.580
Item 57 Am irritated more than people are aware			.137		.324	.524

Appendix 27 Reliability analysis using the PAF six factor extraction with oblique rotation

Factor 1

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.944	.944	15

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item 16 Am quick tempered	34.64	128.495	.846	.807	.937
Item 17 Have fiery temper	34.60	128.268	.782	.761	.938
Item 18 Am hotheaded person	34.82	126.440	.853	.810	.936
Item 21 Fly off handle	34.84	127.870	.871	.811	.936
Item 19 Angry when slowed by other's mistakes	34.35	131.454	.735	.581	.940
Item 20 Annoyed when not given recognition	34.43	134.063	.615	.572	.942
Item 22 Say nasty things	34.42	130.601	.688	.566	.941
Item 23 Furious when criticised in front of others	34.08	134.144	.591	.495	.943
Item 24 Feel like hitting someone when frustrated	34.84	129.975	.686	.551	.941
Item 25 Furious when good job but bad evaluation	34.31	133.467	.617	.545	.942
Item 27 Express anger	34.31	133.780	.613	.511	.942
Item 31 If annoyed usually tell how I feel	34.25	137.836	.413	.405	.947
Item 35 Lose my temper	34.65	128.333	.817	.758	.937
Item 43 Slam doors	34.59	129.624	.682	.549	.941
Item 51 I strike out at what infuriates me	34.93	128.225	.797	.719	.938

Factor 2

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.950	.950	16

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item 28 Take deep breath and relax	38.14	120.663	.643	.534	.948
Item 32 Calm myself as soon as possible	37.59	118.257	.739	.643	.946
Item 36 Try to simmer down	37.48	119.620	.701	.582	.947
Item 40 Soothe angry feelings	37.72	120.282	.642	.522	.948
Item 44 Try to become calm again	37.41	118.729	.802	.716	.945
Item 48 Reduce anger as soon as possible	37.52	117.133	.788	.708	.945
Item 52 Do something relaxing to calm down	37.94	121.332	.582	.593	.949
Item 56 Try to relax	37.61	119.293	.748	.693	.946
Item 26 Control temper	37.61	117.095	.727	.643	.946
Item 30 Am patient with others	37.56	118.104	.726	.599	.946
Item 34 Control urge to express angry feelings	37.67	120.037	.646	.497	.948
Item 38 Keep my cool	37.63	117.905	.763	.658	.945
Item 42 Can control behaviour	37.49	117.896	.741	.595	.946
Item 46 Can stop self from losing temper	37.48	118.304	.745	.703	.946
Item 50 Am tolerant and understanding	37.27	118.977	.707	.647	.947
Item 54 Can control my angry feelings	37.56	117.591	.762	.747	.945

Factor 3

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.935	.936	12

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item 1 Am furious	15.14	41.111	.571	.523	.935
Item 2 Feel irritated	14.69	39.059	.571	.539	.935
Item 3 Feel angry	14.91	37.952	.729	.735	.929
Item 6 Am mad	15.00	37.539	.770	.674	.928
Item 10 Feel annoyed	14.67	35.537	.812	.710	.926
Item 4 Feel like yelling	14.90	36.252	.826	.754	.925
Item 9 Feel like swearing	14.88	36.491	.769	.729	.928
Item 12 Feel like cursing	15.01	37.493	.727	.681	.929
Item 13 Feel like screaming	14.96	37.459	.758	.701	.928
Item 15 Feel like shouting	14.92	36.954	.750	.630	.929
Item 5 Feel like breaking things	15.05	38.215	.750	.697	.929
Item 7 Feel like banging on table	15.19	41.563	.561	.559	.936

Factor 4

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.935	.937	3

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item 8 Feel like hitting someone	2.24	.908	.854	.734	.921
Item 11 Feel like kicking somebody	2.27	1.043	.862	.754	.912
Item 14 Feel like pounding somebody	2.25	.967	.892	.798	.886

Factor 5

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.773	.768	7

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item 33 Pout or sulk	14.50	17.344	.594	.409	.725
Item 37 Withdraw from people	13.78	21.026	.146	.211	.807
Item 45 Harbour grudges	14.27	16.447	.616	.439	.718
Item 49 Am secretly critical of others	14.26	17.629	.510	.323	.742
Item 39 Make sarcastic remarks to others	14.07	16.417	.623	.433	.716
Item 47 Argue with others	14.01	19.395	.329	.253	.776
Item 55 Say nasty things	14.29	16.404	.665	.556	.708

Factor 6

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.753	.751	4

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Squared Multiple Correlation	Cronbach's Alpha if Item Deleted
Item 29 Keep things in	8.07	6.528	.421	.264	.760
Item 41 Boil inside but don't show it	8.36	5.377	.629	.409	.650
Item 53 Am angrier than I am willing to admit	8.42	5.693	.543	.400	.699
Item 57 Am irritated more than people are aware	8.05	5.518	.609	.408	.662

Appendix 28 Reliability analysis using Spielberger's (1999) STAXI-2 structure

State Anger

Reliability Statistics

Cronbach's Alpha	N of Items
.938	15

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 1 Am furious	18.53	53.672	.558	.937
Item 2 Feel irritated	18.07	51.817	.516	.939
Item 3 Feel angry	18.29	50.406	.684	.934
Item 4 Feel like yelling	18.28	48.414	.787	.931
Item 5 Feel like breaking things	18.43	50.313	.746	.932
Item 6 Am mad	18.39	49.699	.749	.932
Item 7 Feel like banging on table	18.58	54.167	.550	.938
Item 8 Feel like hitting someone	18.54	52.750	.601	.936
Item 9 Feel like swearing	18.26	48.010	.797	.931
Item 10 Feel annoyed	18.06	47.385	.796	.931
Item 11 Feel like kicking	18.58	53.772	.553	.937
Item 12 Feel like cursing	18.39	49.056	.767	.932
Item 13 Feel like screaming	18.35	49.044	.796	.931
Item 14 Feel like pounding	18.56	52.880	.643	.936
Item 15 Feel like shouting	18.31	48.530	.780	.931

Trait Anger

Reliability Statistics

Cronbach's Alpha	N of Items
.931	10

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 16 Am quick tempered	22.35	58.070	.816	.920
Item 17 Have fiery temper	22.31	57.688	.766	.922
Item 18 Am hotheaded person	22.52	56.620	.829	.919
Item 19 Angry when slowed by other's mistakes	22.06	59.753	.724	.925
Item 20 Annoyed when not given recognition	22.14	60.711	.655	.928
Item 21 Fly off handle	22.55	57.762	.834	.919
Item 22 Say nasty things	22.13	59.022	.684	.927
Item 23 Furious when criticised in front of others	21.79	60.640	.637	.929
Item 24 Feel like hitting when frustrated	22.55	58.052	.716	.925
Item 25 Furious good job but bad evaluation	22.02	60.480	.644	.928

Anger Expression Out

Reliability Statistics

Cronbach's Alpha	N of Items
.872	8

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 27 Express anger	16.82	31.953	.618	.857
Item 47 Argue with others	17.00	31.224	.710	.848
Item 51 I strike out at what infuriates me	17.44	29.511	.787	.838
Item 39 Make sarcastic remarks to others	17.05	33.800	.400	.880
Item 31 If annoyed usually tell how I feel	16.76	33.550	.440	.875
Item 55 Say nasty things	17.27	31.293	.651	.853
Item 43 Slam doors	17.10	30.107	.668	.851
Item 35 Lose my temper	17.16	29.874	.779	.839

Anger Expression In

Reliability Statistics

Cronbach's Alpha	N of Items
.779	8

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 41 Boil inside but don't show it	17.67	20.526	.561	.742
Item 29 Keep things in	17.38	22.763	.354	.775
Item 57 Am irritated more than people are aware	17.35	19.967	.644	.728
Item 37 Withdraw from people	17.53	22.343	.378	.772
Item 45 Harbour grudges	18.01	21.052	.442	.763
Item 33 Pout or sulk	18.24	21.592	.457	.759
Item 49 Am secretly critical of others	18.01	21.007	.484	.755
Item 53 Am angrier than I am willing to admit	17.73	20.697	.537	.746

Anger Control Out

Reliability Statistics

Cronbach's Alpha	N of Items
.920	8

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 42 Can control behaviour	18.00	30.461	.755	.908
Item 38 Keep my cool	18.14	30.308	.797	.904
Item 54 Can control my angry feelings	18.07	30.061	.804	.904
Item 50 Am tolerant and understanding	17.78	32.183	.599	.920
Item 26 Control temper	18.12	29.986	.743	.909
Item 30 Am patient with others	18.07	30.798	.715	.911
Item 34 Control urge to express anger	18.18	31.295	.682	.913
Item 46 Can stop self from losing temper	17.99	30.592	.769	.907

Anger Control In

Reliability Statistics

Cronbach's Alpha	N of Items
.910	8

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
Item 36 Try to simmer down	16.86	27.124	.684	.900
Item 32 Calm myself as soon as possible	16.97	26.163	.760	.893
Item 28 Take deep breath and relax	17.52	27.896	.592	.908
Item 40 Soothe angry feelings	17.10	27.076	.662	.902
Item 44 Try to become calm again	16.78	26.631	.802	.891
Item 48 Reduce anger as soon as possible	16.90	26.002	.770	.893
Item 56 Try to relax	16.99	26.605	.779	.892
Item 52 Do something relaxing to calm	17.32	27.285	.629	.905

Appendix 29 Reliability analysis of the 57 items from the STAXI-2

Cronbach's Alpha	N of Items
.825	57

Item-Total Statistics

	Scale Mean if Item Deleted	Scale Variance if Item Deleted	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
1 Am furious	123.14	268.308	.341	.822
2 Feel irritated	122.69	262.427	.457	.819
3 Feel angry	122.91	262.505	.472	.819
4 Feel like yelling	122.90	259.028	.552	.817
5 Feel like breaking things	123.05	262.386	.511	.819
6 Am mad	123.00	262.961	.446	.820
7 Feel like banging on table	123.19	268.668	.358	.823
8 Feel like hitting someone	123.16	266.396	.403	.821
9 Feel like swearing	122.88	258.741	.544	.817
10 Feel annoyed	122.67	256.774	.578	.816
11 Feel like kicking somebody	123.19	268.141	.358	.822
12 Feel like cursing	123.01	261.085	.496	.818
13 Feel like screaming	122.96	260.709	.530	.818
14 Feel like pounding somebody	123.17	267.550	.372	.822
15 Feel like shouting	122.92	258.560	.573	.817
16 Am quick tempered	121.93	259.233	.407	.819
17 Have fiery temper	121.90	256.923	.435	.818
18 Am hotheaded person	122.11	258.047	.400	.819
19 Angry when slowed by other's mistakes	121.65	256.269	.514	.816
20 Annoyed when not given recognition	121.73	258.911	.429	.819
21 Fly off handle	122.14	259.185	.407	.819
22 Say nasty things	121.72	256.019	.463	.817
23 Furious when criticised in front of others	121.38	253.355	.586	.814
24 Feel like hitting someone when frustrated	122.14	254.409	.490	.816
25 Furious when good job but bad evaluation	121.61	257.608	.452	.818
26 Control temper	121.80	279.413	-.185	.833
27 Express anger	121.60	266.294	.195	.824
28 Take deep breath and relax	122.33	276.974	-.124	.831
29 Keep things in	121.41	272.019	.034	.828
30 Am patient with others	121.75	276.954	-.119	.831
31 If annoyed usually tell how I feel	121.55	270.078	.076	.827
32 Calm myself as soon as possible	121.78	277.253	-.130	.831
33 Pout or sulk	122.27	265.763	.219	.824
34 Control urge to express angry feelings	121.86	272.935	.004	.828
35 Lose my temper	121.95	262.168	.303	.822
36 Try to simmer down	121.67	276.513	-.109	.831
37 Withdraw from people	121.56	267.275	.176	.825
38 Keep my cool	121.82	277.923	-.151	.832
39 Make sarcastic remarks to others	121.84	259.453	.367	.820
40 Soothe angry feelings	121.91	272.860	.007	.828
41 Boil inside but don't show it	121.69	260.280	.377	.820
42 Can control behaviour	121.68	278.640	-.170	.832
43 Slam doors	121.89	257.415	.395	.819
44 Try to become calm again	121.59	274.558	-.046	.829
45 Harbour grudges	122.04	257.906	.409	.819

46 Can stop self from losing temper	121.67	276.566	-.109	.831
47 Argue with others	121.78	263.762	.280	.822
48 Reduce anger as soon as possible	121.71	273.420	-.012	.829
49 Am secretly critical of others	122.03	258.466	.418	.819
50 Am tolerant and understanding	121.46	274.632	-.049	.830
51 I strike out at what infuriates me	122.22	260.687	.335	.821
52 Do something relaxing to calm down	122.13	272.154	.028	.828
53 Am angrier than I am willing to admit	121.76	259.211	.407	.819
54 Can control my angry feelings	121.75	278.152	-.156	.832
55 Say nasty things	122.06	256.424	.476	.817
56 Try to relax	121.80	274.492	-.044	.829
57 Am irritated more than people are aware	121.38	257.026	.486	.817

Appendix 30 Publication Baker, Kay-Lambkin, Lee, Claire & Jenner (2003)

Baker, A., Kay-Lambkin, F., Lee, N., Claire, M. & Jenner, L. (2003). A brief cognitive behavioural intervention for amphetamine users. Canberra: Australian Government Department of Health and Ageing.
http://www.health.gov.au/internet/main/publishing.nsf/Content/health-pubhlth-publicat-document-cognitive_intervention-cnt.htm

A brief cognitive behavioural intervention for regular amphetamine users

A treatment guide

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Background

In 2001, the Australian Government Department of Health and Ageing funded a project entitled “An evaluation of cognitive-behaviour therapy (CBT) among regular amphetamine users” (Baker, Kay-Lambkin, Lee, et al., unpublished), which built on results from a pilot study conducted by Baker, Lewin & Bloggs in 1998.

The current project aimed to evaluate the effectiveness of both a two- and four-session cognitive-behavioural intervention among a sample (N=214) of regular amphetamine users recruited from Brisbane, Queensland and Newcastle, New South Wales. The four-session intervention is detailed in this publication; however practitioners may choose to offer a two-session intervention according to client needs. The development of the CBT intervention was informed by various treatment approaches that were considered appropriate for regular amphetamine users. The sources are acknowledged in Appendix 1.

This manual is divided into five sections:

Section 1. Context

- Key points from *Models of Intervention and Care for Psychostimulant Users*, National Drug Strategy Monograph Series (in press) are included to present the evidence supporting this type of intervention for regular amphetamine users.
- A flow-chart to place the intervention in a treatment context.

Section 2. Background to the study and results of evaluation

- A brief description of how the study was developed, undertaken and evaluated.
- A brief description of the evaluation outcome data (detailed results will be published separately).
- Suggestions for pre-intervention assessment including instruments.

Section 3. The intervention

- The CBT intervention is presented in a clear and easy to use format for practitioners.

Section 4. Suggested alternative brief interventions for those not suitable for the current intervention

- This section provides an overview of recommendations for alternative interventions for psychostimulant users who are unsuitable for the CBT intervention (e.g. those who are not considering change, experimental users etc).

Section 5. Other available resources

- This section lists a range of other resources that are currently available for practitioners working with psychostimulant users.

This intervention guide has not been designed to stand alone. Rather, practitioners are encouraged to:

1. Acquaint themselves with the current research and clinical literature. The recently completed monograph *Models of Intervention and Care for Psychostimulant Users* is an excellent resource for current evidence supporting practice in this area.
2. Undertake training in CBT and motivational enhancement techniques if unfamiliar with these approaches.
3. Obtain ongoing clinical supervision.

Section 1. Context

Section 1. Context

Key Points in the Provision of Interventions for Psychostimulant Users¹

- There are clear signs that amphetamine use is increasing; however, there are few services in Australia that offer amphetamine-specific interventions.
- The literature is very limited in the number of well-conducted, controlled studies, but the available evidence suggests that outpatient cognitive-behaviour therapy appears to be current best practice for psychostimulant users.
- The service context in which interventions are provided is important in attracting and retaining people who present to treatment facilities.
- Psychosocial approaches to psychostimulant dependence include outpatient interventions, residential treatment and therapeutic communities (TCs).
- Completion of treatment is associated with improved client outcomes.
- Enhancement of residential treatment with behaviour therapy or cognitive-behaviour therapy (CBT) is also associated with improved client outcomes.
- Service delivery may be enhanced by considering the following issues: attracting and retaining clients; establishing treatment partnerships; and monitoring and evaluating services.

The use of psychostimulants is increasing in Australia and internationally (see Jenner & McKetin (in press) for a thorough review of these studies). In 2000, nearly one and a half million Australians reported using amphetamines at least once in their life, and half a million people reported use of these drugs at some time during that year (Australian Institute of Health and Welfare (AIHW), 2002). Currently, amphetamines are the second most frequently used illicit drug after cannabis (AIHW, 2002).

Psychostimulants include amphetamine sulphate and amphetamine hydrochloride ('speed'), and the more potent methamphetamine ('base', 'ice', 'pills'). Cocaine and MDMA (ecstasy) are also classed as psychostimulants but as the current treatment was evaluated among regular amphetamine users its efficacy cannot be generalised to users of

¹ These points have been adapted from Baker, Gowing, Lee & Proudfoot, Psychosocial Interventions for Psychostimulant Users, in Baker, Lee & Jenner (eds), *Models of Intervention and Care for Psychostimulant Users*, National Drug Strategy Monograph Series (in press).

other psychostimulants. Hence this guide refers to amphetamines (including methamphetamine) only.

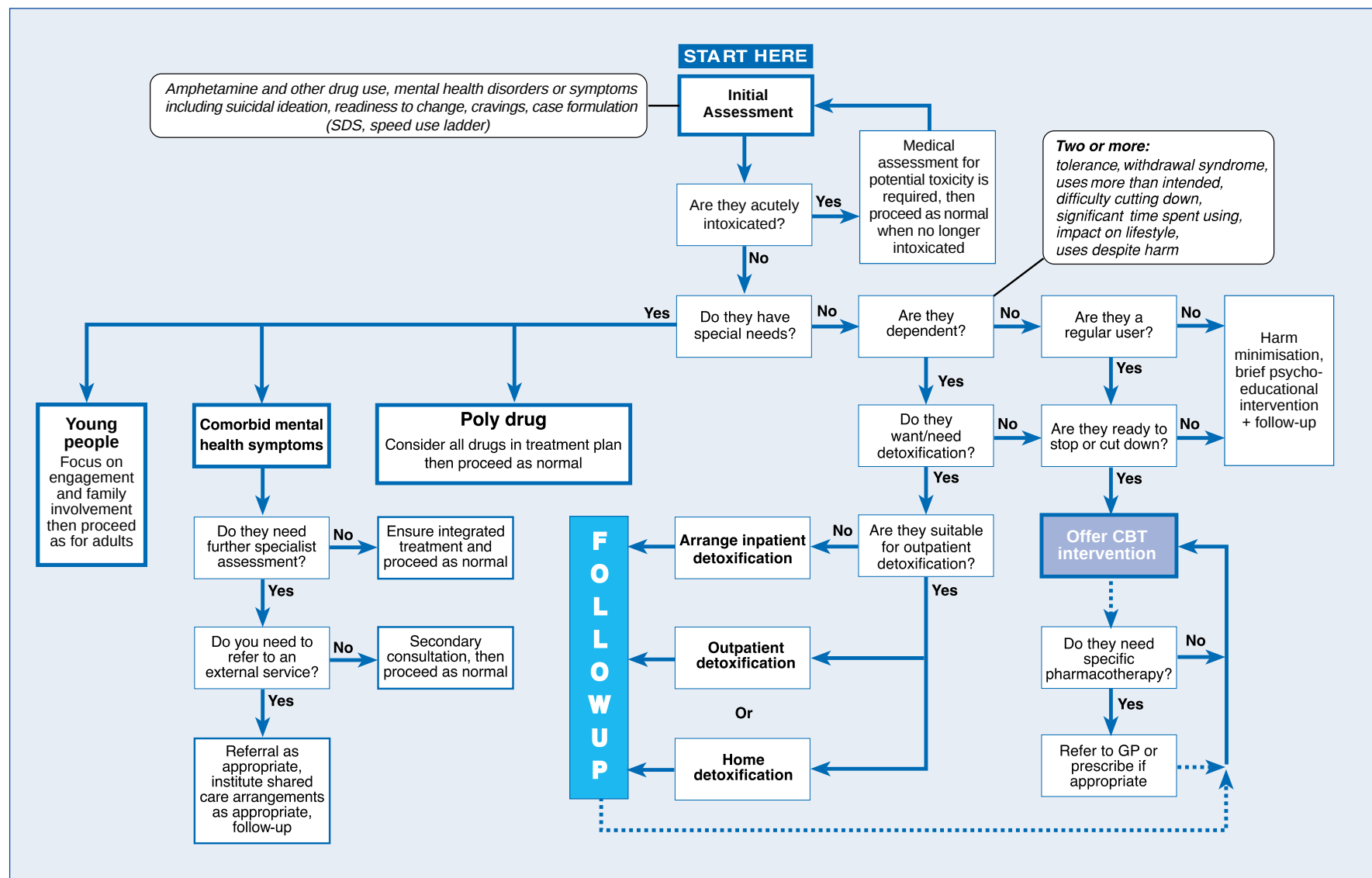
Amphetamines stimulate neurotransmitters (particularly dopamine, noradrenaline and serotonin) in the central nervous system and cause a range of effects both sought after and adverse. Sought after effects of amphetamines include euphoria, mood elevation, a sense of well-being and confidence, increased energy and wakefulness, and increased concentration and alertness (Dean, in press). Adverse effects include severe restlessness, tremor, anxiety, dizziness, tenseness, irritability, insomnia, confusion, and possibly aggression (Dean, in press). At toxic doses amphetamines can produce psychosis, delirium, auditory, visual and tactile illusions, paranoia, hallucinations, loss of behavioural control, alterations in consciousness and severe medical complications such as serotonin toxicity and cardiovascular and neurological events (Dean, in press; Dean & Whyte, in press).

Amphetamine users report a reluctance to seek treatment and a level of dissatisfaction with services currently provided (Kamieniecki, Vincent, Allsop, Lintzeris, 1998). Adverse consequences of amphetamine use such as symptoms of dependence, aggression, depression, hallucinations and panic attacks have been identified as prompts for treatment seeking (see Baker, Gowing, Lee & Proudfoot, in press for a review of relevant studies).

Clinicians and researchers have identified the need for specific treatment approaches for this group to attract and engage clients into treatment (Baker et al., in press). This guide details a brief intervention specifically designed for regular amphetamine users that may be utilised by practitioners working in a wide range of treatment settings.

A flow-chart² that visually depicts the context in which the current CBT intervention could be offered is presented in Figure 1. For further detail please refer to the National Drug Strategy Monograph *Models of Intervention and Care for Psychostimulant Users*.

² Adapted from Chapter 12, Clinical Recommendations in Baker, Lee & Jenner (eds), *Models of Intervention and Care for Psychostimulant Users*, National Drug Strategy Monograph Series (in press).

Figure 1: Flow-chart for clinical decision making in offering interventions for psychostimulant users

Section 2. Background to the study and results of evaluation

Section 2. Background to the study and results of evaluation

Study Methodology³

Subjects A total of 214 regular users of amphetamines were included in the evaluation of the current CBT intervention. Participants were recruited from the Newcastle area of NSW (n=98) and from Brisbane and the Sunshine Coast of Queensland (n=116).

Potential participants were assessed for regular amphetamine use with the Opiate Treatment Index (OTI, Darke, Hall, Heather, Wodak & Ward, 1991) and were included in the study if they scored at least 0.14 for amphetamine use (ie. at least weekly use). Due to the high levels of polydrug use among regular amphetamine users, participants receiving maintenance pharmacotherapy for heroin dependence (ie. methadone maintenance treatment or buprenorphine) and/or polydrug users were also included.

Potential participants were considered to be inappropriate, and therefore excluded from the study if they were expressing current suicidal ideation that was assessed as posing high risk for client safety, were acutely psychotic, showed evidence of acquired cognitive impairment or were receiving other counselling for amphetamine use. All potential participants who were excluded because of psychosis or suicidal ideation were referred to an appropriate mental health agency.

Written, informed consent was obtained from each suitable participant and interviews took approximately one hour to complete.

Measures Domains measured by the research team using a range of screening and assessment instruments included:

- demographic characteristics;
- alcohol and other drug use history including treatment history;
- psychiatric history;
- quality of life;
- risk-taking behaviours; and
- general health, including mental health symptomatology.

All participants were assessed at pre-treatment and again at five weeks and six months post treatment.

³ A paper reporting the details of methodology and outcome data is in preparation and will be published separately from this guide.

Procedure Consenting participants assessed as suitable for inclusion in the study were randomly assigned to one of three conditions and received:

- A two-session CBT intervention (n=74, or 35% of participants)
- A four-session CBT intervention (n=66, or 31% of participants)
- A self-help manual only⁴ (control condition) (n=74, or 35% of participants)

Pre-Intervention A snapshot of the relevant characteristics of the sample is presented in Table 1.

The age of participants ranged from 16-55 years and 63% were men. Duration of use of amphetamines ranged from one year to 34 years, with regular use of amphetamines ranging from four months to 31 years.

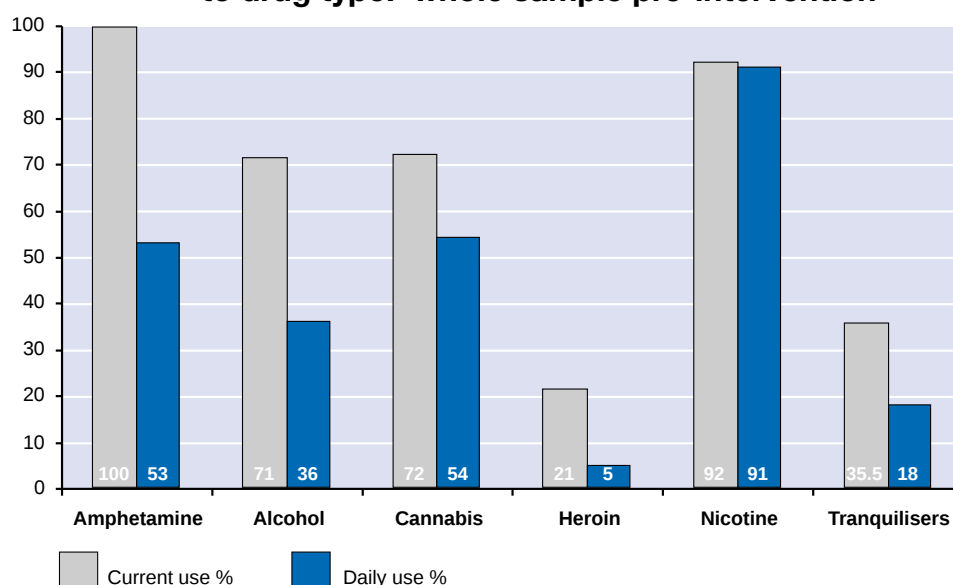
Nearly all participants (96%) met six-month criteria for amphetamine dependence at first assessment (Structured Clinical Interview for Dependence-I, Research Version, First et al., 1996).

At the time of first interview, nearly all participants had made the transition to injecting amphetamines every time (58.9%) or most times (32.7%).

The rate of comorbid mental health disorders among the participants was considerable (47.7%), and many were taking prescribed medication such as anti-depressants, anxiolytics and anti-psychotics (see Table 1).

Polydrug use was common among study participants. Levels of drug use prior to the intervention are graphically presented in Figure 2.

Figure 2. Per cent of current and daily drug use according to drug type: whole sample pre-intervention



⁴ *A user's guide to speed*. National Drug and Alcohol Research Centre (NDARC).

Table 1. Characteristics of participants at initial assessment (N=214)*

Demographic characteristics		
% Born in Australia	92.1	(197)
% Aboriginal or Torres Strait Islander	6.1	(13)
% Male	62.6	(134)
Mean age (years)	30.2	(range 16-55 years)
% Unemployed	74.8	(160)
% Never married	64.5	(138)
% With children	47.2	(101)
% Residing in same accommodation past year	44.4	(95)
% Receiving Government Financial Assistance	76.6	(164)
Treatment History		
% Previous treatment for substance use	23.8	(51)
Mean number of times in previous treatment	4.2	(range 1-20 times)
% Current treatment for substance use	31.8	(68)
Of these, % methadone treatment (MMT)	70.6	(48/68)
Of these, % buprenorphine	8.8	(6/68)
Mean duration of MMT enrolment (months)	37.9	(range 1-240 months)
Amphetamine Use		
Mean age at initiation to speed use	18.7	(range 9-40 years)
Mean age at regular use (years)	21.2	(range 11-43 years)
Mean age at first injecting amphetamine	20.6	(range 11-42 years)
Mean duration of amphetamine use (years)	11.5	(range 1.40-34.61 years)
Mean duration of regular use (years)	9.0	(range 0.27-31.07 years)
Mental Health Issues		
% Ever diagnosed/treated mental health condition	47.7	(102)
% Currently taking medication for mental health problem	41.6	(89)
Mood stabilizers/anti-depressants	29.0	(62)
Anti-psychotics	15.0	(32)
Anxiolytics	14.5	(31)
% Ever admitted to psychiatric unit	29.0	(62)
Mean age first diagnosed with mental health problem	23.7	(range 7-40 years)

* Tabled values are percentages (and frequencies) or mean scores (with ranges).

Results

Completion rates

Of the 74 participants assigned to the two-session CBT intervention, 56 (75.7%) completed the treatment. Of the 66 assigned to four sessions, 45 (68.2%) completed 3 or 4 sessions. Females were more likely than males to have completed the allocated interventions (86% of females versus 61% of males, $\chi^2(1) = 8.152$, $p < 0.004$). No other differences were found between completers and non-completers.

Depression

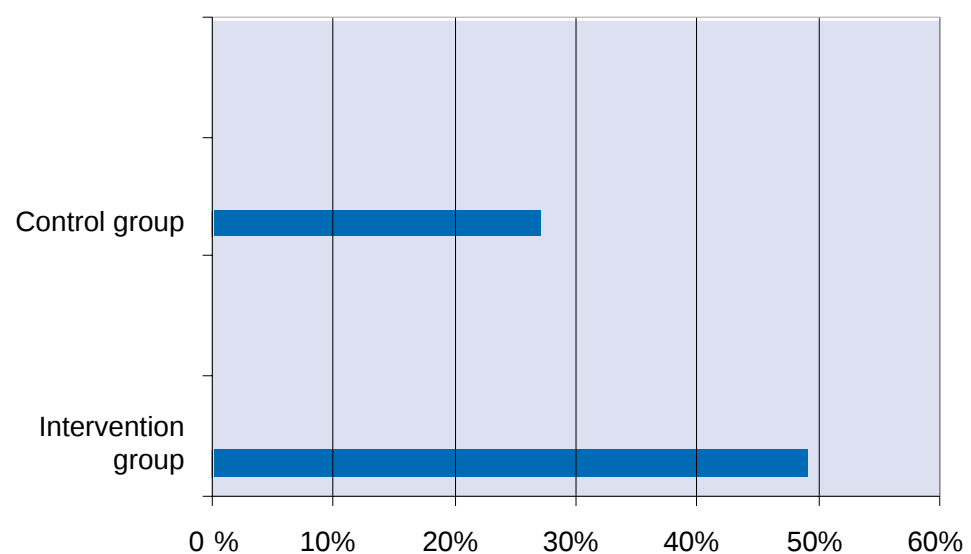
There was a significant overall improvement for participants in levels of depression as measured by the BDI-II (Beck, Steer & Brown, 1996) between pre-treatment and 5-week follow-up ($t(154) = 7.074$, $p < 0.000$). This was also true for pre-treatment and 6-month follow-up assessments ($t(152) = 8.281$, $p < 0.000$). Depression levels among the control group also reduced to a level comparable with the intervention group at the 6-month follow-up. It is pertinent to note, however, that participants who reported an increase in symptoms of depression at the 6-month follow-up (ie. increase in BDI-II scores) also reported increased levels of amphetamine use.

Amphetamine use

Approximately one-quarter (13/38, 27.1%) of the participants in the control group were abstinent from amphetamine use at the 6-month follow-up, compared to 49.4% (42/85) of those who participated in two or more treatment sessions (see Figure 3). Adjusting for the effects of duration of regular amphetamine use, this represents a significant increase in the likelihood of abstinence among those receiving two or more treatment sessions [Adjusted Odds Ratio (AOR) = 3.00, $p < .01$, 99% Confidence Interval: 1.06 to 8.44].

Similar reductions in polydrug use were also reported, initially at the 5-week follow-up, and sustained at the 6-month follow-up⁵.

Figure 3. Abstinence rates at 12-month follow-up*



* $p < 0.01$

Conclusion The participants in the evaluation study comprised a group of regular amphetamine users with long histories of amphetamine use. They had high levels of dependence on amphetamines, and reported high levels of injecting risk-taking behaviour and polydrug use. Rates of depression and other mental health disorders were also high. Many participants reported poor quality of life.

Although only 35% of the initial sample was assessed as being in the action stage of change (Prochaska & DiClemente, 1986) for reducing amphetamine use, 71.5% were retained at 6-month follow-up. In addition, almost three-quarters (72.14%) of all participants who received either the 2- or 4-session CBT intervention (detailed in the next section of this guide) attended all sessions. This demonstrates that regular users of amphetamines, many of whom are ambivalent about change, can be engaged in and complete treatment.

There was a marked reduction in amphetamine use among all participants over time, including those in the 2- and 4-session interventions and the control group. This reduction was likely related to a commitment to being involved in a research project and possibly to undertaking a series of detailed assessments over time that might be considered a brief intervention in itself. However, being in active treatment (compared to the control condition) was associated with significantly greater rates of abstinence from amphetamine use that was sustained at the 6-month follow-up period. Therefore it appears that active therapy gave subjects an added incentive for abstinence. In addition, being in active treatment had a significant short-term effect on symptoms of depression.

The results of this study undertaken among a group of mostly dependent amphetamine users with long drug use histories indicate that the intervention described in this guide might provide a significant proportion of similar users the incentive and skills required to achieve abstinence from amphetamine use in the future.

⁵ A detailed analysis of these subgroups is in progress and will be reported separately.

Section 3. The intervention

Section 3. The intervention

Rationale and principles of treatment

Throughout this guide the term ‘speed’ is used to encompass all forms of amphetamines.

This treatment is based on the assumption of the motivational enhancement therapy (MET) approach that the responsibility for change lies within the client (Miller, Zweben, DiClemente & Rychtarik, 1995). The therapist’s task is to create a set of conditions that will enhance the client’s own motivation and commitment for change. The therapist does this by following the five basic motivational principles:

1. express empathy
2. develop discrepancy
3. avoid argumentation
4. roll with resistance
5. support self-efficacy

Following the development of the client’s commitment to change, the therapist assists the client in learning skills that will help him/her achieve change.

Goals of treatment

The main goal of treatment is to reduce the level of drug use and the harm (e.g., mental and physical health, financial, social, occupational) associated with regular amphetamine use. The client will be assisted to identify specific goals. If the client has a concurrent mental health problem (e.g., depression or a psychotic illness) then an important goal is to enhance the client’s understanding of possible interactions between their use of amphetamines and other drugs and any current psychiatric symptoms they might be experiencing.

Format of therapy

Guidelines for the delivery of the treatment sessions are given for each of the interventions in this guide. These guidelines are general and a practitioner can modify the guidelines to be consistent with his or her own counselling experience. The suggestions for practitioner statements throughout this guide are taken from the MET manual (Miller et al., 1995).

This publication presents the guide for a four-session intervention; however the decision to offer either a two- or four-session intervention may be made by the practitioner in accordance with individual client needs.

The content of the four sessions is listed below and each session should last approximately one hour. The first session will begin following the initial assessment.

1. Motivational interviewing (session 1)
2. Coping with cravings and lapses (session 2)
3. Controlling thoughts about amphetamine use and pleasurable activities (session 3)
4. Amphetamine refusal skills and preparation for future high-risk situations (session 4)

Although weekly sessions are preferable, there will be occasions when clients cannot attend or forget their appointment. In this case, an attempt should be made to reschedule for the same week in an effort to maintain engagement and the client's motivation to change drug use behaviours. If this is not possible, the session should be carried over to the regular time the following week.

Initial assessment

The assessment package that was developed for the evaluation study would not be practical in the context of routine clinical care. However, specific elements are required in the initial assessment so the sessions can be tailored to individual needs. The essential elements of the initial assessment include:

1. A thorough alcohol and other drug use history that includes use of amphetamines and other drug classes, quantity, frequency, route of administration and associated risks, duration of current use, age of initiation, severity of dependence, experience of previous treatment, and history of withdrawal symptoms.
2. A thorough mental health assessment including past mental health history and assessment of current symptoms (presence and severity) with an emphasis on psychosis, depression and suicidal ideation (see Figure 3 for suggested questions for assessing suicidal ideation).
3. Client's readiness to change amphetamine (and other drug) use (see Figure 4, 'speed ladder' below).

A practitioner's initial assessment will inform the decision regarding which aspects of the four-session CBT intervention to emphasise with each client. For example, if the client is assessed as being in the *action* stage of change (Prochaska & DiClemente, 1986), session 1 that concentrates on motivational interviewing may be kept to a minimum so that more time is available for other issues that require emphasis such as coping with cravings to use amphetamines.

To enable the development of a thorough assessment and formulation, the following assessment instruments are recommended as an adjunct to routine assessments:

- The amphetamine version of the Severity of Dependence Scale (SDS) (Gossop, Darke, Griffiths, et al., 1995), which is a five-item scale that measures dependence. Australian researchers reported that a cut-off score of greater than four corresponded to a diagnosis of severe amphetamine dependence (Topp & Mattick, 1997) (see Figure 2).
- The Speed Use Ladder adapted from Biener and Abrams (1991), used to assess readiness for changing or reducing amphetamine use (see Figure 3).⁶
- Questions for assessing suicide risk (Treatment Protocol Project, 2000) (see Figure 4).

Figure 2. Severity of Dependence Scale (Gossop et al., 1995)

1. Have you ever thought your speed use is out of control?	Never (0)	Sometimes (1)	Often (2)	Always (3)
2. Has the thought of not being able to get any speed really stressed you at all?	Never (0)	Sometimes (1)	Often (2)	Always (3)
3. Have you worried about your speed use?	Never (0)	Sometimes (1)	Often (2)	Always (3)
4. Have you wished that you could stop?	Never (0)	Sometimes (1)	Often (2)	Always (3)
5. How difficult would you find it to stop or go without?	Never (0)	Sometimes (1)	Often (2)	Always (3)
Total Score: _____				
Note: A cut-off score of greater than four corresponds to a diagnosis of severe amphetamine dependence (Topp & Mattick, 1997)				

⁶ The readiness to change model (see Prochaska & DiClemente, 1986) provides a framework to understand and identify a client's readiness to change drug use behaviours. The model describes six broad categories of the change process, and relapse can occur at any stage:

1. pre-contemplation: not considering change
2. contemplation: thinking about change
3. determination: has made a decision to change
4. preparation: getting ready for change
5. action: is in the early stage of change
6. maintenance: is maintaining changes made

Figure 3. Questions for assessing suicidal ideation

1. Have you been feeling depressed for several days at a time?
2. When you feel this way, have you ever had thoughts of killing yourself?
3. When did these thoughts occur?
4. What did you think you might do to yourself?
5. Did you act on these thoughts in any way?
6. How often do these thoughts occur?
7. When was the last time you had these thoughts?
8. Have your thoughts ever included harming someone else as well as yourself?
9. Recently, what specifically have you thought of doing to yourself?
10. Have you taken any steps toward doing this? (e.g. getting pills/buying a gun?)
11. Have you thought about when and where you would do this?
12. Have you made any plans for your possessions or left any instructions for people for after your death such as a note or a will?
13. Have you thought about the effect your death would have on your family or friends?
14. What has stopped you from acting on your thoughts so far?
15. What are your thoughts about staying alive?
16. What help could make it easier to cope with your problems at the moment?
17. How does talking about all this make you feel?

Reproduced with permission from the Treatment Protocol Project (2000), *Management of Mental Disorders*, pp. 22-23, Third Edition, Sydney: World Health Organisation Collaborating Centre for Mental Health and Substance Abuse.

If you feel that a client fits in the 'high-risk' suicide category, follow the suicide policy in place at your workplace. If a decision is made to manage a high-risk suicidal client, the client should be given written information about how to seek 24-hour assistance if required, and they should be closely monitored throughout the intervention.

Figure 4. Speed use ladder (client to complete)

The rungs on this ladder can be used to represent where you are now in regard to your speed use.

Tick the rung that best describes where you are right now.

I have already cut down or quit some time ago		<i>Maintenance</i>
I have recently started to quit or cut down		<i>Action</i>
I have made real plans to quit or cut down		<i>Preparation</i>
I think I might need to quit or cut down but I'm not sure I want to		<i>Contemplation</i>
I'm happy using speed and don't feel the need to quit or cut down		<i>Pre-contemplation</i>

Session 1: Motivational Interviewing

THERAPIST SUMMARY SHEET

- Aims**
- Engagement and building motivation for change in relation to speed use.
 - Prepare to quit/cut down on speed use.
 - Introduction to behavioural self-monitoring.

Materials needed for Session 1

- A photocopy of Exercise 1: Grid to explore the pros and cons of using speed
- A photocopy of Exercise 2: Urge diary (or alternative)
- A photocopy of Exercise 3: Case Formulation
- A blank piece of paper and a pen.
- Feedback from the initial assessment.

Key elements of Session 1 *(may be photocopied for quick reference).*

PHASE 1: Building motivation to change.

After presenting rationale for treatment, use the following strategies for eliciting self-motivational statements:

- ☐ presenting the rationale treatment
- ☐ a typical day
- ☐ personal feedback from assessment
- ☐ impact on lifestyle
- ☐ explore the pros and cons of using speed (complete exercise 1 grid)
- ☐ explore concerns
- ☐ explore health risks
- ☐ financial costs of using
- ☐ looking back
- ☐ looking forward
- ☐ self vs self as a user
- ☐ encountering ambivalence
- ☐ summarise

PHASE 2: Strengthening commitment.

Use the following strategies:

- ☐ ask a transitional question
- ☐ communicate free choice
- ☐ address fears
- ☐ provide information and advice
- ☐ setting goals

PHASE 3: Behavioural self-monitoring.

Use the following strategies:

- ☐ introduce rationale for behavioural self-monitoring
- ☐ elicit concerns about high risk situations and triggers for using
- ☐ introduce link between triggers, thoughts about using and urges to use
- ☐ use urge diary
- ☐ summarise

PHASE 4: Formulation.

- ☐ explain rationale for formulation
- ☐ agree on the elements of the formulation
- ☐ jointly develop a treatment plan

PHASE 5: Session termination.

- ☐ summarise
- ☐ shoring up commitment
- ☐ establishing a contract
- ☐ set homework, including:
 - ☐ identify triggers for using
 - ☐ start cutting down if appropriate
 - ☐ complete an urge diary for the next week

DETAILED INTERVENTION

Engagement and building motivation for change in amphetamine use

Familiarise yourself with motivational approaches. Clients will be at various stages of change for their amphetamine use and associated harms. A motivational approach will address each harm the client is experiencing during the course of the intervention. You will need to gauge how quickly you can move to discussing amphetamine use with each individual client.

PHASE 1: Building Motivation to Change

The goals of motivational interviewing (Rollnick et al. 1999) are to:

- (i) Maintain rapport;
- (ii) Accept small shifts in attitude as a worthy beginning;
- (iii) Promote some concern about risk (e.g. for health, legal problems);
- (iv) Avoid increasing resistance;
- (v) Promote self-efficacy and responsibility; and
- (vi) View lifestyle holistically (each aspect usually affects the other).

Critical conditions for promoting change are empathy, warmth and genuineness. Strategies to promote motivation to change include:

- removing BARRIERS to change;
- providing CHOICE;
- decreasing DESIRABILITY of substance use;
- practising EMPATHY;
- providing FEEDBACK;
- clarifying GOALS; and
- active HELPING.

Presenting the rationale for treatment

The following is an example of what you might say:

“Before we begin, let me just explain a little about how we will be working together. You have already spent time completing the assessment that we need, and we appreciate the effort you put into that process. We’ll make good use of that information from those questionnaires today. This is the first of four sessions that we will be spending together, during which we’ll take a close look at your situation. I hope that you’ll find the sessions interesting and helpful. I should also explain right up front that I’m not going to be changing you. I hope that I can help you think about your present situation and consider what, if anything, you might want to do, but if there is any changing, you will be the one who does it. I’ll be giving you a lot of information about yourself and maybe some advice, but what you do with all of that after our sessions together is completely up to

you. I couldn't change you if I wanted to. The only person who can decide whether and how you change is you. How does that sound to you?"

A typical day

Presenting the client with feedback from your assessment is important; however doing so this early in the first treatment session could elicit resistance and hinder engagement in the treatment program. To minimise this, an important first step in raising the issue of your client's speed use is to understand how they see their situation. Proceed with strategies for eliciting self-motivational statements about change by approaching health/lifestyle issues first and gently fit your questions about their speed use into this perspective. Miller et al. (1995), in their MET manual, suggest the following approach is a useful way to stimulate a discussion about the client's current issues:

"The information we have talked about in this session has given me a bit of an idea about what is going on in your life at the moment. But I really don't know a lot about you and the kind of life you lead. I wonder if I could ask you to tell me a little more about your life and the problems you are coping with right now? It would help me to understand the situation better if you could pick a typical day in your life and take me through it from the time you woke up. Tell me about the things you struggled with and how you felt at the time".

(later)

"Can you tell me where your using speed fits in? Can you think of a typical recent day from beginning to end? You got up..."

Allow the person to continue with as little interruption as possible. If necessary, prompt with open-ended questions:

"What happened then?"

Review and summarise, and if required ask:

"Is there anything else at all about this picture you have painted that you would like to tell me?"

Personal feedback from assessment

Once you have a reasonably clear picture of how the client's speed use fits into their typical day and their current concerns, ask the client's permission to provide feedback from your assessment in the following way:

"In getting a feel for what's going on in your everyday life at the moment, you've mentioned several things that are concerning you (summarise these problem areas briefly, using those issues raised by the client in the "typical day" discussion, e.g. quality of life, health, mood, speed use). Would it be OK if I gave you some feedback from the assessment we completed together, because I think it fits into some of these issues?"

Discuss the client's level of dependence and other salient results from the initial assessment. Talk about the diagnosis of dependence and the implications of this, including physical and psychological dependence. Check whether the client feels this is an accurate reflection by asking the following questions:

"How do you feel about this?"

"Does it surprise you?"

**Impact on
lifestyle**

Once you have provided the client with feedback (or "your impression" of their areas of concern), raise the issue of how their use of amphetamines impacts on their lifestyle. The MET manual suggests the following approach:

"I've been wondering what you think is the most important thing to concentrate on to improve your health and lifestyle at the moment ... What do you think the priority should be?"

If appropriate...

"I think it would help a lot if you could have a closer look at your use of speed ... How does it seem to you?"

In conjunction with the client and using the information gained from the assessment, discuss their pattern of amphetamine use (regular, binge, etc) and any concerns they have about this.

**Explore the pros
and cons of using
speed**

Now, begin to explore further the client's concerns about their speed use. Ask about their reasons for using speed, the pros and the cons, writing these down together as you go (Exercise 1).

Exercise 1: Grid to explore the pros and cons of using speed

1. Provide the client with the following grid:

- Good things about using/less good things about using
- Good things about using less/less good things about using less

2. Elicit from the client all the positives they associate with using speed and write them down in the relevant quadrant. Use the following questions as a guide:

“Tell me about your speed use. What do you like about it? What’s positive about using for you?”

3. Consider with the client how important these positive aspects are, and ask the client to write their importance rating next to the relevant aspect. Use the following questions as a guide:

“How IMPORTANT is this to you personally? If ‘0’ was ‘not important’ and ‘10’ was ‘very important’ what number would you give this aspect of your speed use?”

4. Repeat this exercise with the less good things associated with speed use and assess how important these are to the client. Ask the client to write these issues down in the relevant quadrant of the grid. Use the following as a starting point:

“And what’s the other side? What are your concerns about your speed use?”

5. Finally, continue with a discussion of the good/less good things the client associates with changing their speed use. Record the issues raised in the relevant quadrant. For each issue raised, discuss the importance to the client.

Exercise 1: Grid to explore the pros and cons of using speed *(continued)*

Good things about continuing to use	Less good things about continuing to use
Less good things about using less	Good things about using less

Establish whether positive reasons outweigh the negative in terms of the number of issues listed for and against change, but also the importance ratings provided by the client for the positives and negatives. This is an important step in assessing the need to continue with motivational interviewing during this session.

If at this stage the good things associated with using speed at the current level and the less good things associated with cutting down/quitting outweigh the other quadrants (i.e. the perceived benefits of using still outweigh the perceived costs), use the following techniques to tip the balance in the other direction. If however, the client determines that the costs associated with continuing to use outweigh the perceived benefits, proceed to PHASE 2: Strengthening Commitment.

You may encounter resistance during this discussion. Miller and Rollnick (1991) have identified four categories of resistance behaviour in clients:

- arguing about the accuracy, expertise or integrity of the therapist (challenging, discounting, hostility);
- interrupting in a defensive manner (talking over, cutting off);
- denying or unwillingness to recognise problems, take responsibility or co-operate (blaming, disagreeing, excusing, claiming impunity, minimising, pessimism, reluctance); and
- ignoring or not following the therapist (inattention, non-answer, no response, sidetracking).

If you pick up on this, use the following techniques in response:⁷

- *Reflection* – simply reflect what the client is saying;
- *Reflection with amplification* – reflect but exaggerate what the client is saying to the point where the client is likely to disavow it. (However do not overdo this and elicit hostility);
- *Double-sided reflection* - reflect a resistant statement back with the other side (based on previous statements made in the session);
- *Shift focus* - shift attention away from the problematic issue; and
- *Roll with resistance* (rather than opposing it) - gentle paradoxical statements that will often bring the client back to a balanced perspective.

Once the client raises a motivational topic, it is also useful to ask them to elaborate on it (Miller & Rollnick, 1991). This will reinforce the power of the statement and can often lead to more motivational statements about change. Miller and Rollnick (1991) suggest that one useful way to do this is to ask for specific examples and/or for the client to clarify why this particular issue is a concern.

⁷ Miller et al. (1995, pg 24)

Explore concerns

"You've said that these are the less good things about using speed (relate to grid), do these things concern you?"

"What other concerns do you have about speed?"

"I wonder how you feel about using speed ... What can you imagine happening to you?"

"How much does that outcome concern you?"

Explore health risks

"Can you tell me some reasons why using speed may be a health risk (check psychological and physical health)?"

"Would you be interested in knowing more about the effects of speed on the body (or on the brain)?"

"Some people find that changing their speed use can improve their depression. What do you think?"

"How does your use of speed affect your mental health?"

Record those risks that the client is most concerned about. Avoid the use of terms such as "problem", "abuse" etc. as these can elicit resistance from the client at this early stage.

If appropriate, ask the client for permission to provide them with some information about the health risks associated with using speed. You may like to photocopy the "Information about Speed" handout on page 23 for the client to review.

Financial costs of using

If the client raises the cost of using speed as a factor in their decision to quit/cut down, ask the client:

"Do you have any idea just how much you think you would save if you didn't use speed?"

If appropriate, calculate how much money they will save in one month or one year by quitting, and with the client determine the important things that could be purchased or bills paid with the money saved.

Looking back

"What were things like before you started using?"

Looking forward

"How would you like things to be different in future?"

"What's stopping you from doing what you like now?"

"How does using affect your life at the moment?"

"If you decide to quit/cut down, what are your hopes for the future?"

Self vs self as a user

This step helps to develop discrepancy.

"What would your best friend/mum say were your best qualities?"

"Tell me, how would you describe the things you like about yourself?"

"And how would you describe you as a speed user?"

"How do these two things fit together?"

Information about speed

- When you take speed, it melts into your bloodstream, and is carried to your brain. Once in the brain, speed joins to certain sites called receptors. These receptors will trigger brain cells to start or stop different brain and body tasks.
- Speed joins to receptors in the brain that trigger the release of dopamine and adrenaline in the body. Dopamine and adrenaline are chemicals that produce positive feelings when released. When speed enters the brain, it causes the artificial release of these chemicals, leading to short-term feelings of satisfaction, well-being, relief, increased attention, lots of energy etc. But these effects are not without cost. The problem is that when the effects of speed wear off, it leaves a person with the opposite feelings – radical mood swings, depression, lack of energy, confusion, total exhaustion, uncontrolled violence etc. The greater the stimulation effects of speed, the greater the negative effects (or rebound) from speed.
- Speed is a stimulating drug. It quickens activity in many parts of the body, including the messages sent from the brain to the body. But, because it does this unnaturally, it must “borrow” from the energy reserves of the brain and body rather than creating new energy for you to use. That’s why you get the rebound effects after taking speed.
- As you continue to use, your body needs to work harder to burn up the speed that you put into it. It also starts to cut down the amount of dopamine and other chemicals it releases from the receptors in the brain. This means that your body won’t give you as good a feeling as when you first started to use speed, and you’ll rebound harder each time.
- Frequent, heavy use can cause hallucinations, paranoia and bizarre behaviour (psychosis). Your appetite will be reduced, and you will be less likely to eat properly, making you run down and more likely to get infections. Heavy speed users may become violent for no apparent reason, and you may also experience constant sleep problems, anxiety and tension, high blood pressure and rapid, irregular heartbeat. Another common side effect is depression.
- Because speed quickly fires up pleasurable feelings, you gain confidence in being able to feel good just by using it. You lose confidence in the people, places and activities that used to give you these feelings, because the effects don’t happen so quickly. You may find yourself spending more time trying to get speed, being with people who also use, and resenting those people and activities that don’t fit in with using speed. The problem, however, is that speed only gives you a false sense of well-being, along with serious side effects.

Information taken from these publications:

High Times: www.pdxnorml.org/brain1.html

Speed – Psychological & Physical probs: www.kci.org/meth_info/sites/meth_psychos.htm

Australian Drug Foundation: www.adf.org.au/drughit/facts/hdayam.html

A primer of drug action. By Robert Julien

Encountering ambivalence

If the client is ambivalent, attempt to explore the reasons that underlie this. Re-establish the initial reasons for wishing to quit/cut down. Incorporate information on health and psychological effects of continued use. Guide the client through a rational discussion of issues involved, and carefully challenge faulty logic or irrational beliefs about the process of quitting. Positive reinforcement and encouragement are crucial. You may be able to tip the balance in favour of the positives of quitting/cutting down and the negatives of using speed, but if you encounter resistance from the client, don't push them. Remember, the client needs to argue for his or her own change. A "yes but..." statement from the client may indicate you have met resistance and is a sign to gently redirect the conversation to other relevant issues.

Summarise

Briefly summarise all of the information gained from Phase 1.

PHASE 2: Strengthening Commitment

The next phase in motivational interviewing is to consolidate all the issues raised by the client in the first phase, and build on their motivation to change. This works best when the person has moved to the late contemplation or early determination stage of change. Be aware that ambivalence will still be present, and if encountered use Phase 1 strategies as appropriate.

Ask a transitional question

Shift the focus from reasons to change to negotiating a plan for change. After summarising above, use the following questions:

"I wonder where this leaves you now?"

"Where do we go from here?"

"What does this mean about your speed use?"

"How would your life be different if..."

"What can you think of that might go wrong with your plans?"

Communicate free choice

Although abstinence is one possible goal, some people may not be ready to stop completely and may opt for reduced or controlled use. In a motivational enhancement paradigm, the client has the ultimate responsibility for change and total freedom of choice to determine their goal for treatment. The therapist's role is to assist the client to determine an initial treatment goal (see Setting Goals below). Be aware that such goals are likely to alter during the course of the intervention, and an initial goal of cutting down may become a goal of abstinence as the client's confidence increases.

Address fears

"You've told me that (refer to grid) ... are the less good things about reducing your speed use. What is your biggest fear if you do decide to cut down or quit?"

Explore any fears that are identified and assist the client with problem solving for each fear raised. Explore concerns with the management of

withdrawal symptoms if this is raised. For example, withdrawal symptoms can include irritability, insomnia, mood disturbances, lethargy and cravings to use. Symptoms are time limited; however in severe cases medications can be prescribed for a short period to assist clients during the acute phase. Education and support are essential components of getting through withdrawal.

Provide information and advice

Provide accurate, specific information when it is requested. When clients seek advice, provide qualifiers and permission to disagree.

“If you want my opinion I can certainly give it to you, but you’re the one who has to make up your mind in the end”.

It may be useful to ask for the client’s response to the information provided:

“Does that surprise/make sense to you?”

Setting goals

The client needs to choose his or her own goal(s) for therapy. In assisting the client to reach a goal, consider the degree of dependence, recent patterns of speed use, and previous attempts to control use, and discuss these issues with the client. Keep in mind the experience from cannabis intervention trials, which suggest that restricting use to weekends or social occasions leads to a slow but steady increase in use over time. Clients must have a firm, personal rule for recreational use (e.g. only use a designated amount (maximum) only once per week, or to never buy speed).

Talk through the characteristics of good, realistic goals with the client. Make sure you cover the following points:

- Goals will help regardless of whether you achieve them. Goals the client reaches can be celebrated/rewarded, but others that aren’t achieved can be used as learning experiences for future goal setting.
- Goals need to be short term, concrete, specific, measurable and realistically achievable. For example, the goal of “*quitting speed*” is not as specific or concrete as “*I will stop using completely by ... date.*”

Commend abstinence and offer the following points in all cases:

“Successful abstinence is a safe choice. If you don’t use you can be sure that you won’t have problems related to your use. There are good reasons to at least try a period of abstinence (e.g., to find out what it’s like to live without speed, and how you feel, to learn how you have become dependent on speed, to break your old habits, to experience a change and build some confidence, to please your partner).”

If the assessment information indicates the need to advise a goal of abstinence (ie. previous episode of amphetamine-induced psychosis, current mental health disorder etc):

“It’s your choice of course. I want to tell you, however, that I’m worried about the choice you’re considering, and if you’re willing to listen, I’d like to tell you why I’m concerned.”

PHASE 3: Behavioural self-monitoring

Introduce rationale for behavioural self-monitoring

The first step in learning to manage daily life without speed is to first identify those situations in which the client is most likely to use/experience the urge to use. Explain that keeping tabs on speed use over time helps to make conscious the apparent 'automatic' nature of a habit or behaviour related to dependence. Self-monitoring assists a client to see patterns of behaviour previously unidentified. Identifying patterns allows clients to more easily identify high-risk situations and triggers for using, and provides an opportunity for people to practise a range of strategies to reduce the likelihood of using.

Elicit concerns about high risk situations and triggers for using

Explain that an important first step in quitting or cutting down speed use is to become aware of the circumstances that tempt the client to use. These circumstances are called "triggers". Triggers can be external or environmental such as bumping into friends who use or being exposed to the drug itself. Internal triggers can include mood states such as feeling depressed or even excited and physical states such as feeling tired and run down. Triggers are very personal and should be identified in detail.

Go through the triggers the client thinks lead to his/her use of speed. Elicit the client's concerns about high-risk situations for using speed and discuss circumstances surrounding these.

Introduce link between triggers, thoughts about using and urges to use

Introduce the link between the personal triggers identified and explain how these triggers promote thoughts (cognitions) about using and often lead to an increase in urges to use. This pattern is often seen in relapse and should be uncovered for each person so a management plan can be developed. Use the following rationale for the client:

"In working out how to better manage your speed use, we first need to find out which situations are most likely to lead you to use and what you are thinking and feeling in those situations. What we want to learn is what kinds of things are triggering or maintaining your urges to use. Then, we can try to develop other ways you can deal with these "high-risk" situations without using speed. An important first step in managing these trigger situations and urges to use is to monitor those times of the day and night when they occur. Quite often, this whole process happens so quickly we don't even realise what has happened – it's almost like we've gone into automatic pilot and are suddenly having a speed craving. But a whole series of thoughts and reactions take place between the trigger situation and our urge to use speed. So, in becoming aware of this process, we put ourselves in a better position of being able to cope."

Use urge diary

Set the client the homework task of monitoring themselves over the next week and writing down the situations in which he/she feels the urge to use and the feelings associated with those situations. The following is an example that could be used:

Exercise 2: The urge diary

Where were you?	Who were you with?	Did any significant events happen?	What were you thinking?	What were you feeling?	What did you actually do?

Summarise Toward the end of the commitment process, offer a broad summary. Include a repetition of the issues of concern, the client's self-motivational statements, the client's plans for change, and the perceived consequences of changing and not changing. Ask:

"Do I have it right?"

"What have I missed?"

Record any additional information that is offered.

PHASE 4: Formulation

It is at this point in therapy that you may like to introduce case formulation to the client. Whilst you may have already made your own formulation, it is suggested that you work with your client and establish a collaborative formulation on the sheet below for your client's record (Exercise 3). This will help empower the client, allowing him/her to be an active part of his/her treatment.

The following guidelines for case formulation (Persons, 2001), if used, will add to the initial assessment, and are consistent with the cognitive behavioural approach of this intervention.

The formulation assists in the development of working hypotheses or clinical assumptions about how the client's beliefs (underlying mechanisms) shape their thoughts, mood and behaviour (overt level).

Environmental factors play a key role in eliciting and triggering beliefs and thoughts, feelings and behaviours. One important area of consideration is the link between beliefs about mental illness (psychotic symptoms, paranoia, depression) and amphetamine use (behaviour).

A formulation therefore is a summary of the client's presentation, gained from the thorough assessment, which draws together important features to facilitate the development of a treatment plan. Information gained from the initial assessment recommended above is utilised in the formulation. The main areas a formulation should cover are:

1. Summary of the presenting problem/s (might include a problem list);
2. Main concern;
3. Predisposing factors;
 - These are the factors that increase a client's vulnerability to drug use such as having parents who used drugs, having a mental health disorder, and holding certain core beliefs about themselves.
4. Precipitating factors;
 - These are the factors that are immediate triggers for drug use, such as feelings of anger or depression, being exposed to drugs, and experiencing withdrawal symptoms.

5. Maintaining factors;
 - These are the factors that maintain use, such as having a circle of drug-using friends, reasons for using (drug expectancies), having a partner who uses, previous failed attempts to stop, not contemplating change, and alleviation of withdrawal symptoms with drug use.
6. Relationship between mental health problems and drug use;
 - What is the relationship between the client's substance use and mental health problem?
 - What are the links in the beliefs the person holds about their drug use and mental health problems?
7. A treatment plan that addresses each of the above areas.

Use the following worksheet to guide your case formulation with the client (Exercise 3).

The case formulation should be constantly revisited and revised throughout treatment to monitor client's progress and evaluate the effectiveness of the intervention.

Explain rationale for formulation

Explain to the client that the development of a formulation provides the foundation for a mutually agreed treatment plan, and allows the key areas that require emphasis during the intervention to emerge.

Agree on the elements of the formulation

- predisposing factors (increase a client's vulnerability to drug use);
- precipitating factors (triggers for drug use as determined previously);
- maintaining factors (maintain use such as drug-using friends etc);
- relationship between mental health problems and drug use.

Make a joint treatment plan

Based on the information gained from the assessment and the formulation, jointly develop an individualised treatment plan that emphasises the relevant aspects of the intervention as appropriate for the person's readiness to change drug use, level of motivation, level of commitment, skills, and goals for treatment.

Exercise 3: The Case Formulation

- Presenting problem/s:

- Problem List:
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.

- Main problem of concern:

- How did these problems develop (predisposing factors)?

- What are the identified triggers (precipitating factors)?

- What factors maintain drug use?

- What is the relationship between speed use and mental health problems (if present)?

- Treatment Plan:

PHASE 5: Session termination

Summarise Summarise all of the information gained so far, including treatment plan and goals.

Shoring up commitment Ask for commitment to the identified treatment goals using the suggested strategies:

- Obtain a verbal, concrete plan;
- Clarify what the client intends to do to bring about change;
- Reinforce perceived benefits of change and consequences of not changing;
- Elicit concerns or doubts they have that might interfere with carrying out the plan;
- Identify other obstacles to the plan. How could the client deal with these?

Establishing a contract It is important to stress to the client that the therapist is capable of helping facilitate change in the client, but ultimately it requires the commitment from the client. This requires certain ground rules (Graham, 2000, p 24):

- *Agree* on the number of future sessions, frequency and location;
- *Attendance* – the client should be able to explain the reasons for missing a session;
- *Promptness* – the client should be on time for sessions or contact the therapist if they cannot be on time;
- *Completion of homework* – treatment relies on the therapist/client making a decision about the appropriate skills to learn and how best to learn them.

Setting homework Throughout sessions 1, 2, 3 and 4, set homework appropriate to the level of the client's motivation and participation in sessions. Work collaboratively with your client, using prompts if necessary to help the client through the homework process. Compliance with, and completion of, homework should set the precedent for the homework to be undertaken in forthcoming sessions.

Session 1 Homework:

- Identify any additional triggers for use that may become apparent during the week and bring to session 2.
- Begin to cut down the speed use (in preparation for quitting completely or reaching lower level of use) if that is appropriate to the agreed treatment goal.
- Complete an urge diary for the week and bring to session 2.

Session 2: Coping with cravings and lapses

THERAPIST SUMMARY SHEET

- Aims**
- Reinforcing motivation to maintain abstinence/reduced level of use.
 - Coping with cravings to use.
 - Preparation for a lapse.

Materials needed for Session 2

- Blank paper and a pen
- Photocopied craving plan or alternative
- Photocopied urge diary (or alternative) for next week

Key elements of Session 2 *(may be photocopied for quick reference).*

PHASE 1: Session introduction

- ☐ review week
- ☐ review homework tasks
- ☐ set agenda for the session

PHASE 2: Introduction to coping with cravings

- ☐ complete exercise 1: describing a craving or urge

PHASE 3: Information about cravings

Provide information about cravings and urges to use:

- ☐ provide information from 'some facts about craving' section

PHASE 4: Strategies to cope with cravings

Discuss the following strategies to cope with cravings:

- ☐ behavioural (3Ds)
- ☐ cognitive (self talk)
- ☐ relaxation and imagery

PHASE 5: Developing a craving plan

- ☐ complete exercise 2: devising a craving plan

PHASE 6: Dealing with a lapse –

use the following strategies

- ☐ give 'coping with a lapse' information
- ☐ discuss steps involved in coping with a lapse
- ☐ discuss abstinence violation effect
- ☐ discuss how to reframe relapse as a lapse

PHASE 7: Session 2 termination

- ☐ set homework, including:
 - ☐ implement craving plan
 - ☐ continue cutting down
 - ☐ complete urge diary for the week
 - ☐ utilise craving plan strategies as required

DETAILED INTERVENTION

PHASE 1: Session introduction

Review of the week, homework exercise, set agenda

Start with an informal discussion about general activities, and also determine whether there are any important issues that have arisen, or any additional questions.

Review the homework activity with the client, and discuss the additional triggers for using that the client may have identified throughout the week. If the client has not completed the homework task, review the triggers identified in Session 1 together now.

Review the client's speed use for the week. Did the client meet the planned goals for tapering? Reinforce positive changes and address minor problems.

Review the client's urge diary. Are there any patterns that emerge? Are there any internal triggers for using that have emerged? Use any information gained from the week to reinforce motivation and commitment to change.

Be aware that ambivalence about changing speed use may still be present and, if encountered, use strategies from session 1 as appropriate (e.g. reflective listening, open-ended questions, affirming, summarising, managing resistance etc.). If your client has not yet moved to the action stage of change, continue to enhance their motivation to change using the techniques and issues covered in previous sessions. Modify the session 2 agenda as appropriate.

Set the agenda for the session by explaining the issues that will be covered.

PHASE 2: Introduction to coping with cravings

Completing an urge diary over the past week will have given the client insight into the trigger situations that lead them towards experience of a craving. They will have practised identifying the elements of the trigger situation itself, along with their responding thoughts, feelings and behaviours. Now it is time to put those observations to use in helping them to better manage their craving situations. By learning techniques to cope with each aspect of the client's experience of a craving, they can be more confident of "surviving" that situation without acting on their urge to use speed.

Exercise 1: Describing a craving/urge⁸

- Ask the person to explain what their experience is of a craving/urge for amphetamines.
"Tell me a bit more about your cravings – what are they like?"
- You may like to refer back to their urge diary, which they completed for homework following session 1, for additional information.
- On a spare piece of paper, write down the headings: Behaviours, Physical Feelings, Thoughts.
- Write down each of the feelings/thoughts/physical responses that the person uses to describe their urge. Group together those responses that are behavioural (e.g. fidgety, pace the floor), thoughts (e.g. *"I must have a hit"*), and physical (e.g. heart races, feeling sick) in nature and write them under each column as appropriate.

Explain that it is possible to fit the person's experience of cravings into the following model.

BEHAVIOURS + PHYSICAL + THOUGHTS = CRAVING

In better coping with craving situations, explain to your client that it is important to use coping techniques that address each of these elements.

An important first step in this process is to educate the client about the nature of withdrawal from speed, and particularly that cravings are a key aspect of withdrawal and are to be expected.

PHASE 3: Information about cravings

Provide the following information about cravings and urges to use

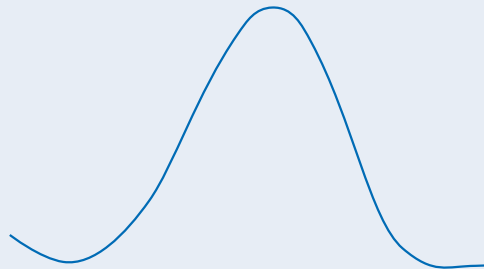
Speed cravings and urges are the sense of wishing to have a hit of speed, or experiencing an impulse to seek out and use it. Urges and cravings tend to increase during withdrawal or in the absence of using. Therefore if your client is trying to abstain from speed, he/she will experience more intense cravings and urges.

The extent of his/her cravings and urges will also be determined by how much he/she dwells on thoughts about using speed. Often, providing the client with some basic facts about cravings can assist their ability to endure them. Use the following "Facts about Cravings" summary as a stimulus for this discussion. If appropriate, you may like to photocopy the following summary sheet and pass on to the client for their reference.

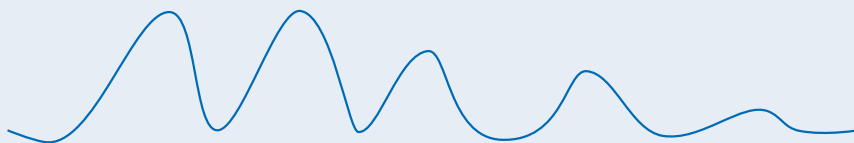
⁸ Adapted from Monti, Abram, Kadden & Cooney, 1989

Some facts about cravings (Marlatt & Gordon, 1985)

1. Cravings/urges to use are a natural part of modifying speed use. This means that you are no more likely to have any more difficulty in altering your speed use than anybody else does. Understanding cravings helps people to overcome them.
2. Cravings are the result of long-term speed use and can continue long after quitting. So, people with a heavier history of use will experience stronger urges.
3. Cravings can be triggered by: people, places, things, feelings, situations or anything else that has been associated with using in the past.
4. Explain a craving in terms of a wave at the beach. Every wave/craving starts off small, and builds up to its highest point, and then it will break and flow away. Each individual craving rarely lasts beyond a few minutes.



5. Cravings will only lose their power if they are NOT strengthened (reinforced) by using. Using occasionally will only serve to keep cravings alive. That is, cravings are like a stray cat – if you keep feeding it, it will keep coming back.
6. Each time a person does something other than use in response to a craving, the craving will lose its power. The peak of the craving wave will become smaller, and the waves will be further apart. This process is known as extinction.



7. Abstinence from speed is the best way to ensure the most rapid and complete extinction of cravings.
8. Cravings are most intense in the early parts of quitting/cutting down, but people may continue to experience cravings for the first few months and sometimes even years after quitting.
9. Each craving will not always be less intense than the previous one. Be aware that sometimes, particularly in response to stress and certain triggers, the peak can return to the maximum strength but will decline when the stress subsides.

PHASE 4: Strategies to cope with cravings

Although cravings are time limited, it is important to equip your client with the tools he/she needs to endure their urges to use speed. This is especially true, given that sometimes, cravings cannot be avoided. Below are listed a number of strategies that seem helpful in managing cravings and urges to smoke. These correspond to the behavioural, physical and cognitive (thought) aspects of cravings described above. You will need to identify with your client the strategies he/she has used and found helpful in the past and add in some of the strategies listed below. Discuss these strategies with your client and identify those that they think they might find useful in managing their experiences of cravings. If time allows, practise each of these techniques during the session. In addition, provide your client with written reminders of each of these techniques as appropriate.

(a) Behavioural

Discuss the “3Ds” of coping with cravings:

1. **Delay** – encourage the client to avoid situational triggers, particularly during the early phase of modifying their use; however this will not stop cravings from coming altogether. When a craving does hit, delay the decision to use for a minute at a time or longer if the client can manage. During this time, ask the client to say to themselves: *“I will not act on this craving right away. I’ll DELAY my decision to act on this craving for...minutes”*. This will help the client to break the habit of immediately reaching for speed when a craving hits. Refer back to assessment (precipitation factors/triggers) to discuss real-life examples with your client.
2. **Distract** – once the decision to use is delayed, the client needs to distract themselves from thoughts about using. Generate some ideas for strategies to use as a distraction technique such as going for a brisk walk, calling a support person, listening to music etc. Write these down for the client and ask him/her to keep this list handy and accessible for ease of reference when the craving begins. Explain to the client that once they are interested in, or actively doing, something else, they will find the urges will reduce in intensity until they have gone altogether.
3. **Decide** – after the craving has passed, revisit all the reasons why the client wanted to stop using speed in the first place. Decide then and there not to use again and ask the client to congratulate himself or herself on not giving in to something that is, after all, only a THOUGHT or a FEELING.

(b) Cognitive

Positive talk – by asking the client to remind themselves about the short-term nature of cravings (e.g. *“this feeling will pass”, “I can cope with this”, “I don’t have to act on this because it will go away on its own”*), the urges themselves will be easier to deal with. It is important to “decatastrophise” the experience of cravings – acknowledge that they are uncomfortable/unpleasant but also that they WILL pass.

(c) Relaxation and imagery

1. Relaxation/deep breathing – if cravings develop in response to stressful situations, relaxation techniques and deep breathing exercises can be useful (if a person is relaxed then they cannot be stressed).
2. The urges that some clients experience can often be in the form of images or even dreams. For example, a particular client (Irene) found that after a period of four months abstinence from speed she started to have images flash into her mind that involved her walking past a house where she knew speed was available. These images had started to increase her cravings to use.
3. Some strategies Irene found to be helpful in managing/transforming such images are listed below. Talk through each of these strategies with your client and then rehearse and practise in the session.

These strategies can be adapted to suit each individual client's disturbing images as they arise.

Mastery (imagine not using in the given situation).

For example, Irene was asked to conjure up the image of the house in which speed was available. She was then asked to imagine herself walking past the house instead of going in and buying speed. She was then asked to imagine how good she would feel about her achievement.

Alternative (replace the image with an alternative "healthy" image).

For example, Irene was asked to conjure up the house image and then to replace it with an alternative image, such as walking along the beach on her last holiday when she was not using speed and was feeling relaxed and happy.

"Fast forward" (unfreeze the image and move it on in time, a few minutes, hours, days etc. to enable the client to see that he/she is looking at only a part of the picture which may in fact be a distortion of the whole picture).

For example, Irene was asked to conjure up the house image and then to unfreeze it and fast forward (almost as if pressing a fast forward button on a video player) and imagine in detail the usual consequences that follow scoring speed from this house. She was asked to describe the immediate, short and long-term consequences in detail. Having done this, Irene found that the negative consequences of scoring and using outweighed the short-term benefits and she was able to apply this realisation to future positive self-talk when cravings emerged.

"Surfing the Urge" (the craving is a wave that can be surfed until it passes).

Irene was asked to see her craving to use speed as a wave. She was then asked to imagine herself surfing the wave (craving) in the way in which a surfer would surf a wave, and to see herself successfully riding the wave (and managing her craving) until it finally broke on the beach (reduced in intensity and passed away without being reinforced).

PHASE 5: Developing a craving plan

Now that you and your client have discussed different types of strategies to better manage their cravings for speed, it is time to summarise the preceding discussion and develop an action plan for the client to implement at times of craving. Spelling out exactly which techniques to use in particular trigger situations removes the obstacle of having to think of something else to do in the heat of the moment when the craving is intense. This increases their chance of successfully not giving in to cravings as they arise.

Exercise 2: Devising a craving plan (Kadden et al., 1995)

- Write down the high-risk situations for speed use generated by the client during the session, or from the homework activities (urge diary), on the following sheet – “My craving plan” (exercise 2).
- Ask the client to circle the triggers he/she feels they can simply avoid or reduce their exposure to (e.g. not having speed in the house, not buying it, thereby reducing the likelihood of experiencing a craving).
- Of the remaining triggers that cannot be avoided, go through the coping strategies described above with your client and jointly identify those that he/she can put in place when he/she experiences cravings and urges to use.
- If your client has not tried any of the coping strategies before (e.g. urge surfing, relaxation, nominating a support person to call on), encourage them to practise the technique in the session with you now. This will make it easier for them to use this strategy later if required.
- Assist the client to generate ideas: *“What things will I do to help me stay off speed?”*
- Record the final plan on the following sheet – “My craving plan” for the client to take home.
- Ask the client to refer to the plan throughout the week when a craving develops and act on all the strategies generated during the session. Some may work better for the client than others and once a strategy is found to be helpful, it may be used again and again.

Exercise 2: My Craving Plan

High risk situations (circle those that you can avoid)	My coping plan	What will help me stay off speed?

PHASE 6: Dealing with a lapse

Coping with a lapse: the abstinence/rule violation effect

Slips and lapses are common in the recovery process. While they are disappointing, they do not mean failure or indicate an inability to change. The client's challenge is to find ways to overcome slips and maintain goals as best as possible. Treat a slip as a learning experience.

It is important to talk about how to deal with a lapse with your client in this session to start them thinking about how to prevent a relapse to regular use of speed. This is particularly important if this is to be your final session (ie. you have decided to deliver the two-session rather than the four-session intervention).

Often people will feel very bad about themselves if they have a lapse, and will see it as the end of the world and an end to their attempts at abstinence (or other goal). The *abstinence violation* effect is said to be your client's reaction if he/she had made a decision to stop using, and then did. Alternatively, a *rule violation* effect is said to be your client's reaction if he/she had decided to change his/her pattern of speed use (e.g. to cut down or to stop) and he/she then had a "slip" and used. If the client returns to using on one or two occasions as they previously were, then this is called a LAPSE. However, if following this "lapse" the client completely returns to their previous levels of speed use, this is called a RELAPSE. If your client has a lapse, it is more likely to turn into a relapse if he/she engages in particular distorted styles of thinking and feelings about him/herself (called the *abstinence/rule violation effect* or "*breaking the rule effect*"). Explain to your client:

The 'Breaking the Rule Effect' could happen if you have a slip and "break your rules". By this I mean your goal or rule about staying off speed completely (or cutting down to a lesser level if reduction is your client's goal). The "breaking the rule effect" happens when you have a slip and break your rules, and then think something like "oh stuff it, I've had a hit – broken my rule, I might as well keep going..."

"But, there are other ways of looking at the situation. Slips will happen – everybody makes mistakes, and it doesn't mean that you have failed completely. You can stop at one hit, and go again from there – you can start with a clean slate. A slip doesn't mean you are getting worse, or headed for a relapse, rather that you are experiencing what everybody does – a simple slip. But, if you have a slip, it is more likely to turn into a relapse if you give into the "breaking the rule effect".

The main strategy to help your client cope with the abstinence/rule violation effect is to re-evaluate and modify the thinking errors that contribute to the effect. The aim is for your client to firstly identify the distortions in his/her thinking that occur in relation to his/her speed use (e.g. minimisation, all or nothing, overgeneralisation); and secondly to generate a more helpful, less catastrophic and more realistic way of

viewing the situation (e.g. a slip/mistake rather than a complete failure).
For example:

Unhelpful thought:

"I've blown it".

Helpful thought:

"I've just had a slip and I can get back on track".

Unhelpful thought:

"I knew I wouldn't be able to stop".

Helpful thought:

"I have been able to make a change...this is only a slip and I will keep on trying".

Unhelpful thought:

"I've messed up already so I might as well keep going".

Helpful Thought:

"I've just made a mistake and I can learn from it and get back on course".

Discuss these alternative thoughts with your client during the session.

PHASE 7: Session termination

- Homework**
- Implement the craving plan throughout the week in response to a craving to use speed.
 - Continue to cut down/maintain abstinence.
 - Complete urge diary for the next week.
 - Utilise craving plan as required, and record which strategies were helpful and which were not.

Session 3: Controlling thoughts about using speed

THERAPIST SUMMARY SHEET

- Aims**
- Introduction to the concept that thoughts influence behaviour.
 - Develop a plan of achievement and pleasurable tasks to carry out through the week.
 - Continue to cut down/maintain abstinence.

Materials needed for Session 3

- Photocopy of the “Self Monitoring Record” (this now replaces the urge diary from Sessions 1 and 2).
- Photocopy of the “Activities List”.
- Photocopy of “The Activity Record”.
- Photocopy of “Seemingly irrelevant decisions” sheet.
- Blank pieces of paper and a pen.

Key elements of Session 3 *(may be photocopied for quick reference).*

PHASE 1: Session introduction

- ☐ review week
- ☐ review homework tasks
- ☐ set agenda

PHASE 2: Link between thoughts and behaviour

Use the following strategies:

- ☐ explain rationale for this exercise
- ☐ demonstrate on paper the link between thoughts, feelings and behaviours (using Ellis’s ABC model)
- ☐ complete exercise: demonstrating link between thoughts and behaviour

PHASE 3: Triggers

Use the following strategies:

- ☐ discuss challenges to unhelpful thinking patterns
- ☐ complete exercise: monitoring thoughts about triggers (self-monitoring record)

PHASE 4: Seemingly irrelevant decisions

Use the following strategies:

- ☐ discuss rationale behind seemingly irrelevant decisions
- ☐ complete exercise: review last relapse for seemingly irrelevant decisions
- ☐ give seemingly irrelevant decisions sheet to client to take away

PHASE 5: Pleasant event and activity scheduling

Use the following strategies:

- ☐ discuss rationale behind activity scheduling
- ☐ complete exercise: identifying pleasant activities and achievement tasks
- ☐ complete exercise: the activity record

PHASE 6: Homework

- ☐ Set homework, including:
 - ☐ complete self-monitoring record
 - ☐ practise identifying seemingly irrelevant decisions as they occur
 - ☐ implement activity record
 - ☐ continue cutting down

DETAILED INTERVENTION

PHASE 1: Session introduction

Review of the week, homework exercise and set agenda

Start with an informal discussion about general activities, and also determine whether there are any important issues that have arisen, any questions so far.

Review the homework activity with the client, and discuss the triggers for using the client has identified throughout the week. If the client has not completed the homework task, ask them to do so now with your assistance.

Review the client's speed use pattern for the week. Did the client meet the planned goals for tapering?

Review their urge diary. Address any important aspects.

Review their cravings plan and discuss aspects of management plan that were helpful and unhelpful.

Reinforce positive changes and address minor problems. Set the agenda for the session by explaining to the client the issues that will be covered.

PHASE 2: The link between thoughts and behaviours⁹

Rationale for the exercise

Explain to your client that it was important to gather information about the situations in which they are more likely to use speed because it helps to establish what kinds of things are triggering or maintaining their use. The next step is to develop other ways to deal with these "high-risk" situations without resorting to using speed.

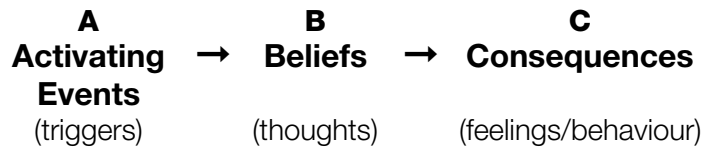
Use the following rationale with your client:

"All people who are trying to reduce their speed use will have thoughts about using, and will increasingly experience urges to seek it out. These thoughts and feelings are quite common, and in themselves do not create problems. Rather, it is important to focus on how you deal with, and respond to, these thoughts and feelings."

⁹ Exercises in Phases 2 and 3 are based on Jarvis, Tebbutt & Mattick, 1995

Link between thoughts, feelings and behaviour

Explain to your client the link between thoughts, feelings and behaviour using the cognitive model illustrated below (Ellis, 1975). This will enable your client to begin to see the links between their thoughts, feelings and subsequent behaviour (e.g. speed use).



Explain to your client that their thinking influences the way they feel and behave. Events/situations that occur in the outside world do not usually cause feelings or behaviour; rather it is an individual's interpretation (or thoughts) about those events that will directly lead to their feelings and subsequent actions. In some cases, the thoughts that they have about a particular situation can be quite unhelpful, and lead to them feeling the urge to use speed to help them cope.

Often, the unhelpful thoughts happen so quickly in response to trigger events that people do not even realise what is happening. That is why these thoughts are often referred to as "automatic." Usually, people suddenly realise that they are experiencing a craving/urge to use. These feelings are often a signal that they have slipped into automatic pilot and allowed a trigger situation to lead to an unhelpful thought about that situation, which has then resulted in a craving.

Exercise 1: Demonstrating the link between thoughts and behaviour

- Take one of the situations from the homework task in which the client experienced strong urges/cravings to use speed or did use speed.
- Help the client to identify the A's, B's and C's surrounding that event/situation. Include any unhelpful self-talk/thoughts the client experienced, such as *"I can't cope without speed"*.
- Explain to the client that an important part in managing those situations that trigger cravings to use speed is to become aware of their unhelpful thinking patterns associated with these situations. The client can then better recognise the patterns associated with a relapse, and develop alternative thoughts or interpretations for those situations.
- Explain to your client that the thoughts that usually lead to cravings and urges to use characteristically fall into one of five *unhelpful patterns of thinking*:
 1. **Black and White Thinking:** this pattern of thinking is characterised by the interpretation that things are either all good or all bad – with nothing in between, no balance, no shades of grey. For example, because something has gone wrong once, black and white thinking dictates it will always go wrong. Does your client have strict rules about themselves and their lives? Are they rigid in their need to stick perfectly to their goals? If so, black and white thinking might be an unhelpful thought pattern that your client is using. Examples of black and white thinking include: *"If I fail partly, it is as bad as being a complete failure"*, or *"I never get what I want so it's foolish to want anything"*. In particular, *"even if I use once this week, I'm a failure, so why bother"* or *"I can't change, so it's pointless trying at all"*.
 2. **Jumping to Negative Conclusions:** does your client automatically draw a negative conclusion about an issue more times than not? People who "jump to negative conclusions" sometimes act like "mind readers". They think they can tell what another person is **really** thinking, often without checking it out or testing the conclusion. Other times, people who "jump to negative conclusions" may engage in "fortune telling". They believe that things will turn out badly, and are certain that this will always be the case. For example, they might think: *"Things just won't work out the way I want them to"*, or *"I never get what I want so it's stupid to want anything"*, or *"There's no use in really trying to get something I want because I probably won't get it"*. In relation to their speed use, people with this pattern of thinking may believe *"I'll never be able to change my drug using, it'll never be any different"*.

Exercise 1: Demonstrating the link between thoughts and behaviour (continued)

- 3. Catastrophising:** People with this pattern of unhelpful thinking tend to give too much meaning to situations. They convince themselves that if something goes wrong, the result will be totally unbearable and intolerable. For example, *"If I get a craving, it will be unbearable and I will be unable to resist it"*. If "catastrophisers" have a disagreement with someone, they may think that *"the person hates me, doesn't trust me, and things will never change"*. Or, *"if I don't have a hit, I'll never be able to cope with this."*
 - 4. Personalising:** "Personalisers" will blame themselves for anything unpleasant that happens. They take a lot of responsibility for other people's feelings and behaviour, and often confuse facts with feelings. For example, *"My brother has come home in a bad mood, it must be something that I have done"* or *"I feel stupid, so I am stupid"*. People with this pattern of thinking often put themselves down, and think too little of themselves, particularly in response to making a mistake. They may think things like *"I'm weak and stupid, there's no way I'll be able to resist my craving"*. In response to a slip, personalisers will often say to themselves: *"see, I knew I'd never be strong enough to resist, I'm such a terrible person."*
 - 5. Shoulds/Oughts:** People with this pattern of thinking use 'should', 'ought' and 'must' when they think about situations. This often results in feelings of guilt. *Shoulds* and *oughts* quite often set a person up to be disappointed, particularly if these thoughts are unreasonable. For example, *"I must not get angry"*, *"He should always be on time"*, and especially, *"I should be strong enough to never even experience a craving – I should just be able to stop."* 'Should' statements can cause a person to experience anger and frustration when that person directs these statements at others.
- In helping your client to better cope in these craving situations, it is important for them to identify the unhelpful thought patterns they are likely to engage in, and then learn ways to deal with these thoughts directly, without using speed.
 - Help the client to identify from their urge diary, which unhelpful thinking patterns they are likely to use.

PHASE 3: Triggers

Challenges to unhelpful thinking patterns

The aim of the remaining session time is to help the client better manage those unhelpful patterns of thinking that are associated with their cravings/use of speed. You will then help the client to learn ways to challenge these unhelpful thoughts and replace them with more helpful ones. In this way the client will learn how to manage their thoughts about stressors and also cope with any cravings they might experience.

Exercise 2: Recognising unhelpful patterns of thinking

- It is important for the client to challenge any unhelpful thinking patterns by asking themselves the following four questions (Jarvis, Tebbutt & Mattick, 1995):
 1. *“What is the evidence to support this thought? Is this 100% true?”*

It is common for people to mistake their feelings for evidence/fact, when in reality feelings are not facts. Often the evidence is contradictory to the client's thought.
 2. *“What are the advantages/disadvantages of thinking in this way?”*

Unhelpful thoughts will have some advantages for the client, particularly when they help him/her avoid a difficult situation. In considering the disadvantages, such as anxiety or increase in speed use, it may be that the disadvantages outweigh the advantages and possibly pave the way for the person to develop new ways of thinking.
 3. *“Is there a thinking error?”*

Is the client able to identify whether they are falling into the habit of an *unhelpful pattern of thinking* described above? For example, are they personalising, catastrophising, jumping to negative conclusions, or using black/white thoughts or should/ought statements? If so, this is a sign that the client is putting himself or herself at risk of using speed.
 4. *“What alternative ways of thinking about the situation are there?”*

There will always be more than one way to interpret any trigger situation. Often these alternatives will be more helpful than the interpretations and consequences encouraged by unhelpful patterns of thinking. Brainstorm with the person some alternative ways of thinking/reacting to the stressful/trigger situations.
- Practise these steps with the client using the trigger situations listed on their urge diary from last week.

Exercise 3: Monitoring thoughts about triggers

- Photocopy the self-monitoring record on the next page and give it to the client.
- Ask the client to take home the self-monitoring sheet and fill it in over the week. Explain how to use the sheet, e.g. *“over the next week, every time you have a craving to use speed, say to yourself STOP, SLOW DOWN, and then fill in the sheet. Make sure you complete all columns on the form, identify the unhelpful thinking pattern you are using in this situation, and ask yourself the four questions listed here on the sheet to challenge these thoughts.”*
- Ask the client to either do this for every craving they experience, or to complete the form at the end of each day, and bring it in next session.

Self-monitoring record

Use this form to record any time this week when you experience a craving to use. Try to fill it in at least once a day to help you remember clearly what was happening.

Time & Date	What was happening? A	What were you thinking? B	What were the consequences? (cravings?) C	What is the evidence to support your thoughts about this situation?	What are the positives and negatives of thinking in this way?	Are you falling into an unhelpful pattern of thinking? If so, what?	Is there another way of looking at this situation?

PHASE 4: Seemingly irrelevant decisions¹⁰

Rationale behind seemingly irrelevant decisions (SIDs)

Previous exercises have helped the client to identify situations in which they are most likely to use speed. Explain to the client that one useful way of avoiding these situations, and hence the trigger for a speed craving, is to become aware of the ‘seemingly irrelevant decisions’ they make that can lead to them being in a situation of high-risk for using. Present the following rationale for the client:

*“Many of our daily decisions and choices **on the surface** seem to have nothing to do with using speed. Although your decisions may not directly involve choosing whether or not to use, they may slowly move you closer to such behavioural/emotional states that are associated with using. It is often through seemingly irrelevant decisions that we gradually work our way closer to entering high-risk situations that may lead to using speed.*

*People often fall victim to their situations (e.g. “I always end up using at parties and can’t help it”). Although it is difficult to recognise choices made when in the middle of the decision-making process, each small decision you make over a period of time can gradually lead you closer to your predicament. The best way to combat this is to **think about each choice you make**, no matter how seemingly irrelevant it is to using speed, so you anticipate potential dangers ahead.*

***Choose the lowest-risk option** when faced with a decision, to avoid putting yourself in a risky situation. When you become aware of seemingly irrelevant decisions, you will be better able to avoid high-risk situations. It is easier to simply avoid the high-risk situation before you are actually in it.”*

Exercise 4: Seemingly irrelevant decisions

- Ask the client to think about their last relapse and to describe the situation/events that preceded the relapse.
- With the client, determine what seemingly irrelevant decisions led up to the relapse.
- Photocopy the reminder sheet on the next page and take the client through the steps. Then, give the sheet to the client to take away with them.

¹⁰ Exercises in Phase 4 are based on Monti, Abrams, Kadden & Cooney (1989)

Exercise 4: Seemingly irrelevant decisions *(continued)*

When making any decision, whether large or small, do the following:

- Think about what different options you have.
- Think ahead to the possible results of each option. What are the positive or negative effects you can think of, and what is the risk of relapse?
- Select one of the options. Choose one that will give you the lowest chance of relapse. If you decide to choose a high-risk option, plan how to protect yourself while in the high-risk situation.

Practise Exercise

Think back to your last lapse to speed use and describe the situation/events that preceded the lapse.

What situations led up to the lapse? _____

What decisions led up to the lapse? _____

What stopped me from recognising these signs? _____

What would have been a more low-risk option? _____

Plan to manage high-risk situations: _____

PHASE 5: Pleasant event and activity scheduling

Rationale behind activity scheduling

For people trying to cut down or stop using speed, planning pleasant and/or meaningful tasks into their day, means they may be able to distract themselves from thinking about using. Often, when people have been using speed for longer periods of time, they focus all their energies on making sure they have access to speed, using it, or recovering from its effects. This is often to the detriment of other activities, which may help bring enjoyment or a sense of achievement to the person's life. Thus the idea of decreasing their speed use often means a decrease in enjoyment in the life of your client. But, by planning "pleasurable" activities into the day, people will realise that they can enjoy themselves without using speed and also, by completing achievement tasks, can gain a sense of control or mastery over important aspects of their life.

Explain these ideas to your client and discuss the importance of formally structuring and prioritising these pleasurable and achievement activities into their day.

It is important to acknowledge that it is impossible to plan every moment of every day in advance. Indeed there will be times when unpredictable things happen and the client will not be able to carry out the pleasurable and achievement tasks set down for that day. Discuss this with the client, and explain that the activity record is not a rigid plan, and they should not feel guilty or bad if they cannot stick exactly to the plan.

In addition, they are able to substitute alternative activities into the record if something prevents them from doing what they planned. For example, on the day a client plans to go for a walk it may be raining. So, explain to the client that in these cases, they are free to substitute an alternative pleasurable task into that timeslot. During the session, complete the activity record for the following day with the client's help.

Active scheduling of pleasurable and achievement tasks

Exercise 5: Identifying pleasant activities and achievement tasks

- Refer to the "Activities List" sheet on page 62.
- Ask the client to list activities they like and enjoy doing that do not involve using speed. For example, going for a walk, taking time for themselves, visiting friends, going to the beach, shopping, reading, having a cup of coffee etc. Make sure these activities are broken down into concrete components. For example, "*time to myself*" needs to be broken down into the actual activities that constitute time to oneself. These could include listening to the radio, practising relaxation etc.
- List these tasks in the "Pleasurable Activities" column.
- Next, ask the client to list the things he/she needs to do. This could include attending treatment sessions, taking medication,

keeping appointments, therapy homework, looking after children, housework etc. It is important to list the components (smaller, discrete and concrete tasks). For example, break housework down into all the different activities that need to be done around the house (e.g. washing dishes etc). *“Looking after the children”* should also be broken down into concrete tasks (e.g. bathing), and include doing fun things with them.

- List these tasks in the “Achievement Activities” column.

The Activity Record

Exercise 6: The Activity Record

- Refer to the sheet titled “The Activity Record” on page 63.
- Using the list of pleasurable and achievement activities developed during the last exercise, complete with the client a schedule for the following day. Be sure to include both pleasurable and mastery activities for that day.
- In the “Evening” section of the record, schedule in time to complete the Activity Record for the following day, along with any other daily homework you have set for the client to complete over the following week. Mark these activities as “Achievement Tasks”.
- Ask the client to sit down at the end of each day during the following week and complete the Activity Record for the next day. Whilst in the session, schedule in your next appointment with the client, and enter this into the Activity Record. If the client is aware of any appointments they must keep throughout the following week, add those to the Activity Record during the session.
- Make sure the client understands the importance of including a balance of both pleasurable and achievement tasks into each day. For example, each achievement activity should be followed by a pleasurable activity to help enhance and maintain motivation.

PHASE 6: Homework

1. Complete self-monitoring record.
2. Become aware of the potential for seemingly irrelevant decisions that put the client at risk for using speed, and identify them when they do occur.
3. Complete activity record and begin to use activity plan.
4. Maintain abstinence/reduced level of use of speed.

Activities List

Pleasurable Activities <i>(Things I like to do)</i>	Achievement Activities <i>(Things I have to do)</i>

The Activity Record

	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Morning							
LUNCH							
Afternoon							
DINNER							
Evening							

Session 4: Relapse prevention

THERAPIST SUMMARY SHEET

Aims

- Learn and practise speed refusal skills.
- Identify potential high-risk situations that may occur in the future.
- Develop a specific relapse prevention/relapse management plan for anticipated high-risk situations.
- Encourage use of relapse prevention/relapse management plan to prevent use of speed.
- Learn how to deal with a lapse.

Materials needed for Session 4

- Photocopy the “Refusal Skills” sheet and give to client.
- Photocopy “Preparing for High-Risk Situations” sheet and give to client.

Key elements of Session 4 *(may be photocopied for quick reference).*

PHASE 1: Session introduction

- ☐ review week
- ☐ review homework tasks
- ☐ set agenda

PHASE 2: Speed refusal skills

Use the following strategies:

- ☐ discuss rationale for learning speed refusal skills
- ☐ discuss non-verbal measures
- ☐ discuss verbal measures
- ☐ complete exercise 1: rehearsing speed refusal skills
- ☐ give client refusal skills reminder sheet

PHASE 3: Relapse prevention

Use the following strategies:

- ☐ Identify high-risk situations by –
 - ☐ discussing a rationale for relapse prevention
 - ☐ identifying high-risk situations from self-monitoring
 - ☐ completing exercise 2: identify high-risk situations
- ☐ Prepare for high-risk situations by –
 - ☐ identifying people and means of maintaining skills
 - ☐ completing exercise 3: preparing for high-risk situations

- ☐ Regulate consequences by –
 - ☐ discussing behavioural self-rewards for abstinence or maintaining goals
 - ☐ completing exercise 4: regulate consequences
- ☐ Devise a relapse prevention plan by –
 - ☐ discussing a written relapse prevention plan
 - ☐ discussing when and where to use the plan
 - ☐ discussing need to monitor early warning signs
 - ☐ discussing refining and updating the plan as necessary

PHASE 4: Session termination

- ☐ Terminate session, including:
 - ☐ reconfirm important motivating factors from session 1
 - ☐ elicit self-motivational statements
 - ☐ summarise commitments and changes so far
 - ☐ affirm and reinforce changes so far
 - ☐ explore potential additional areas of change raised previously
 - ☐ support self-efficacy to change
 - ☐ deal with any special problems (including referral)

DETAILED INTERVENTION

PHASE 1: Session introduction

Review the week, homework tasks and set agenda

Start with an informal discussion about general activities, and also determine whether there are any important issues that have arisen, any questions so far.

Review the homework activity with the client, and discuss how the client was able to manage/challenge their thoughts about using speed. If the client has not completed the homework task, ask them to do so now. In addition, check how well the client was able to use the Activity Record and list of Pleasurable Activities.

Review the client's speed use pattern for the week. Did the client meet the planned goals for tapering? Reinforce positive changes and address minor problems if convenient.

Set the agenda for the session by explaining to the client the issues that will be covered.

PHASE 2: Speed refusal skills

Rationale for learning speed refusal skills

As previously stated, in the early stages of modifying use of speed, it is important to consider avoiding high-risk situations completely. However, it is acknowledged that avoidance is not a long-term solution, nor is it always a practical one. One particularly unavoidable situation might involve a person offering your client speed. There are a number of strategies that can make saying NO easier. Discuss the following elements of speed refusal with your clients.

Non-Verbal Measures for Refusing Speed

(Monti et al., 1989)

1. Make direct eye contact with the other person to increase the effectiveness of your message.
2. Stand or sit up straight to create a confident air.
3. Do not feel guilty about the refusal and remember, you will not hurt anyone by not using.

Verbal Measures for Refusing Speed

(Monti et al., 1989)

1. Use a clear, firm, confident and unhesitating tone of voice.
2. "NO" should be the first word out of your mouth. A direct statement is more effective when refusing the offer.
3. Suggest an alternative (e.g. something else to do/eat/drink).
4. Request a behaviour change so that the other person stops asking (e.g. ask the person not to offer speed anymore).
5. Change the subject to something else to avoid getting involved in a drawn out debate about using/drinking.
6. Avoid using excuses and avoid vague answers, which will imply that at a later date you may accept an offer to use.

Exercise 1: Rehearsing speed refusal (Monti et al., 1989; NIDA, 1998)

- Select a concrete situation in the recent past, where the client was offered speed.
- Ask the client to provide some background on the person involved in the situation (the “offerer”).
- For the first role-play, have the client take the part of the “offerer”, so they can convey a clear picture of the style of that person, and the therapist shall model the speed refusal skills outlined above.
- Discuss the role-play. The therapist should say, *“That was good, how did it feel to you?”* Be sure to praise any effective behaviours and offer clear constructive criticism.
- Repeat the role-play, with the therapist playing the role of the “offerer” and the client playing himself or herself.
- Discuss the second role-play using the same guidelines as above.

Photocopy the “Refusal skills reminder sheet”¹¹ on page 67 and give to the client. Go through the refusal skills at the top of the page to help summarise the previous exercise.

Explain the rationale for learning and practising refusal skills to the client. Use the following information:

“It is often difficult to refuse someone who is offering you speed. This is particularly the case if you don’t want to offend the other person. It can be tough to say “no”, particularly when you have said “yes” before. But, equally important are your feelings and your goals, so it is a good idea to practise what you might say in these situations before they happen. To help you say “NO” comfortably, take some time to prepare some responses you might make to different people who might offer you speed.”

Ask the person to fill in the table on the sheet and nominate some responses they may use when confronted by “a friend they used to use with”, “a co-worker”, “a party”, or other potentially “high-risk” situations. Write down the exact words the client feels they can use in each of these situations, using the key principles. This sheet can then be taken with the client.

Note – if appropriate, the client may want to practise saying these responses out loud during the session, or you may like to conduct a role-play around one of the nominated scenarios.

¹¹ NIDA, 1998

Refusal skills reminder sheet

Tips for responding to offers of speed:

1. Say no first.
2. Make direct eye contact.
3. Ask the person to stop offering speed.
4. Don't be afraid to set limits.
5. Don't leave the door open to future offers.
6. Remember there is a difference between being assertive and being aggressive. Assertiveness means being direct but not bossy, being honest but not big-headed, and being responsible for your own choices without forcing your opinions onto others.

People who might offer me drugs	What I'll say to them
A friend I used to drink or use with:	
A co-worker:	
At a party:	
Other:	

PHASE 3: Relapse prevention

Rationale for relapse prevention

Once clients have learned the skills and behaviours to help them quit/cut down on the use of speed, they are ready to begin preparing for life after therapy where they must manage on their own. The rest of this session is concerned with anticipating future situations that pose relapse risks to the client. This session can be a way of increasing the client's self-efficacy about how they will cope in these high-risk situations, perhaps circumventing a relapse in the process (Wilson, 1992).

At this stage, both you and the client have the benefit of hindsight to assist you in collaboratively preparing for future high-risk situations. That is, you know how the client has responded to the different skills/techniques taught in previous sessions, as well as how they relate to events, thoughts and behaviours. In addition, the client has hopefully incorporated some of the skills/techniques into their repertoire of coping strategies, and will have a greater understanding of their problem (Wilson, 1992).

Identification of high-risk situations from self-monitoring

It is inevitable that certain events will occur in the client's life that will pose threats to maintaining abstinence or reduced use. Indeed Wilson (1992) reports that the average person will experience at least one adverse event in a 12-month period.

A vital first step in preventing relapse is to identify those high-risk situations in advance and allow the client time to prepare for them when they occur. Take time in the session to revisit the self-monitoring record the client has been completing for homework as a guide to the types of situations that have posed problems for them in the past. In addition, probe for additional life events the client anticipates will probably pose difficulties for them. These might include loss events (social, financial, failure to complete tasks, loss of status etc.) or even happy events that can also increase risk of relapse (celebrations, completion of projects etc).

Exercise 2: Identify/anticipate high-risk situations (Wilson, 1992)

- Ask the client to brainstorm high-risk situations or changes that they can anticipate in the future (e.g. adjustment to new situations, financial changes, and social separation).
- Use the following questions to assist the client to generate the list: *What kinds of people/places/things will make it difficult for you to stay on top of things/feel good about yourself? What situations do you consider to be high-risk for relapsing? How will you know when a slip occurs?* Alternatively, use the client's self-monitoring forms completed in previous sessions as a prompt.
- Write these situations down in the space provided on the "Relapse Prevention Plan" handout (below).

Preparation for high-risk situations

In preparing for the high-risk situations that will inevitably occur, it is useful for the client to take stock of everything he or she has learned during the entire four-session intervention. This will also help the client to generalise the lessons learned during the sessions to real life situations.

Documenting which strategies are most useful in dealing with specific high-risk situations can also be useful, and can serve as a reference for the client at a later stage.

Exercise 3: Preparing for high-risk situations (Wilson, 1992)

- Look at the list made in the previous activity that will detail the client's anticipated high-risk situations.
- Ask the client to think back about all the different skills they have learned during the therapy sessions, and nominate which ones are appropriate to use in each of the high-risk situations. Examples may include: speed refusal, coping with cravings, challenging unhelpful thoughts, relaxation etc.
- Write these coping behaviours down on the space provided on the "Relapse Prevention Plan" handout on page 64.
- Explain to the client that not all situations can be anticipated in advance. Therefore it is useful to think about some generic coping strategies that the client can employ regardless of the situation. Write these down in the space provided on the handout ("General coping strategies for any situation").
- Also ask the client whether there are any additional skills they think they may need to assist them in future situations. Record these on the form ("Additional Skills Required") and discuss options for referral with the client to ensure he/she receives the necessary intervention.

Regulate the consequences of thoughts and behaviours

Finally, discuss with the client how they intend to reward themselves for remaining abstinent. It is important for the client to create their own rewards as reinforcement for their behaviour, as this may not always come from other sources (e.g. family, friends).

Ask the client what it is that they enjoy doing. By planning time/criteria for participation in these activities the client can learn to regulate the consequences of their behaviour/thoughts for themselves.

Exercise 4: Regulate consequences (Wilson, 1992).

- Refer back to the "Relapse Prevention Plan" handout on page 71.
- Ask the client the following questions: *How will you know that you are successfully maintaining your behaviours? How can you reward yourself for a job well done?*
- Write these "rewards" down on the "Relapse Prevention Plan" handout.

Identify support people and additional means of maintaining skills

An important step in preventing relapse is identifying key people in the person's life who can help encourage them to keep to their goals, and support them through the challenges they will face. Thus, at this point it is also important to ask the client:

“Who can help you to maintain these skills you have learned?”

Record a list of support people on the second page of the Relapse Prevention Plan. It can be very useful to record contact phone numbers on this sheet to enable clients to contact support people (including agencies) quickly if a high-risk situation is encountered and support is required rapidly. Some clients find it useful to carry a purse or wallet-sized card with support people/agencies and contact telephone numbers.

If the client chooses to list relatives/friends on their support list, remind them it is a good idea to talk to these people about their plans sometime over this next week, and explain to their relatives/friends what type of support they are hoping to receive from them (e.g. distraction, general chat etc.)

Using the relapse prevention plan

Now that you have collaboratively worked out a relapse prevention plan for high-risk situations with the client, you need to ensure the client uses his/her plan effectively (Graham, 2000). To do this, Graham (2000) suggests you talk with the client about the following things:

- When to use his/her plan;
- How to regularly monitor their early warning signs of relapse;
- Refining and updating the plan as necessary (ie. coping strategies, forms of intervention and supports) and as circumstances change.

Discuss this information with your client, and document your client's “early warning signs of relapse” on the second page of the Relapse Prevention Plan.

PHASE 4: Session termination

Formal termination should be acknowledged and discussed at the end of this session. Reinforce the client's progress and situation through the sessions and include:

- Reconfirmation of the most important factors motivating the client that were identified in Session 1.
- Summarise commitment and the changes made so far.
- Affirm and reinforce changes already made.
- Explore additional areas of change that might now be identified.
- Elicit self-motivational statements for maintenance of change and further change.
- Support self-efficacy.
- Deal with any special problems that might emerge during termination, including referral to other agencies as required.

Relapse Prevention Plan

Anticipated High-Risk Situations	Coping Strategies	Reward
General Coping Strategies for any situation:		
Additional Skills Required:		

My early warning signs of relapse are:

- ☐ More moody or irritable
- ☐ Just not wanting to see people
- ☐ Sleep more
- ☐ Sleep less
- ☐ Eat more
- ☐ Eat less
- ☐ Getting easily tired
- ☐ Giving up on exercise
- ☐ Not wanting to deal with day-to-day things (opening mail, paying bills etc.)
- ☐ Putting deadlines off
- ☐ Putting off housework/other responsibilities
- ☐ Craving more
- ☐ Not keeping up the skills and techniques learnt during treatment
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____
- ☐ _____

If I see these early warning signs I will take some action immediately and refer to my Relapse Prevention Plan.

Support people I can call on are:

Support Person / Agency

Contact number

- | | |
|----------|-------|
| 1. _____ | _____ |
| 2. _____ | _____ |
| 3. _____ | _____ |
| 4. _____ | _____ |

Section 4. Suggested alternative brief interventions for those not suitable for the current intervention

Section 4. Suggested alternative brief interventions for those not suitable for the current intervention

Some psychostimulant users might be unsuitable for the current CBT intervention. These clients might include regular users who are not contemplating change and experimental or irregular users who might not see a need for formalised treatment. The flow-chart on page 7 of this guide provides a context for various alternative interventions, which may include the following strategies.

Experimental, recreational, occupational and non-injecting users who are not dependent on psychostimulants and are not considering change

Harm reduction strategies are appropriate for this group, and clinical recommendations might include:

- cut down the amount of speed used at any one time;
- use in the presence of other people;
- continue to practise alternatives to injecting (e.g. 'snort', swallow, etc).

In addition, education about the range of possible adverse consequences of use such as mood disturbances, paranoid ideation, irritability and health consequences have been recommended to encourage early intervention by users if adverse consequences do arise (Hando, Topp, & Hall, 1997).

A recommendation that the person receive vaccination for hepatitis B might be appropriate as are brief interventions to reduce the risk of transition to regular use or injecting.

The essential elements of a brief intervention are included in the FRAMES model first developed by Miller and Sanchez (Hulse, G. et al., in press).

Feedback: involves feedback to clients of findings from your assessment

Responsibility: Patient is responsible for acting on the feedback given

Advice: Advice from a health professional to change behaviour may be effective

Menu: Offer the patient a menu of options for change

Empathy: Showing empathy has been shown to enhance motivation for change

Self-efficacy: Reinforce the patient's optimism by identifying their skills and ability to change.

**Regular users
and dependent
users who are
not considering
change**

Regular psychostimulant users may experience a range of adverse psychological, physical and social problems. Individual management plans will be informed by the patient's treatment goals, but might include the harm reduction strategies described above in addition to:

- a recommendation to use sterile injecting equipment when continuing to inject;
- education regarding signs and symptoms of severe adverse consequences including toxicity;
- recommend 'rest' periods from the psychostimulant to enable the body to recover;
- encourage adequate nutrition and fluid intake;
- offer ongoing reviews of the person's physical and mental health to ensure early intervention if problems should occur, which may also provide an opportunity for engagement into a formal intervention such as the CBT sessions described in this guide; and
- the client might benefit from information to take home, for example *A user's guide to speed* (NDARC) is an excellent resource.

Section 5. Other available resources and useful websites

Section 5. Other available resources and useful websites

1. *A user's guide to speed*. National Drug and Alcohol Research Centre (NDARC) ndarc.med.unsw.edu.au/ndarc.nsf/website/Publications.resources (to order a copy).
2. *Alcohol and Other Drugs: A Handbook for Health Professionals*. Australian Government Department of Health and Ageing, 2003.
3. Australian Drug Foundation: www.adf.org.au/drughit/facts/hdayam.html
4. Australian Drug Information Network (ADIN) www.adin.com.au
5. Barry, K.L. (1999). *Brief interventions and brief therapies for substance abuse. Treatment Improvement Protocol (TIP) Series No. 34*. US Department of Health and Human Services: Rockville, Maryland.
6. Beck, A.T., Wright, F.D., Newman, C.F. and Liese, B.S. (1993). *Cognitive therapy of substance abuse*. New York: Guilford Press.
7. Carroll, K.M. (1998), *A cognitive-behavioural approach: treating cocaine addiction*, National Institute on Drug Abuse (NIDA). *Therapy Manuals for Drug Addiction*. U.S. Department of Health and Human Services, National Institute of Health, Maryland.
8. Centre for General Practice Integration Studies, University of NSW www.commed.unsw.edu.au/cgpis/
9. Clinical skills training series: effective approaches to alcohol and other drug problems, modules 1-5. Newcastle: University of Newcastle: Training, Health and Educational Media, 1998. (National Teaching Grant held by Amanda Baker and National Centre for Education and Training on Addiction).
Module 1: *Motivational interviewing: how to encourage motivation for change*.
Module 2: *Relapse prevention*.
Module 3: *Raising the issue and assessment: triggers to learning*.
Module 4: *Brief intervention: triggers to learning*.
Module 5: *Brief intervention strategies among Aboriginal and Torres Strait Islander people*.
Each module consists of 1-3 videotapes and a booklet including summation of the script, training questions and exercises, and student assessment and evaluation forms.
10. Clinical Treatment Guidelines Series, Turning Point Alcohol and Drug Centre, www.turningpoint.org.au/service_information/si_ctgs.html (to order a copy).

11. Davies, J. (2000) *A Manual of Mental Health Care in General Practice*. Commonwealth Department of Health and Aged Care. Canberra.
12. Hulse, G. et al. (in press). *Alcohol and other drug clinical presentations and management – a case series exercise and record book*. Oxford University Press.
13. *Motivational interviewing: a resource for clinicians, researchers and trainers*. www.motivationalinterview.org/
14. Orford, J. (2001). *Excessive Appetites: A Psychological View of Addiction* (Second Edition). John Wiley & Sons: New York.
15. *Models of intervention and care for psychostimulant users*. National Drug Strategy Monograph Series. Baker, A., Lee, N. K. & Jenner, L. eds. (in press), Australian Government Department of Health and Ageing.
16. *Treatment Approaches for Alcohol and Drug Dependence: An Introductory Guide*. ndarc.med.unsw.edu.au/ndarc.nsf/website/Publications.resources (to order a copy).

References

- Australian Institute of Health and Welfare (2002). *2001 National Drug Strategy Household Survey, Drug Statistics Series Number 11*. Australian Government Publishing Service, Canberra.
- Baker, A. Lee, N.K. & Jenner, L. (eds), *Models of Intervention and Care for Psychostimulant Users*, National Drug Strategy Monograph Series (in press), Canberra. Australian Government.
- Baker, A., Gowing, L., Lee, N.K. & Proudfoot, H. *Psychosocial Interventions for Psychostimulant Users*, in Baker, A. Lee, N.K. & Jenner, L. (eds), *Models of Intervention and Care for Psychostimulant Users*, National Drug Strategy Monograph Series (in press). Australian Government.
- Baker, A., Lee, N.K., Kay-Lambkin, F. & Claire, M. (unpublished). *An Evaluation of Cognitive Behavioural Programs Among Regular Amphetamine Users*. Report to Commonwealth Department of Health and Ageing, Illicit Drugs Section.
- Beck, A.T, Steer, R.A. & Brown, G.K. (1996). *Beck Depression Inventory II Manual*. The Psychological Corporation, San Antonio.
- Biener, L & Abrams, D.A. (1991). *The Contemplation Ladder: Validation of a measure of readiness to consider smoking cessation*. *Health Psychology*, 10(5), 360-365.
- Darke, S., Hall, W., Heather, N., Wodak, A. & Ward, J. (1992). *Development and validation of a multi-dimensional instrument for assessing outcome of treatment among opioid users: the Opiate Treatment Index*. *British Journal of Addiction*, 87, 593-602.
- Dean, A. (in press), *Pharmacology of psychostimulants*, in Baker, A., Lee, N.K. & Jenner, L. (eds), *Models of Intervention and Care for Psychostimulant Users*, National Drug Strategy Monograph Series (in press). Australian Government.
- Dean, A., & Whyte, I. (in press). *Emergency Management of Acute Psychostimulant Toxicity*, in Baker, A. Lee, N.K. & Jenner, L. (eds), *Models of Intervention and Care for Psychostimulant Users*, National Drug Strategy Monograph Series (in press). Australian Government.
- Derogatis, L. R. & Melisaratos, N. (1983). *The Brief Symptom Inventory: An introductory report*. *Psychological Medicine*, 13(3), 595-605.
- First, Michael B., Spitzer, Robert L, Gibbon Miriam, and Williams, Janet B.W. (1996). *Structured Clinical Interview for DSM-IV Axis I Disorders, Research Version (SCID-RV)*. Washington, D.C.: American Psychiatric Press, Inc
- Gossop, M., Darke, S., Griffiths, P., Hando, J., Powis, B., Hall, W., & Strang, J. (1995). *The Severity of Dependence Scale (SDS): Psychometric properties of the SDS in English and Australian samples of heroin, cocaine and amphetamine users*. *Addiction*, 90, 607-614.
- Graham, H.L. (2000). *Cognitive-behavioural integrated treatment (C-BIT): An approach for working with your clients who have severe mental health problems and use drugs/alcohol problematically*. Northern Birmingham Mental Health (NHS) Trust, Birmingham.
- Hando, J., Topp, L. & Hall, W. (1997) *Amphetamine-related harms and treatment preferences of regular amphetamine users in Sydney, Australia*. *Drug and Alcohol Dependence*, 46, 105-113.

- Hulse, G. et al. (in press). *Alcohol and other drug clinical presentations and management – a case series exercise and record book*. Oxford University Press.
- Jarvis, T.J., Tebbutt, J.T., and Mattick, R.P. (1995). *Treatment approaches for alcohol and drug dependence: An introductory guide*. John Wiley & Sons, Chichester.
- Jenner, L & McKetin, R. (in press) *Prevalence and patterns of psychostimulant use*, in Baker, A. Lee, N.K. & Jenner, L. (eds) *Models of Intervention and Care for Psychostimulant Users*, National Drug Strategy Monograph Series (in press). Australian Government.
- Kamieniecki G, Vincent N, Allsop S, Lintzeris N. *Models of intervention and care for psychostimulant users*. Canberra, ACT: Commonwealth of Australia; 1998
- Miller, W. R., Zweben, A., DiClemente, C. C., & Rychtarik, R. G. (1995). *Motivation enhancement therapy manual*. US Department of Health and Human Services, Rockville, Maryland.
- Miller, W.R. & Rollnick, S. (eds) (1991). *Motivational Interviewing: Preparing People to Change Addictive Behaviour*. The Guilford Press, New York.
- Monti, P.M., Abram, D.B., Kadden, R.M. and Cooney, N.L. (1989). *Treating Alcohol Dependence*. Guilford Press, New York.
- National Institute on Drug Abuse (NIDA) (1998). *Therapy Manuals for Drug Addiction*. U.S. Department of Health and Human Services, National Institute of Health, Maryland.
- Orford, J. (2001). *Excessive Appetites: A Psychological View of Addiction* (Second Edition). John Wiley & Sons: New York.
- Persons, J.B., Davidson, J. & Tompkins, M.A. (2001). *Essential Components of Cognitive-Behaviour Therapy for Depression*. American Psychological Association: Washington.
- Prochaska, J.O, DiClemente, C.C. & Norcross, J.C. (1992). *In search of How People Change: Applications to Addictive Behaviours*. American Psychologist 47, 1102-1114.
- Prochaska, J.O. & DiClemente, C.C. (1986). *Toward a comprehensive model of change*. In W.R. Miller & N. Heather (eds), *Treating Addictive Behaviours: Process of Change*. New York: Plenum Press.
- Topp, L., & Mattick, R. P. (1997). *Choosing a cut-off on the Severity of Dependence Scale (SDS) for amphetamine users*. *Addiction*, 92, 839-845.
- Treatment Protocol Project (2000), *Management of Mental Disorders*, pp. 22-23, Third Edition, Sydney: World Health Organisation Collaborating Centre for Mental Health and Substance Abuse.
- Wilson, P.H. (1992). Depression. In P.H. Wilson (ed.). *Principles and practice of relapse prevention*. Guilford Press, New York.

Appendix 1. Sources and acknowledgements

The CBT intervention in this guide has been adapted from the following sources:

- *A user's guide to speed*. National Drug and Alcohol Research Centre (NDARC)
- Graham, H.L. (2000). *Cognitive-behavioural integrated treatment (C-BIT): An approach for working with your clients who have severe mental health problems and use drugs/alcohol problematically*. Northern Birmingham Mental Health (NHS) Trust, Birmingham.
- Jarvis, T.J., Tebbutt, J.T., and Mattick, R.P. (1995). *Treatment approaches for alcohol and drug dependence: An introductory guide*. John Wiley & Sons, Chichester.
- Kadden, R., Carroll, K., Donovan, D., Cooney, N., Monti, P., Abrams, D., Litt, M., and Hester, R. (1995). *Cognitive-behavioral coping skills therapy manual*. US Department of Health and Human Services, Rockville, Maryland.
- Kay-Lambkin, F., Hazell, T. & Waring, T. (2000). *Pondrom: An educational resource on post-natal depression for general practitioners*. Hunter Institute of Mental Health, Newcastle.
- Marlatt, G. and Gordon, J.R. (1998) *Relapse Prevention*. The Guilford Press, New York.
- Miller, W.R. and Rollnick, S. (1991). *Motivational interviewing: Preparing people to change addictive behaviour*. Guilford Press, New York.
- Miller, W. R., Zweben, A., DiClemente, C. C., and Rychtarik, R. G. (1995). *Motivation enhancement therapy manual*. US Department of Health and Human Services, Rockville, Maryland.
- Monti, P.M., Abram, D.B., Kadden, R.M. and Cooney, N.L. (1989). *Treating Alcohol Dependence*. Guilford Press, New York.
- National Institute on Drug Abuse (NIDA) (1998). *Therapy Manuals for Drug Addiction*. U.S. Department of Health and Human Services, National Institute of Health, Maryland.
- Rees, V., Copeland, J., and Swift, W. (1998). *A brief cognitive-behavioural intervention for cannabis dependence: Therapists' treatment manual*. NDARC Technical Report No. 64.
- Rollnick, S., Mason, P., and Butler, C. (1999). *Health behaviour change: A guide for practitioners*. Churchill Livingstone, Edinburgh.
- Wilson, P.H. (1992). Depression. In P.H. Wilson (ed.). *Principles and practice of relapse prevention*. Guilford Press, New York.

Notes

Appendix 31 Publication Baker, Lee, Claire et al., (2004)

Removed due to copyright restrictions

Baker, A., Lee, N., Claire, M., Lewin, T., Grant, T., Pohlman, S., Saunders, J., Kay-Lambkin, F., Constable, P., Jenner, L., & Carr, V. (2004). Drug use patterns and mental health of regular amphetamine users during a reported 'heroin drought'. *Addiction*, 99(7), 875-884.
<http://dx.doi.org/10.1111/j.1360-0443.2004.00741.x>

Appendix 32 Publication Baker, Lee, Claire et al., (2005)

Removed due to copyright restrictions

Baker, A., Lee, N., Claire, M., Lewin, T., Grant, T., Pohlman, S., Saunders, J., Kay-Lambkin, F., Constable, P., Jenner, L., & Carr, V. (2005). Brief cognitive behavioural interventions for regular amphetamine users: a step in the right direction. *Addiction* 100(3), 367-378.
<http://dx.doi.org/10.1111/j.1360-0443.2005.01002.x>

Appendix 33. Model 1. Variables in the equation predicting methamphetamine change scores: baseline trait anger, treatment group status, interaction term

Final step (12) is base model plus one additional predictor

Tests of Between-Subjects Effects

Dependent Variable: Methamphetamine change score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	148.494 ^a	6	24.749	20.779	.000
Intercept	3.422	1	3.422	2.873	.093
treatgroup	.002	1	.002	.001	.971
location	1.027	1	1.027	.862	.355
trait anger	6.965	1	6.965	5.848	.017
anger expression out	4.761	1	4.761	3.998	.048
methamphetamine use	121.736	1	121.736	102.209	.000
treatgroup * trait anger	.014	1	.014	.012	.913
Error	123.869	104	1.191		
Total	328.113	111			
Corrected Total	272.363	110			

a. R Squared = .545 (Adjusted R Squared = .519)

Parameter Estimates

Dependent Variable: Methamphetamine change score

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	.587	.458	1.282	.203	-.321	1.496
[treatgroup=1]	-.026	.715	-.036	.971	-1.444	1.393
[treatgroup=2]	0 ^a	.	.	.	.	.
[location=1]	.208	.224	.928	.355	-.237	.653
[location=2]	0 ^a	.	.	.	.	.
trait anger	-.055	.023	-2.423	.017	-.100	-.010
anger expression out	.056	.028	1.999	.048	.000	.112
methamphet use	-.815	.081	-10.110	.000	-.975	-.656
[treatgroup=2] * trait	.003	.028	.110	.913	-.053	.059
[treatgroup=2] * trait	0 ^a	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

Appendix 34 Model 1 Variables in the equation predicting methamphetamine change scores: baseline trait anger, treatment group status, non interaction term

Final step (12) of base model plus one additional predictor

Between-Subjects Factors			
		Value Label	N
Treatment Group	1	Control	35
	2	Treatment	76
Client Location (Brisbane or Newcastle)	1	Brisbane	46
	2	Newcastle	65

Tests of Between-Subjects Effects

Dependent Variable: Methamphetamine change score

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	143.731 ^a	4	35.933	29.611	.000
Intercept	8.796	1	8.796	7.248	.008
treatgroup	.074	1	.074	.061	.806
location	.735	1	.735	.606	.438
xtang	2.991	1	2.991	2.465	.119
xqotiamp	122.188	1	122.188	100.690	.000
Error	128.632	106	1.214		
Total	328.113	111			
Corrected Total	272.363	110			

a. R Squared = .528 (Adjusted R Squared = .510)

Parameter Estimates

Dependent Variable: Methamphetamine change score

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	.824	.405	2.036	.044	.022	1.626
[treatgroup=1]	.056	.228	.246	.806	-.395	.507
[treatgroup=2]	0 ^a	.	.	.	.	.
[location=1]	.176	.226	.778	.438	-.272	.624
[location=2]	0 ^a	.	.	.	.	.
xtang	-.020	.013	-1.570	.119	-.045	.005
xqotiamp	-.816	.081	-10.034	.000	-.977	-.655

a. This parameter is set to zero because it is redundant.

Appendix 35 Model 2 Variables in the equation predicting methamphetamine change scores: baseline high trait anger, treatment group status, interaction term

Tests of Between-Subjects Effects

Dependent Variable: Methamphetamine change score

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	149.354 ^a	7	21.336	17.866	.000
Intercept	14.603	1	14.603	12.228	.001
Treatment Group	.074	1	.074	.062	.803
Location	.091	1	.091	.076	.783
Pharmacotherapy	3.599	1	3.599	3.013	.086
High Trait Anger	1.300	1	1.300	1.088	.299
Methamphetamine Use	119.401	1	119.401	99.979	.000
Cannabis Use	3.992	1	3.992	3.343	.070
Treatment Group * High Trait	.097	1	.097	.082	.776
Error	123.008	103	1.194		
Total	328.113	111			
Corrected Total	272.363	110			

a. R Squared = .548 (Adjusted R Squared = .518)

Parameter Estimates

Dependent Variable: Methamphetamine change score

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	.849	.313	2.712	.008	.228	1.469
[treatgroup=1]	.126	.377	.335	.738	-.621	.873
[treatgroup=2]	0 ^a	.	.	.	.	.
[location=1]	.064	.234	.276	.783	-.399	.528
[location=2]	0 ^a	.	.	.	.	.
[txpharm=1]	-.427	.246	-1.736	.086	-.914	.061
[txpharm=2]	0 ^a	.	.	.	.	.
[highxtrait=1]	-.178	.265	-.673	.503	-.703	.347
[highxtrait=2]	0 ^a	.	.	.	.	.
xqotiamp	-.882	.088	-9.999	.000	-1.057	-.707
xqotican	-.020	.011	-1.828	.070	-.043	.002
[treatgroup=1] * [highxtrait=1]	-.136	.475	-.286	.776	-1.079	.807
[treatgroup=1] * [highxtrait=2]	0 ^a	.	.	.	.	.
[treatgroup=2] * [highxtrait=1]	0 ^a	.	.	.	.	.
[treatgroup=2] * [highxtrait=2]	0 ^a	.	.	.	.	.

Parameter Estimates

Dependent Variable: Methamphetamine change score

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	.849	.313	2.712	.008	.228	1.469
[treatgroup=1]	.126	.377	.335	.738	-.621	.873
[treatgroup=2]	0 ^a	.	.	.	.	.
[location=1]	.064	.234	.276	.783	-.399	.528
[location=2]	0 ^a	.	.	.	.	.
[txpharm=1]	-.427	.246	-1.736	.086	-.914	.061
[txpharm=2]	0 ^a	.	.	.	.	.
[highxtrait=1]	-.178	.265	-.673	.503	-.703	.347
[highxtrait=2]	0 ^a	.	.	.	.	.
xqotiamp	-.882	.088	-9.999	.000	-1.057	-.707
xqotican	-.020	.011	-1.828	.070	-.043	.002
[treatgroup=1] * [highxtrait=1]	-.136	.475	-.286	.776	-1.079	.807
[treatgroup=1] * [highxtrait=2]	0 ^a	.	.	.	.	.
[treatgroup=2] * [highxtrait=1]	0 ^a	.	.	.	.	.
[treatgroup=2] * [highxtrait=2]	0 ^a	.	.	.	.	.

a. This parameter is set to zero because it is redundant.

Appendix 36 Model 2 Variables in the equation predicting methamphetamine change scores: baseline high trait anger, treatment group status, non interaction term

Tests of Between-Subjects Effects

Dependent Variable: Methamphetamine change score

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	149.257 ^a	6	24.876	21.015	.000
Intercept	14.522	1	14.522	12.268	.001
Treatment Group	.038	1	.038	.032	.858
Location	.101	1	.101	.085	.771
Pharmacotherapy	3.504	1	3.504	2.960	.088
High Trait Anger	1.218	1	1.218	1.029	.313
Methamphetamine Use	122.125	1	122.125	103.171	.000
Cannabis Use	4.119	1	4.119	3.479	.065
Error	123.106	104	1.184		
Total	328.113	111			
Corrected Total	272.363	110			

a. R Squared = .548 (Adjusted R Squared = .522)

Parameter Estimates

Dependent Variable: Methamphetamine change score

Parameter	B	Std. Error	t	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Intercept	.867	.305	2.843	.005	.262	1.472
[treatgroup=1]	.040	.224	.179	.858	-.405	.485
[treatgroup=2]	0 ^a	.	.	.	.	.
[location=1]	.068	.232	.292	.771	-.393	.528
[location=2]	0 ^a	.	.	.	.	.
[txpharm=1]	-.417	.242	-1.721	.088	-.898	.064
[txpharm=2]	0 ^a	.	.	.	.	.
[highxtrait=1]	-.221	.218	-1.014	.313	-.652	.211
[highxtrait=2]	0 ^a	.	.	.	.	.
xqotiamp	-.878	.086	-10.157	.000	-1.049	-.706
xqotican	-.021	.011	-1.865	.065	-.043	.001

a. This parameter is set to zero because it is redundant.

Appendix 37 Model 3 Final Step(12) Variables in the equation predicting methamphetamine abstinence: baseline trait anger, treatment group status, interaction term

Classification Table ^{a,b}

Observed			Predicted		
			Methamphetamine abstinence 7mths post baseline		Percentage Correct
			abstinent	not abstinent	
Step 0	Methamphetamine abstinence 7mths post baseline	abstinent	0	46	.0
		not abstinent	0	65	100.0
Overall Percentage					58.6

a. Constant is included in the model.

b. The cut value is .500

Variables in the Equation

	B	S.E.	Wald	df	Sig.	Exp(B)
Step 0 Constant	.346	.193	3.220	1	.073	1.413

Variables not in the Equation

	Score	df	Sig.
Step 0 Variables			
treatgroup(1)	3.489	1	.062
location(1)	.651	1	.420
xtang	4.384	1	.036
xqotiam p	.111	1	.739
xqotican	6.880	1	.009
treatgroup(1) by xtang	1.117	1	.290
Overall Statistics	12.048	6	.061

Iteration History ^{a,b,c,d}

Iteration	-2 Log likelihood	Coefficients						
		Constant	treatgroup(1)	location(1)	xtang	xqotiam p	xqotican	treatgroup(1) by xtang
Step 1	137.990	.595	1.795	.100	-.013	.038	-.039	-.048
2	137.620	.619	2.382	.097	-.013	.044	-.044	-.066
3	137.617	.621	2.449	.096	-.013	.044	-.045	-.068
4	137.617	.621	2.450	.096	-.013	.044	-.045	-.068

a. Method: Enter

b. Constant is included in the model.

c. Initial -2 Log Likelihood: 150.610

d. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	12.993	6	.043
	Block	12.993	6	.043
	Model	12.993	6	.043

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	137.617 ^a	.110	.149

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	8.394	8	.396

Contingency Table for Hosmer and Lemeshow Test

		Methamphetamine abstinence 7mths post baseline = abstinent		Methamphetamine abstinence 7mths post baseline = not abstinent		Total
		Observed	Expected	Observed	Expected	
Step 1	1	7	8.072	4	2.928	11
	2	6	6.295	5	4.705	11
	3	6	5.371	5	5.629	11
	4	9	4.929	2	6.071	11
	5	4	4.681	7	6.319	11
	6	3	4.448	8	6.552	11
	7	4	4.231	7	6.769	11
	8	3	3.787	8	7.213	11
	9	3	2.576	8	8.424	11
	10	1	1.610	11	10.390	12

Variables in the equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1 ^a	treatgroup(1)	2.450	1.642	2.225	1	.136	11.586	.463	289.737
	location(1)	.096	.445	.046	1	.829	1.101	.460	2.632
	xtang	-.013	.029	.214	1	.644	.987	.933	1.044
	xqotiamp	.044	.164	.072	1	.789	1.045	.757	1.442
	xqotican	-.045	.025	3.228	1	.072	.956	.911	1.004
	treatgroup(1) by xtang	-.068	.062	1.185	1	.276	.934	.827	1.056
	Constant	.621	.845	.539	1	.463	1.860		

a. Variable(s) entered on step 1: treatgroup, location, xtang, xqotiamp, xqotican, treatgroup * xtang .

Correlation Matrix

		Constant	treatgroup(1)	location(1)	xtang	xqotiamp	xqotican	treatgroup(1) by xtang
Step 1	Constant	1.000	-.375	-.452	-.858	-.302	-.023	.345
	treatgroup(1)	-.375	1.000	.008	.398	-.083	.064	-.958
	location(1)	-.452	.008	1.000	.153	.270	.147	-.001
	xtang	-.858	.398	.153	1.000	-.019	-.211	-.408
	xqotiamp	-.302	-.083	.270	-.019	1.000	.030	.079
	xqotican	-.023	.064	.147	-.211	.030	1.000	-.081
	treatgroup(1) by xtang	.345	-.958	-.001	-.408	.079	-.081	1.000

Appendix 38 Model 3 Final Step(12) Variables in the equation predicting methamphetamine abstinence: baseline trait anger, treatment group status, non interaction term

Iteration History ^{a,b,c,d}									
		-2 Log likelihood	Coefficients						
			Constant	treatgroup(1)	location(1)	xtang	xqotiamp	xqotication	
Iteration	Step 1	1	139.073	.908	.647	.086	-.025	.044	-.040
		2	138.872	.978	.754	.089	-.027	.055	-.047
		3	138.872	.980	.759	.090	-.027	.056	-.048
		4	138.872	.980	.759	.090	-.027	.056	-.048

a. Method: Enter; b. Constant is included in the model; c. Initial -2 Log Likelihood: 150.610; d. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	11.738	5	.039
	Block	11.738	5	.039
	Model	11.738	5	.039

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	138.872 ^a	.100	.135

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test			
Step	Chi-square	df	Sig.
1	9.479	8	.304

Contingency Table for Hosmer and Lemeshow Test						
		Methamphetamine Abstinent		Methamphetamine Not Abstinent		Total
		Observed	Expected	Observed	Expected	
Step 1	1	6	8.277	5	2.723	11
	2	8	6.240	3	4.760	11
	3	7	5.322	4	5.678	11
	4	7	4.887	4	6.113	11
	5	3	4.599	8	6.401	11
	6	4	4.233	7	6.767	11
	7	3	3.909	8	7.091	11
	8	3	3.476	8	7.524	11
	9	4	2.726	7	8.274	11
	10	1	2.330	11	9.670	12

Classification Table^a

Observed			Predicted		
			Methamphetamine abstinence 7mths post baseline		Percentage Correct
			abstinent	not abstinent	
Step 1	Methamphetamine	abstinent	14	32	30.4
	abstinence 7mths post baseline	not abstinent	9	56	86.2
	Overall Percentage				63.1

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1 ^a	treatgroup(1)	.759	.457	2.750	1	.097	2.136	.871	5.235
	location(1)	.090	.441	.041	1	.839	1.094	.461	2.595
	xtang	-.027	.026	1.096	1	.295	.973	.925	1.024
	xqotiamp	.056	.162	.117	1	.732	1.057	.769	1.453
	xqotican	-.048	.025	3.593	1	.058	.954	.908	1.002
	Constant	.980	.783	1.566	1	.211	2.664		

a. Variable(s) entered on step 1: treatgroup, location, xtang, xqotiamp, xqotican.

Correlation Matrix

		Constant	treatgroup(1)	location(1)	xtang	xqotiamp	xqotican
Step 1	Constant	1.000	-.210	-.471	-.833	-.339	.014
	treatgroup(1)	-.210	1.000	.028	.079	-.040	-.069
	location(1)	-.471	.028	1.000	.152	.270	.140
	xtang	-.833	.079	.152	1.000	.000	-.272
	xqotiamp	-.339	-.040	.270	.000	1.000	.026
	xqotican	.014	-.069	.140	-.272	.026	1.000

Appendix 39 Model 4 Final Step(12) Variables in the equation predicting methamphetamine abstinence: baseline high trait anger, treatment group status, interaction term

Iteration History ^{a,b,c,d}								
Iteration	-2 Log likelihood	Coefficients						
		Constant	treatgroup(1)	location(1)	age	highxtrait	xqotiamp	treatgroup(1) by highxtrait
Step 1 1	138.022	-1.574	-.891	.148	.048	.104	.047	1.187
2	137.152	-1.774	-1.511	.121	.056	.096	.044	1.819
3	137.107	-1.789	-1.712	.116	.056	.095	.044	2.019
4	137.106	-1.789	-1.729	.116	.056	.095	.044	2.037
5	137.106	-1.789	-1.729	.116	.056	.095	.044	2.037

a. Method: Enter; b. Constant is included in the model; c. Initial -2 Log Likelihood: 150.610

d. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Omnibus Tests of Model Coefficients

		Chi-square	df	Sig.
Step 1	Step	13.504	6	.036
	Block	13.504	6	.036
	Model	13.504	6	.036

Model Summary

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	137.106 ^a	.115	.154

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test

Step	Chi-square	df	Sig.
1	12.981	8	.113

Contingency Table for Hosmer and Lemeshow Test

		Methamphetamine abstinent		Methamphetamine not abstinent		Total
		Observed	Expected	Observed	Expected	
Step 1	1	7	7.009	4	3.991	11
	2	7	6.427	4	4.573	11
	3	6	5.816	5	5.184	11
	4	5	5.295	6	5.705	11
	5	6	5.003	5	5.997	11
	6	6	4.749	5	6.251	11
	7	1	4.302	10	6.698	11
	8	2	3.833	9	7.167	11
	9	6	2.686	5	8.314	11
	10	0	.881	12	11.119	12

Classification Table^a

			Predicted		
			Methamphetamine abstinence 7mths post baseline		Percentage Correct
			abstinent	not abstinent	
Step 1	Methamphetamine abstinence 7mths post baseline	abstinent	20	26	43.5
		not abstinent	13	52	80.0
	Overall Percentage				64.9

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1 ^a	treatgroup(1)	-1.729	1.553	1.240	1	.266	.177	.008	3.725
	location(1)	.116	.452	.065	1	.798	1.122	.463	2.722
	age	.056	.029	3.652	1	.056	1.058	.999	1.121
	highxtrait	.095	.496	.037	1	.848	1.100	.416	2.909
	xqotiamp	.044	.163	.072	1	.789	1.045	.759	1.438
	treatgroup(1) by highxtrait	2.037	1.250	2.656	1	.103	7.670	.662	88.890
	Constant	-1.789	1.088	2.702	1	.100	.167		

Classification Table^a

Observed			Predicted		
			Methamphetamine abstinence 7mths post baseline		Percentage Correct
			abstinent	not abstinent	
Step 1	Methamphetamine	abstinent	20	26	43.5
	abstinence 7mths post baseline	not abstinent	13	52	80.0
	Overall Percentage				64.9

a. Variable(s) entered on step 1: treatgroup, location, age, highxtrait, xqotiamp, treatgroup * highxtrait .

Correlation Matrix

		Constant	treatgroup (1)	location(1)	age	highxtrait	xqotiamp	treatgroup (1) by highxtrait
Step 1	Constant	1.000	-.279	-.021	-.690	-.555	-.298	.221
	treatgroup(1)	-.279	1.000	.066	-.068	.438	.095	-.951
	location(1)	-.021	.066	1.000	-.298	.062	.245	-.068
	age	-.690	-.068	-.298	1.000	-.101	.043	.077
	highxtrait	-.555	.438	.062	-.101	1.000	.039	-.405
	xqotiamp	-.298	.095	.245	.043	.039	1.000	-.109
	treatgroup(1) by highxtrait	.221	-.951	-.068	.077	-.405	-.109	1.000

Appendix 40 Model 4 Final Step(12) Variables in the equation predicting methamphetamine abstinence: baseline high trait anger, treatment group status, non interaction term

Iteration History ^{a,b,c,d}								
		-2 Log likelihood	Coefficients					
			Constant	treatgroup(1)	location(1)	highxtrait	xqotiamp	xqotican
Step 1	1	138.856	-.326	.694	.168	.438	.039	-.044
	2	138.628	-.400	.811	.183	.498	.053	-.051
	3	138.627	-.403	.817	.183	.501	.054	-.052
	4	138.627	-.403	.817	.183	.501	.054	-.052

a. Method: Enter; b. Constant is included in the model; c. Initial -2 Log Likelihood: 150.610

d. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Omnibus Tests of Model Coefficients				
		Chi-square	df	Sig.
Step 1	Step	11.983	5	.035
	Block	11.983	5	.035
	Model	11.983	5	.035

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	138.627 ^a	.102	.138

a. Estimation terminated at iteration number 4 because parameter estimates changed by less than .001.

Hosmer and Lemeshow Test			
Step	Chi-square	df	Sig.
1	13.968	8	.083

Contingency Table for Hosmer and Lemeshow Test

		Methamphetamine abstinent		Methamphetamine not abstinent		Total
		Observed	Expected	Observed	Expected	
Step 1	1	6	8.235	5	2.765	11
	2	8	6.263	3	4.737	11
	3	9	5.303	2	5.697	11
	4	2	4.951	9	6.049	11
	5	5	4.630	6	6.370	11
	6	3	4.403	8	6.597	11
	7	5	3.891	6	7.109	11
	8	4	3.320	7	7.680	11
	9	3	2.839	8	8.161	11
	10	1	2.165	11	9.835	12

Classification Table^a

Classification Table					
Observed			Predicted		
			Methamphetamine abstinent		Percentage Correct
			abstinent	not abstinent	
Step 1	Methamphetamine abstinent	abstinent	15	31	32.6
		not abstinent	8	57	87.7
Overall Percentage					64.9

a. The cut value is .500

Variables in the Equation

		B	S.E.	Wald	df	Sig.	Exp(B)	95% C.I. for EXP(B)	
								Lower	Upper
Step 1 ^a	treatgroup(1)	.817	.458	3.183	1	.074	2.263	.923	5.549
	location(1)	.183	.437	.176	1	.675	1.201	.510	2.829
	highxtrait	.501	.435	1.323	1	.250	1.650	.703	3.872
	xqotiamp	.054	.163	.109	1	.741	1.055	.767	1.452
	xqotican	-.052	.024	4.534	1	.033	.949	.905	.996
	Constant	-.403	.747	.292	1	.589	.668		

a. Variable(s) entered on step 1: treatgroup, location, highxtrait, xqotiamp, xqotican.

Correlation Matrix

		Constant	treatgroup(1)	location(1)	highxtrait	xqotiamp	xqotican
Step 1	Constant	1.000	-.189	-.406	-.815	-.354	-.313
	treatgroup(1)	-.189	1.000	.019	.045	-.034	-.044
	location(1)	-.406	.019	1.000	.051	.271	.196
	highxtrait	-.815	.045	.051	1.000	-.001	.103
	xqotiamp	-.354	-.034	.271	-.001	1.000	.020
	xqotican	-.313	-.044	.196	.103	.020	1.000