**Multiple and severe forms of socioeconomic disadvantage and tobacco use:
exploring the factors that contribute to smoking amongst clients of community
service organisations**

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Submitted for the Degree of Doctor of Philosophy

Submitted 4th September, 2015

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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 1986.

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I hereby certify that this thesis is in the form of a series of published papers of which I am a joint author. I have included as part of the thesis a written statement from each co-author, endorsed by the Faculty Assistant Dean (Research Training), attesting to my contribution to the joint publications.

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List of Publications included within this thesis

Paper One: Twyman L, Bonevski B, Paul C, Bryant J, West R, Siahpush M, D'Este C, Oldmeadow C, Palazzi K.. What factors are associated with abstinence amongst socioeconomically disadvantaged smokers? A cross sectional survey of smoker characteristics, reasons for quitting, use of quitting support and quitting approach. Under Editorial Review.

Paper Two: Twyman L, Bonevski B, Paul C, Bryant J. Perceived barriers to smoking cessation in selected vulnerable groups: a systematic review of the qualitative and quantitative literature. BMJ Open. 2014;4(12):e006414.

Paper Three: Twyman L, Bonevski B, Paul C, Bryant J, Oldmeadow C, Palazzi K, Guiallaumier A. What are the most important barriers? A ranking survey of socioeconomically disadvantaged smokers' barriers to stopping smoking. Under Editorial Review.

Paper Four: Twyman L, Bonevski B, Paul C, Bryant J, West R, Siahpush M, D'Este C, Oldmeadow C, Palazzi K. Factors associated with concurrent tobacco smoking and heavy alcohol consumption within a socioeconomically disadvantaged Australian sample. Under Editorial Review.

Paper Five: Twyman L, Bonevski B, Paul C, Kay-Lambkin F, Bryant J, Oldmeadow C, Palazzi K, Guillaumier A. A mediation analysis of cannabis use, motivation to quit tobacco and length of previous tobacco quit attempts within an Australian sample of socioeconomically disadvantaged smokers. Under Editorial Review.

Paper Six: Twyman L, Bonevski B, Paul C, Bryant J, Gartner C, Guillaumier A. Electronic cigarettes: awareness, recent use, and attitudes within a sample of socioeconomically disadvantaged Australian smokers. Nicotine & Tobacco Research. In Press.

Statement of Contribution: Paper One

I attest that Research Higher Degree candidate Laura Twyman contributed substantially in terms of study concept and design, data collection and analysis, and preparation of the manuscript entitled:

"What factors are associated with abstinence amongst socioeconomically disadvantaged smokers? A cross sectional survey of smoker characteristics, reasons for quitting, use of quitting support and quitting approach."

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Statement of Contribution: Paper Four

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Statement of Contribution: Paper Five

I attest that Research Higher Degree candidate Laura Twyman contributed substantially in terms of study concept and design, data collection and analysis, and preparation of the manuscript entitled:

"A mediation analysis of cannabis use, motivation to quit tobacco and length of previous tobacco quit attempts within an Australian sample of socioeconomically disadvantaged smokers"

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Acknowledgements

There are many people I am grateful to over the course of the past four years. Firstly, I would like to acknowledge my supervisors: Associate Professor Billie Bonevski, Associate Professor Christine Paul and Dr Jamie Bryant. I could not have asked for a wiser or more supportive supervisory team. I am especially grateful to my supervisors for their generosity, patience and inspiration.

My special thanks must also be extended to the two community service organisations who took part in this research for welcoming me and never wavering in their support and enthusiasm for this research. I would also like to acknowledge the participants who gave up their time and effort to participate in the research and without whom the findings presented would not exist. I am also very grateful to project staff, in particular Leah Zsozak, Emma Walter and Gamze Abramov, who provided extremely helpful and practical guidance.

I would like to thank my co-authors on the papers that came from this body of work for their expertise and thoughtful feedback. I would also like to acknowledge my fellow PhD colleagues: Ashleigh and Tonelle, your support and willingness to share your knowledge has been priceless. Kristen, Sam, Eliza and Erin, thank you for your support, encouragement and the endless cups of tea that helped keep me focussed and determined.

To my family and friends, a big thank you for always believing I could do it, even when I had my doubts. Most of all I would like to thank my mum whose steadfast support and love made it possible for me to achieve this and who continues to inspire me every day. And finally, thank you to my furry friend Bella, for always being by my side while I was writing.

Table of Contents

List of abbreviations

ABS	Australian Bureau of Statistics
ACOSS	Australian Council of Social Service
ACSS	Australian Community Sector Survey
CBT	Cognitive Behaviour Therapy
CSO	Community Service Organisation
ENDS	Electronic Nicotine Delivery System
FTND	Fagerstrom Test for Nicotine Dependence
GDP	Gross Domestic Product
HSI	Heaviness of Smoking Index
ITC-4	International Tobacco Control Four Country Survey
NHS	National Health Service
NIH	National Institutes of Health
NRT	Nicotine Replacement Therapy
NSW	New South Wales
PBS	Pharmaceutical Benefits Scheme
RA	Research Assistant
SDHF	Social Determinants of Health Framework
SEIFA	Socio-Economic Indexes for Areas
SEP	Socioeconomic position
SSS	Stop Smoking Services
STS	Smoking Toolkit Study
UK	United Kingdom
US	United States of America
WHO	World Health Organization

Synopsis

This thesis aimed to provide a detailed examination of the factors that affect smoking cessation within socioeconomically disadvantaged subgroups. Within this thesis socioeconomically disadvantaged groups were defined as groups who are more likely to experience multiple forms of social, material and financial disadvantage and who are less likely to be represented in epidemiological or population-wide studies. Six Papers are included in this thesis. Papers Two and Six are published and the remaining four papers are currently under editorial review. The results of two quantitative cross-sectional surveys carried out with clients of community service organisations formed the basis of this thesis. Clients of community service organisations represent a subgroup of the population who experience multiple forms of socioeconomic disadvantage.

Paper One provided insight into the factors associated with being an ex-smoker versus a current smoker in a sample of individuals experiencing multiple and severe forms of disadvantage. To the authors' knowledge, no other study has examined the sociodemographic differences between disadvantaged current smokers and ex-smokers. Overall, ex-smokers appeared to exhibit less socioeconomic disadvantage relative than current smokers. Ex-smokers were also less likely to report using cessation aids and more likely to have abruptly quit smoking during their last quit attempt.

The systematic review presented in Paper Two systematically synthesised and compared the perceived barriers to smoking cessation across six disadvantaged groups: low income, Indigenous people, people with mental illness, people experiencing homelessness, prisoners and at risk youth. This paper provided new knowledge about the barriers to smoking cessation identified by disadvantaged smokers that were common across six selected socioeconomically disadvantaged groups. Smoking in order to manage stress, high prevalence and perceived acceptability of smoking and lack of

support from health and other professionals are the three common barriers reported. The review also identified unique barriers that were specific to disadvantaged groups that should be considered when designing interventions for example, ceremonial and traditional significance of tobacco use in certain Indigenous communities.

Paper Three extended the existing literature about the barriers to quitting by using a valid and reliable measure to identify the most important barriers to smoking cessation experienced within a socioeconomically disadvantaged sample of smokers. To date, no other study has clarified disadvantaged smokers' perspectives on the prioritisation of barriers with a view to maximising smoking cessation success. Addiction, stress management and enjoyment were the top three barriers ranked as most important to address before cessation could occur. Barriers rated as large by more than a third of the sample included addiction, stress management, anxiety or depression management, relaxation, being unable to manage withdrawal symptoms and stressful life events.

It is important to examine use of alcohol and tobacco in disadvantaged groups because use of both substances compounds the negative health effects associated use of either substance alone, and because heavy alcohol use compromises smokers' ability to maintain smoking cessation. Paper Four extended the literature by examining the characteristics of individuals with different alcohol and tobacco use profiles compared to individuals who were neither heavy drinkers nor tobacco users. The comparison of different alcohol and tobacco use profiles with neither smokers nor heavy drinkers was a novel feature of this study and allowed the identification of potential factors that promote heavy drinking and tobacco use within disadvantaged groups. People who were concurrent heavy alcohol and tobacco users were more likely to experience more

isolated living conditions and financial stress than individuals who were neither heavy alcohol users nor tobacco users.

Similarly, examining the use of cannabis by disadvantaged smokers is important to consider, as cannabis use also compromises smokers' ability to maintain smoking cessation. Paper Five provided new information on the prevalence of co-occurring cannabis and tobacco use in disadvantaged groups (including simultaneous use and the way cannabis may impact on cessation attempts. While there is a literature base surrounding the effects of cannabis use on smoking cessation, the literature provides limited guidance regarding the proposed mechanisms through which cannabis effects smoking cessation. Regular cannabis use was associated with decreased motivation to quit tobacco smoking and shortened length of previous quit attempt in a sample of socioeconomically disadvantaged smokers. Lower motivation to quit tobacco significantly mediated the association between regular cannabis use and shorter quit attempts.

Paper Six explored the new and topical area of electronic nicotine delivery systems (ENDS; also known as electronic cigarettes) which may present opportunities for disadvantaged smokers interested in quitting or reducing their tobacco use. The Paper assessed awareness and use of electronic cigarettes amongst socioeconomically disadvantaged smokers in Australia, where electronic cigarettes containing nicotine are restricted. At the time of publication, only two other studies had assessed electronic cigarette use in disadvantaged groups in high income countries, and neither of these studies were carried out in Australia. Levels of awareness and use were comparable to levels in the Australian general population. Higher motivation to quit tobacco and use of e-cigarettes in the past 12 months is associated with perceiving e-cigarettes as effective aids to quit smoking and as a safer product compared to traditional cigarettes.

In summary, this thesis provided new knowledge of the factors that affect smoking cessation within a subgroup of the population (clients of CSOs) who experience multiple and severe forms of socioeconomic disadvantage. The findings within this thesis suggest that there are multiple influences that affect smoking cessation that need to be addressed through individual and broader community and social network interventions. These include high levels of social and economic disadvantage, low levels of use of evidence based methods to quit, multiple and severe barriers to cessation at the individual, community and socio-economic level, and high levels of concurrent risky alcohol use and cannabis use. This thesis highlights the complexity of addressing smoking and cessation and the fundamental requirements for interventions to effectively aid quitting in groups experiencing multiple and severe forms of disadvantage.

1. INTRODUCTION

Smoking, the social gradient and socioeconomically disadvantaged groups: an

overview

This Introduction will provide an overview of the burden of illness and economic costs associated with tobacco use, the prevalence of smoking and the social gradient in the prevalence of tobacco use within high income countries. Evidence for the high prevalence of smoking within selected disadvantaged groups and the associated disproportionate burden of illness experienced within these groups will also be provided. Socioeconomic differences in smoking and quitting related behaviours, receipt and utilisation of smoking cessation support and broader social and community level influences will be summarised with reference to the Social Determinants of Health framework and the Socioeconomic Lifecourse Theory. The potential of community service organisations to extend reach into socioeconomically disadvantaged groups will be explored, given that socioeconomically disadvantaged subgroups of the population are typically harder to reach and retain for research and treatment. Finally, this Introduction will provide the overall aims of the thesis and research questions to be answered in each paper.

1.1 Tobacco related burden of illness and economic costs

Global morbidity, mortality and cost

Tobacco smoking is the leading cause of avoidable mortality and morbidity globally. It is a key modifiable risk factor for the development of a number of diseases, including cardiovascular disease, cerebrovascular disease, lower respiratory infections, chronic obstructive pulmonary disease (COPD), tuberculosis and cancer (1, 2). Smokers are 25 times more likely than people who never smoke to develop lung cancer (1). Tobacco use also increases the likelihood of developing cancers of the mouth, lips, nose and sinuses, larynx, pharynx, throat, oesophagus, stomach, pancreas, kidney, bladder, uterus, cervix, colon/rectum, ovary and also acute myeloid leukaemia (1). Nearly six million people die from tobacco related disease worldwide each year (2), and hundreds

of billions of dollars in economic damage is also caused (2). For example, in the United States of America (US) direct medical care costs for smoking related illness were estimated at $170 billion each year, and more than $156 billion in lost productivity (3). Approximately 80% of the world's smokers live in low and middle income countries, where the tobacco-related burden of disease and mortality is also the highest (2).

Australian morbidity, mortality and cost

In Australia, smoking accounts for approximately 8% of the national burden of disease (4). More recent data from the 2010 Global Burden of Disease Study estimated that tobacco smoking was responsible for 8% of the burden of disease in Australia and New Zealand (5). Smoking is a key modifiable risk factor for the three most common causes of premature death in Australia (5) and smoking accounts for more drug-related hospitalisations and deaths than alcohol and illicit drugs combined (6).

The latest Australian data from 2004-05 shows the costs of tobacco use totalled just under $31.5 billion (7). These costs included both tangible costs (costs to health care systems) and intangible costs (psychological impact of premature death) (4). The large burden of illness and costs associated with tobacco use have led governments and peak health organisations in many countries to prioritise tobacco as a major modifiable risk factor that deserves attention. Efforts involve preventing people from beginning to use tobacco, increasing the number of smokers who successfully stop smoking and decreasing the harms arising from exposure to second-hand smoke.

Prevalence of tobacco use between and within countries

Tobacco use is associated with disadvantage both between countries and within countries. High income countries such as the US, the United Kingdom (UK), Australia, Canada and New Zealand have seen tobacco prevalence rates fall over the past three decades. The fall in tobacco use in these high income countries has been attributed to

increased knowledge of the negative health effects of tobacco use and the result of coordinated, population level strategies to urge smokers to quit.

This is in contrast to low and middle income countries, where the prevalence of smoking has remained stable or increased over the same time period, as tobacco companies expand business into countries where there are fewer restrictions and public health warnings (8). The tobacco epidemic diffusion model states that as tobacco use increases within countries, the prevalence of smoking by sociodemographic characteristics varies. (9). Large socioeconomic inequalities in the smoking prevalence *within* countries begin to occur in later phases of the tobacco epidemic. This pattern is currently evident in high income countries, where the prevalence of smoking is unequally distributed across the population. Recently, attention has turned to alleviating disparities in smoking prevalence within populations as well as decreasing the overall population smoking prevalence (2, 10).

1.2 Smoking prevalence and the social gradient

There is strong evidence to support the existence of a socioeconomic gradient in smoking prevalence in high income countries. That is, decreasing socioeconomic position (SEP) is associated with increasing prevalence in smoking, while increasing socioeconomic position is associated with decreasing prevalence of smoking. In this thesis, the term socioeconomic position is used to refer to a broad range of indicators of economic disadvantaged that arise from socially driven factors (for example occupation or education level) (11) and is used instead of socioeconomic status in line with suggested practice (11).

Measuring SEP

There are both area (ecological) level and individual level measures of SEP. Area level measures of SEP are either based on aggregates of the data from people

living in that area or by measures of characteristics integral to the neighbourhood. Area level measures are usually calculated from census or other broad scale sources (12). Area level measures of SEP provide specific information for specified geographical locations and the people within those areas on a continuum from less advantaged to more affluent. An example in Australia is the Socio-Economic Indexes for Areas (SEIFA) code (13). The SEIFA code consists of four indices based on census data designed to provide information on varying indicators of relative advantage and disadvantage.

A wide range of individual level measures of SEP exist. These include (but are not limited to): education, employment, occupation, housing, income, poverty levels as well as car ownership or living conditions (12). As the next section will demonstrate, most individual level measures of SEP are associated with smoking status, as a person's SEP decreases their likelihood of being a smoker increases (14-18).

The social gradient of smoking in selected high income countries

The social gradient in smoking has been demonstrated in multiple high income countries using varied measures of SEP. For example, in Australia, smoking prevalence is inversely related to socioeconomic position, with rates of 20% found in the lowest socioeconomic quintile (as measured by SEIFA code) compared to 7% in the highest socioeconomic quintile (19) (see Figure 1). A social gradient in smoking is also evident in New Zealand, where a smoking prevalence of 30% was found in the lowest neighbourhood deprivation quintile compared to 11% in the highest quintile in 2012 (20) (see Figure 2). In the UK, a gradient is apparent when occupation is examined, with smoking prevalence lowest for people in managerial/professional occupations (14%) and highest in routine and manual occupations (29%) (21) (see Figure 3).
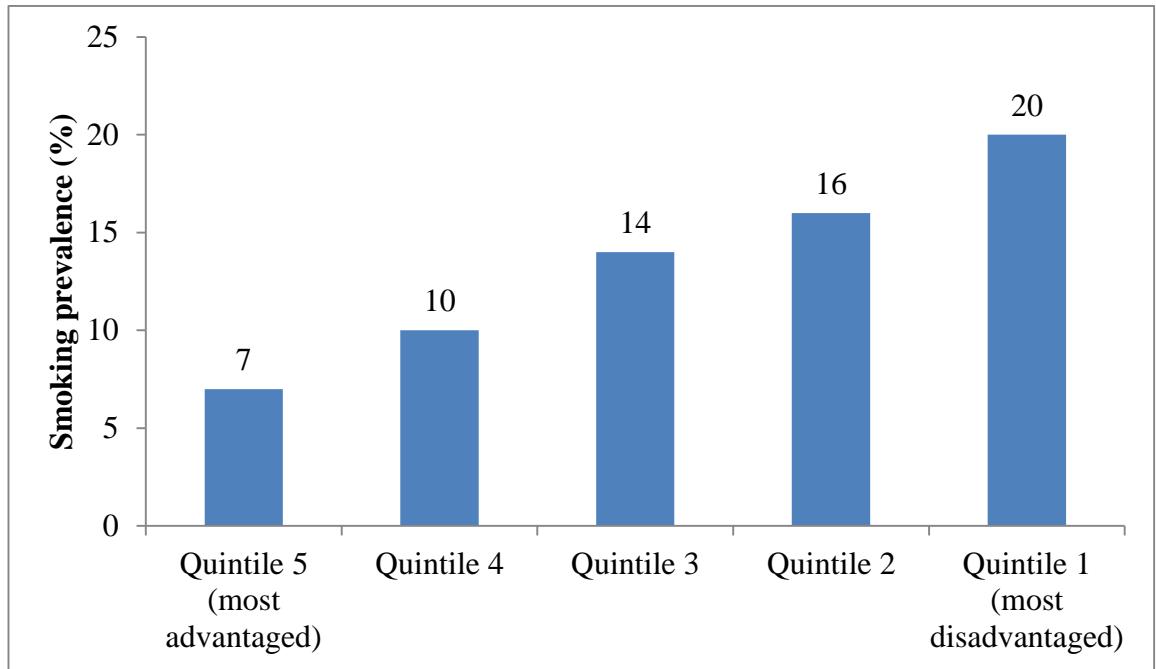
Figure 1. Smoking prevalence by SEIFA code (disadvantage quintile) in Australia, 2013.
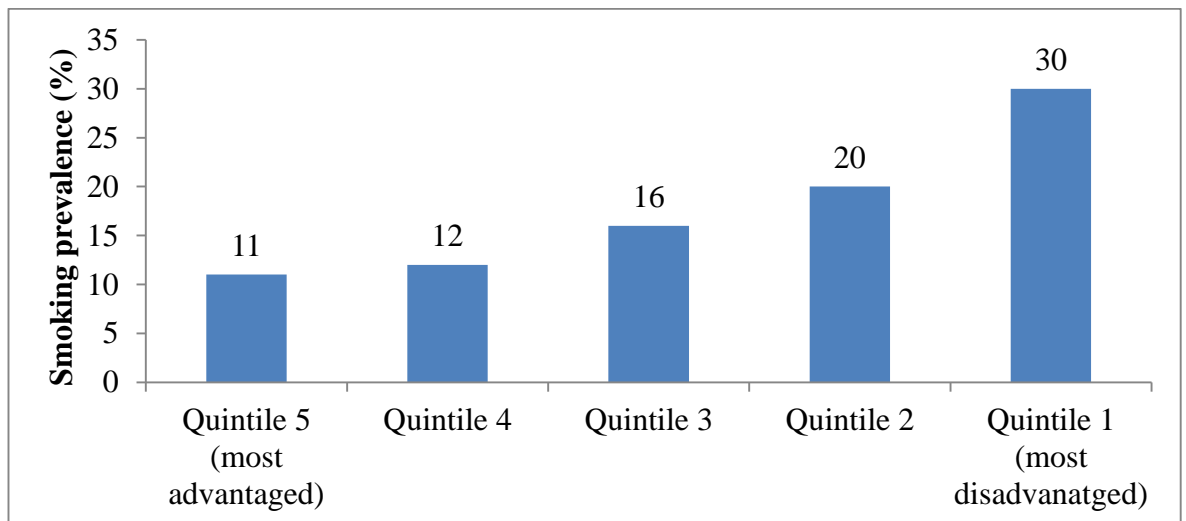
Figure 2. Smoking prevalence by neighbourhood deprivation quintile in New Zealand, 2012.
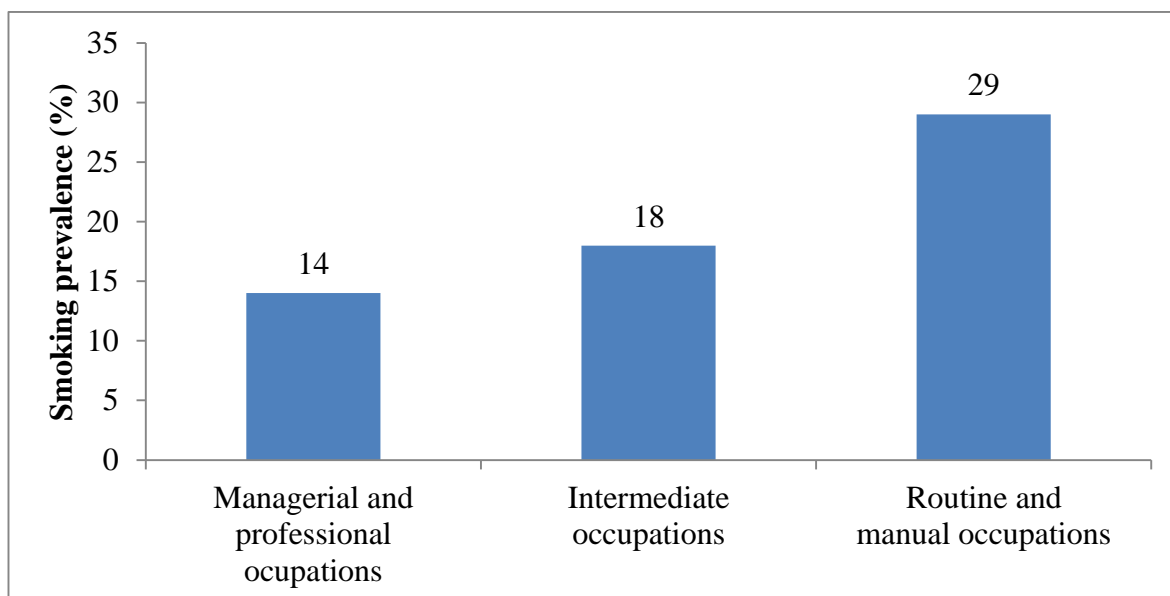
Figure 3. Smoking prevalence by occupation classification in Great Britain, 2013.

Burden of tobacco related illness and lower socioeconomic position

As a result of the higher prevalence of smoking, people of lower SEP experience

a greater burden of disease due to tobacco related illness (4). Premature death

attributable to tobacco smoking contributes to increased costs to health systems,

prevents economic development and has negative impacts on levels of income for

families (2). One third of the excess mortality in males with lower levels of education is

estimated to be attributable to smoking (22). Differences in mortality rates between the

lowest and highest socioeconomic groups have been attributed to tobacco (23). Smoking

and its associated health and social effects expose people in disadvantaged groups to

higher levels of social isolation, financial stress and a lower quality of life thus

exacerbating their disadvantage (24). Studies suggest that in many Western countries,

smoking is probably the largest cause of socioeconomic inequalities in morbidity and

premature mortality, particularly among men (25). Given these tobacco related health

disparities, addressing tobacco and increasing quit rates in disadvantaged smokers must

be a priority.

1.3 Smoking and socioeconomic disadvantage

Given that typical indicators of SEP tend to correlate with one another and occur together (26, 27), certain subgroups of the population can be characterised by multiple indicators of disadvantage. It is possible to examine how the prevalence of smoking varies in these subgroups relative to the prevalence of smoking found in the general population. Subgroups that tend to experience multiple types of disadvantage are often referred to as "socially disadvantaged groups". Other labels given to these groups include vulnerable, marginalised, underserved and priority groups. There is no universally accepted definition of "disadvantage", thus the following section will provide a working definition of disadvantage that will be used within this thesis.

Defining disadvantage

Definitions of disadvantage have evolved over time, with earlier definitions focussing on traditional measures such as income, education and unemployment (26). Recently, calls have been made for a more inclusive definition which recognises broader indicators including social exclusion and deprivation (26, 28, 29), as a focus on strictly economic or poverty-related indicators of disadvantage fails to capture the living standards and experiences of disadvantaged people.

A useful model for considering different components of disadvantage and the way these components overlap with one another has been put forward by Saunder's et al (26) (Figure 4). This model posits that disadvantage is comprised of poverty, deprivation and social exclusion. The authors emphasise that while these three concepts are distinct, they frequently overlap with one another in terms of people's experiences. This idea of overlap is echoed by Scutella et al's definition of disadvantaged groups who experience multiple, overlapping problems, such as unemployment, poor health and inadequate education, which limits their ability to meaningfully participate in
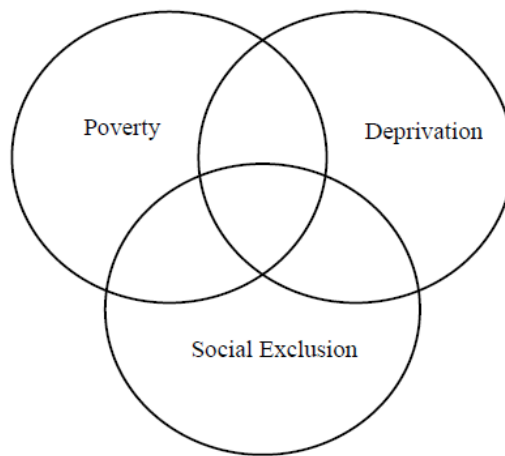
Figure 4. Framework for exploring the associations between poverty, deprivation and social exclusion (Adapted from Saunders et al).

society (27). Within this thesis the term "socioeconomically disadvantaged" will be used to refer to subgroups of the population that are more likely to experience multiple forms of social, material and financial disadvantage and who are less likely to be represented in epidemiological or population-wide studies (28).

Prevalence of smoking in selected socioeconomically disadvantaged subgroups

Unemployment, mental health problems, substance use problems, Indigenous status, homelessness, and sole parenting are all characteristics of people who are more likely to experience multiple, overlapping forms of socioeconomic disadvantage. Consistent with the social gradient and the strong association between socioeconomic disadvantage and smoking, people within these subgroups exhibit smoking rates far higher than those found in the general population. It is important to note that other groups also experience substantial social and economic disadvantage. For example, lesbian, gay, bisexual, transgender and other sexual minorities, ethnic minorities, immigrants and people from culturally and linguistically diverse backgrounds; and

people living in rural and remote communities may also experience considerable levels of social exclusion and deprivation. Table 1 exhibits the prevalence of smoking by selected high income country and disadvantaged subgroups. The following sections will provide data regarding the smoking prevalence, burden of tobacco related disease and smoking cessation behaviours and characteristics within the aforementioned groups.

Table 1. Prevalence of smoking in selected disadvantaged groups by selected high income country

	Country				
Population group	**Australia**	**United Kingdom**	**United States of America**	**New Zealand**	**Canada**
General population	13% (19)	19% (21)	18% (30)	18% (20)	15% (31)
People who are unemployed	25% (19)	35% (21)	45% (32)	No data available	No data available
People from Indigenous communities	32% - 41% (19, 33)	No data available	32% (30)	39% (20)	33% - 60% (34)
People with mental health problems	32% (35)	30% (36)	31% - 41% (35, 37, 38)	32% (39)	55% (40)
People with substance use problems	70% - 73% (41, 42)	88% (43)	51% – 67% (38)	56% (39)	No data available
People who are homeless	77% - 83% (44, 45)	70% (46)	69% - 73% (47, 48)	No data available	81% (49)
People who are sole parents	46% (50)	49% (51)	27% - 32% (52, 53)	No data available	30% (54)

People who are unemployed

Unemployment is consistently associated with current smoking (55-57). The prevalence of smoking in unemployed subgroups is higher than the prevalence found in the general population and the prevalence of smoking in employed persons. US research from California found that people who were unemployed but seeking work reported even higher smoking rates than people who were unemployed and not currently seeking work (58). Unemployment is also associated with poverty and lower education. Compared to people who are currently employed, people who are unemployed have higher rates of tobacco-related mortality (59-61), cardiovascular disease (62) and COPD (63, 64). People who are unemployed may also report higher levels of nicotine dependence (65). Compared to other occupational groups, people who are unemployed may be more likely to intend to quit (66, 67).

People from Indigenous communities

Indigenous people within Australia, Canada, New Zealand and the US experience far higher smoking prevalence than the general population. It is important to note that there is variation in smoking prevalence within certain Indigenous communities. For example, a study concerning American Indian peoples found that the smoking prevalence amongst tribal members from the South Western regions was lower (14%) compared to the smoking prevalence amongst tribal members from the Northern Plains regions (50%) (68).

Indigenous peoples in many countries experience a disproportionate burden of disease. The age adjusted death rates and tobacco-related mortality rates are higher in American Indian and Alaska Native peoples compared to white Americans aged over 35 (69). Indigenous Australians are more likely to die of tobacco-related illnesses, such as diseases of the respiratory system and cancers, than other Australians. Smoking is the

leading cause of avoidable mortality in the Indigenous Australian population, associated with 20% of all mortality (70).

One of the reasons for higher rates of tobacco use may be the ongoing effects of historical traumas, including colonisation, removal from native land, racism, and discrimination experienced by Indigenous groups (71, 72). Traditional and ceremonial use of tobacco also plays a role in some First Nations, American Indian, Alaska Native and Aboriginal and Torres Strait Islander communities; however this use of tobacco should be considered distinct from recreational use (73).

Evidence suggests that fewer gains have been made in addressing tobacco use amongst Indigenous Australian's compared to the general population (74). However, evidence does suggest Indigenous Australians are motivated to quit smoking, with 62% reporting cutting down or stopping smoking in the past 12 months and 45% having made a quit attempt in a nationally representative sample (75). Evidence suggests Aboriginal and Torres Strait Islander smokers may be less likely to use Nicotine Replacement Therapy (NRT) or other stop smoking medications compared to other Australian smokers (76).

People with mental health problems

People with mental health problems exhibit smoking rates two to three times higher than the general population in most high income countries (35, 37). The prevalence of smoking varies across different diagnoses. Generally, the prevalence of smoking is higher amongst those diagnosed with severe mental illness or substance use disorders, and those who are currently hospitalized or living in care (37, 77). The proportion of smokers in Australia who have been diagnosed with or treated for a mental illness slightly increased between 2007 and 2010, from 17% to 19% (78). In 2013 the proportion of smokers who had been diagnosed with or treated for a mental

illness was estimated at 22% (19). Similar data from New Jersey, US suggests smoking rates have remained largely unchanged between 2001 to 2010 for those with self-rated poor mental health (79).

People with mental health problems are more likely to die from heart disease, respiratory disease and cancer than those in the general population (80). People with mental health problems die up to 25 years earlier and suffer increased medical comorbidity when compared to the general population (81). In the US, people with mental health problems consume over 30% of cigarettes sold and comprise 44% of the entire tobacco market (37, 82). Smokers with mental health problems are also more likely to be nicotine dependent, with tobacco addiction being the most common co-occurring disorder for people with mental health problems (83). Historically, people with mental health problems have not received help to quit, with health providers ignoring or encouraging continued tobacco use (83, 84), despite a recent review concluding people with mental health problems show similar levels of motivation to quit smoking to people without mental health problems (85).

People with substance use problems

The prevalence of smoking within groups that experience substance use problems is far higher than the prevalence found in the general population. Rates between 77% - 88% have been reported in clients accessing substance abuse treatment settings (42, 43); and 83% in clients of methadone clinics (41).

Evidence also suggests the burden of illness from smoking related disease is higher for people with substance use problems. People who had received inpatient treatment for alcohol dependence were more likely to die from a tobacco related, rather than alcohol related, cause (49). Data from people who received publicly funded substance use or mental health treatment were matched with death records from 1996 to

2005 in Oregon, US to explore the impact of tobacco use on causes of death. People with a substance use disorder and people with both a substance use disorder and mental health disorder had higher tobacco related death rates than those without these disorders (86).

Historically, substance use treatment programs have not regularly addressed smoking cessation (87, 88) with only 30% to 54% regularly providing at least one form of smoking cessation care. Nevertheless, there is considerable interest in receiving help to quit among smokers with substance use problems. Although 56% of those surveyed in residential and community drug and alcohol services reported never receiving help to quit from a physician, almost half (46%) were willing to talk about how they might reduce the harms from tobacco smoking and 63% expressed a desire to quit in the next three months (43).

People experiencing homelessness

People who are homeless often report some of the poorest health behaviour profiles in society. Prevalence rates of smoking between 69% (48) to 73% (47) among people who are homeless in the US, 81% in Canada (49) and 77% (44) to 83% (45) in Australia have been reported.

The high prevalence of tobacco use in this group contributes to the high levels of chronic and acute illness experienced by people who are homeless (89). Mortality rates in homeless groups associated with tobacco are three to five times greater than those reported in the general population (90, 91). Rates of smoking related disease are higher in people who are homeless, including cardiovascular disease, COPD and cancers associated with tobacco use (89).

Evidence suggests smokers who are homeless are receptive to addressing their tobacco use but may be less likely to receive help to quit. In a national sample of

homeless people in the US only 54% reported physician advice to quit in the year prior (47). A separate study showed 37% intend to quit within next 6 months and 72% had tried to quit at least once in the past 12 months (48).

People who are sole parents

Sole (also referred to as lone or single) parents exhibit higher smoking rates than cohabitating or partnered parents. The majority of research concerned with smoking prevalence in sole parents has been conducted with sole mothers. Rates of smoking among a national sample of sole mothers in Australia were estimated at 46% (50). Sole mothers who were younger, less educated, received government pension, occupied rental housing or who lived in more disadvantaged areas were more likely to smoke than others (50). Sole mothers were more likely to relapse than partnered mothers, and this association remained after accounting for differences in SEP, mental health and social support (92). In a 2005 study conducted in Finland, sole fathers had higher rates of smoking (48%) than sole mothers (26%) (93). Sole parents also represent a group that are more likely to experience socioeconomic disadvantage. Sole parents may experience higher levels of financial stress, lower levels of social support and higher rates of depression and anxiety (50, 94) and are at higher risk for cardiovascular disease (54).

Summary of the prevalence of smoking in the selected disadvantaged groups above

It should be noted that due to variations in population sampling, data collection and analysis it is difficult to make direct comparisons in the prevalence of smoking between these groups. However, a consistent pattern is apparent. Subgroups of the population that are more likely to experience multiple forms of socioeconomic disadvantage are also more likely to report higher smoking prevalence. These groups

exhibit higher rates of tobacco related morbidity and mortality compared to the general population.

It is also important to note that forms of disadvantage overlap in groups: e.g. people who are homeless are more likely to experience mental health and substance use problems (95, 96), and people who are diagnosed with a mental illness are more likely to be currently homeless or have experienced homelessness in their lifetime (97). Aboriginal and Torres Strait Islander people are more likely to have higher rates of psychological distress (33) and to experience homelessness (98) compared to non-Indigenous people. American Indian and Alaska Native peoples who are nicotine dependent are also more likely to report past 12 month alcohol or other drug dependence (72). As far as definitions and measures of disadvantage are concerned, these groups, with considerable amounts of overlap, represent some of the most disadvantaged in society, that are significantly below even the lowest SEIFA quintile in Australia.

1.4 Mechanisms behind the high prevalence of smoking associated with socioeconomic disadvantage

Theoretical frameworks for describing socioeconomic factors related to smoking prevalence

There are many theories that are useful in examining how socioeconomic factors are related to smoking. The following section provides brief descriptions of two theories that have been applied: the Social Determinants of Health framework (SDHF) and the Socioeconomic Lifecourse Theory; and evidence that supports each theory.

Social Determinants of Health Framework

Broadly, ecological models of health behaviour hold that health behaviours influence and are influenced by multiple levels of factors, including intrapersonal,

interpersonal, community, socioeconomic, organisational and environmental factors (99). Factors interact with one another across various levels of influence as well as being associated with the behaviour in question. Ecological models of health behaviour complement the SDHF. The social determinants can be defined as the conditions in which people live and the wider socio-structural influences (including economic and social policies and political systems) that shape their lives (100). Figure 5 provides a depiction of the various levels of influence of the SDHF (99). People who are more likely to experience socioeconomic disadvantage are more likely to report lower incomes, lower levels of education, unemployment, living in inadequate or crowded housing, and violent neighbourhoods. The associations between lower socioeconomic position, unemployment, homelessness and smoking have been discussed above. However, emerging evidence also suggests that characteristics including neighbourhood disadvantage (or deprivation) (101-103), higher density of tobacco retail outlets in disadvantaged areas (104, 105), and lower access to smoking cessation support by smokers of low SEP (106) are associated with smoking and cessation.

Figure 5. The Social Determinants of Health (adapted from Dahlgren and Whitehead) (99).

Socioeconomic Lifecourse Theory

Similarly, the socioeconomic lifecourse theory holds that over the span of an individual's life, their biological and physiological characteristics interact with economic, social and psychological factors through the adoption of health risk and protective behaviours and the development of disease and illness (107, 108). This theory holds that disadvantage experienced in childhood can have effects in adulthood independent of adult levels of socioeconomic disadvantage. When applied to smoking, the evidence suggests that key factors experienced in childhood are significantly associated with persistent smoking in adult smokers (10, 109). In the UK, father's lower socioeconomic position, early motherhood (becoming a mother at age 21 or younger), not living with a partner and sole motherhood were significantly associated with adult women's current smoking (110). Gender differences in the effects of SEP over the lifecourse on likelihood of smoking may exist. The contributions of childhood and adult SEP were assessed in a cohort in the UK over 41 years. The researchers found that childhood SEP was significantly associated with persistent smoking among women but not men (111).

A common theme amongst these theories is that factors both internal and external to people work together to compound the likelihood of smoking which is not limited to individual choice, but influenced by a wide range of social and environmental factors. While the studies within this thesis focus on individual-level factors, they also aim to understand the influence of a person's wider socioeconomic context at the same time. The following section summarises the existing literature regarding the association between SEP and smoking initiation, cessation and associated smoking characteristics. The findings from large, representative population-level will be summarised, including the International Tobacco Control – Four Country survey (ITC-4), a representative

survey across the US, UK, Australia and Canada (112) and the Smoking Toolkit Study

(STS) a large, repeated cross-sectional survey in the UK (113).

Differences in smoking initiation

Both rates of initiation (that is, the number of people taking up smoking) and

rates of cessation (the number of people successfully quitting smoking) contribute to the

prevalence of smoking in a given group. Socioeconomic differentials can be found in

both. People of lower SEP are more likely to begin using tobacco (114-116) and less

likely to stop successfully (15).

A prospective birth cohort study in the US used multiple measures of SEP (both

during childhood and adulthood) and found that measures of low SEP were consistently

associated with initiation and progression to regular smoking (114). Similar results were

found in a 2014 analysis of representative data in the UK, with lower levels of parental

education consistently associated with higher rates of initiation and progression to

regular smoking (115). The differences associated with SEP in this study persisted over

the period from 1994 to 2008 covered in the analysis. Data from the Netherlands shows

that the initiation ratio (the number of ever smokers/all potential respondents) was

higher for those with lower education and lower incomes, and the gap in initiation ratios

between women with high income and low income has widened significantly between

2001 to 2008 (116).

Differences in rates of successful cessation

Studies suggest that the rates of quit attempts (that is, the number of people

attempting to quit smoking) are similar between smokers of lower and higher SEP (15,

117, 118). This finding is not universal, with other studies finding evidence that lower

SEP is associated with lower likelihood of making a quit attempt (17, 119-121).

Reasons for the discrepancy in findings may be differences in the definitions and

indicators used to measure SEP (14), as well as wider gaps between those with high and low SEP in different countries (15).

However, clear evidence shows that smokers of lower SEP are less likely to succeed when they attempt to quit (15, 17). This indicates that while smokers of lower SEP may be trying to quit at the same or slightly lower rates than smokers who are of higher SEP, lower SEP smokers are far less likely to convert these quit attempts into long term smoking cessation. Increasing the cessation rates in disadvantaged groups is important as evidence shows that the harms caused by smoking can be ameliorated if smokers stop early enough and for long enough (1); thus minimising the burden of illness experienced by smokers of lower SEP.

Differences in nicotine dependence

One of the most consistent predictors of successful smoking cessation is nicotine dependence (18). Higher levels of nicotine dependence have also been associated with the experience of stronger nicotine withdrawal symptoms and stronger cravings in particular (122). Smokers from lower SEPs are more likely to experience higher levels of nicotine dependence (123). Higher Heaviness of Smoking Index scores have been associated with lower levels of education and lower income in the ITC-4 study (123).

In the UK, social grade is a commonly used measure of SEP calculated as a function of occupation. There are five grades within the classification system: Grade A refers to higher managerial, administrative or professional occupations, B to intermediate managerial, administrative or professional occupations, C1 to supervisory or clerical, junior managerial occupations, C2 to skilled manual workers, D to semi and unskilled manual workers and E to casual or lowest grade workers, state pensioners and unemployed welfare recipients (124). Mean scores on the Fagerstrom Test for Nicotine Dependence (FTND) were lower for those classified in the highest social grade in the

UK (social grade AB: mean = 2.3, p <.0001) than those found in the lowest social grade (social grade E: mean = 3.8) in a representative sample of smokers (15).

Differences in use of aids to cessation

There are several evidence based aids to cessation that smokers are able to use in order to quit smoking. These include NRT (125), bupropion, varenicline and nortriptyline (126-128), both individual (129) and group (130) based support to quit, and physician advice (131). Again, the evidence is mixed regarding the association between SEP and use cessation aids. Within the UK, data from the STS found no association between a smoker's social grade and use of bupropion, varenicline, telephone support or the National Health Service- Stop Smoking Services (NHS-SSS). People in social grade E were *more* likely to use prescription medication aids to cessation than those from other grades (132). A nationally representative study in Australia found smokers in the lowest socioeconomic quintile (based on SEIFA) were more likely to use prescription medication while smokers from higher socioeconomic quintiles were more likely to use patches, gum or lozenges (133). However this analysis did not adjust for higher levels of nicotine dependence that are often concentrated in disadvantaged groups (134-136).

Research conducted in the US has found that people of lower SEP are less likely to use cessation aids than those from higher SEP. People who were more educated and wealthier were more likely to adopt any type of treatment for smoking cessation (behavioural, pharmacological or alternative) (137). Contextual elements including the NHS network of stop smoking services and strong government emphasis on prescribing and using pharmacological aids in the UK and subsidised NRT on the Pharmaceutical Benefits Scheme (PBS) available in Australia may mean that differences in use of these aids are not as pronounced in the UK and Australia as they are in the US.

In studies that examine associations between SEP and use of cessation aids, it is important to account for the effect of nicotine dependence. People of lower SEPs are more likely to report higher levels of nicotine dependence (15, 123). People with higher levels of nicotine dependence are also more likely to use cessation aids (134-136). Therefore studies that do not account for nicotine dependence may overestimate the number of lower SEP smokers using cessation aids (138).

Differences in motivation and intentions to quit smoking

Smokers in the Smoking Toolkit Study from lower social grades were less likely to report a desire, intention or sense of duty to quit smoking than those with higher social grades (139). This is supported by results from the ITC-4 study showing that both lower levels of education (having less than high school diploma) and lower levels of income ($\leq$ \$30, 000 in US, Australia and Canada or $\leq$ £15, 000 in the UK) were associated with larger odds of having no intention to quit (17, 123). This conflicts with earlier data showing that smokers within specific disadvantaged groups report high levels of desire to quit. Additionally, in a representative sample of young adults (aged 18 – 30 years) from the US, those who earned between \$29,000 to \$45,000 per year were less likely to report an intention to quit than those on higher incomes or those who were unemployed (67).

Differences in self-efficacy, reasons for quitting and motives for continuing to smoke

There are also socioeconomic differences in the reasons for quitting identified by current smokers. People of lower SEP are more likely to want to quit due to financial and health reasons (140); to have lower levels of self-efficacy (123) and to cite stress relief and boredom as motives to continue to smoke (141) compared to those of higher SEP.

Differences in receipt of smoking cessation support

Smokers of lower SEP may be less likely to receive smoking cessation support from health and other professionals. A study conducted in the US found that when adjusting for multiple factors, people of higher socioeconomic position (people with higher education, higher income, and those who had health insurance) were more likely to receive smoking cessation advice from their health care providers (106).

Differences in disadvantaged communities and social networks

There is evidence to support that neighbourhood and community level factors also contribute to smoking in disadvantaged groups. The prevalence of smoking is higher in lower SEP neighbourhoods (102). Lower SEP neighbourhoods have higher density of tobacco retail outlets and more frequent advertising (142-144). Young-Wolffe found that 50% of smokers with a mental health problem live within 250 metres of a tobacco retailer in the San Francisco Bay area (145). Participants who lived in tobacco retail dense areas were also more likely to report poorer mental health, greater nicotine dependence and lower self-efficacy to quit (145).

Smokers of lower SEP may also have more smokers in their social networks. Findings from the ITC-4 study indicate smokers with lower education and income levels reported higher numbers of friends who were smokers compared to moderate/high SEP smokers (146) and were more likely to gain additional friends who were smokers over time and less likely to lose friends who smoked (147). Higher numbers of smokers in social networks may contribute to perceptions of smoking as a highly prevalent and acceptable behaviour (148).Taken together, these findings suggest that smokers of lower SEP are more likely to be surrounded by other people who smoke (which may contribute to high levels of perceived acceptability of smoking in disadvantaged groups) and are more likely to live in areas where access to tobacco is higher.

Differences in socioeconomic related stressors

There are also socioeconomic related stressors faced by people of lower SEP that contribute to continued smoking. These include stressful life events, financial stress, higher rates of crime and violence, and higher likelihood of living in deprived neighbourhoods(149). Smoking to cope with stress related to hardship has also been reported (10, 150, 151). Increased levels of unemployment and lower disposable incomes mean that lower SEP smokers may also have fewer affordable recreation opportunities and leisure activities and smoke in response to higher levels of boredom (148).

Clearly there are a wide range of factors that impact on the ability of smokers of lower SEP to quit. These factors occur not only on an individual level, but within social and community networks, living conditions and broader socioeconomic conditions that are experienced by disadvantaged smokers. The literature outlined above shows that, in keeping with the SDHF, a wide range of factors external to the individual are implicated in smoking initiation and cessation. Social inequalities facilitate certain choices for people of higher SEP while impeding those same choices for people of lower SEP (152). Inequalities in levels of nicotine dependence, access and utilisation of cessation aids, pro-smoking social norms, high acceptability of smoking, high levels of stress and intense stressors including unemployment, chronic disease, poverty and targeted marketing means that smokers of lower SEP are exposed to multiple factors that compromise their autonomy in deciding whether to smoke or not.

1.5 Reaching disadvantaged groups for research purposes

Socioeconomically disadvantaged people are less likely to be included in health and medical research (153), less likely to be involved in epidemiological or population-wide surveys and are under-represented in tobacco related research. Therefore, it is

necessary to consider potential ways to extend reach into socioeconomically disadvantaged groups in order to ensure that they are adequately represented in tobacco control research. Recently researchers have identified community service organisations (CSOs) as novel settings that have the potential to increase reach into disadvantaged groups for research purposes (154) and address smoking cessation and other health behaviours through these settings (155, 156).

Community service organisations (CSOs)

CSOs have been identified as promising settings to increase reach into disadvantaged groups (155, 156). The community service sector contributes 5% to Australia's Gross Domestic Product (GDP) and 7% to employment annually, employing over 900, 000 staff and a further 2, 000, 000 (or two million) volunteers. Across Australia, there are approximately 5800 CSOs that provide aid to people on approximately six million occasions each year (157).

What services do CSOs provide?

CSOs provide a wide range of services to clients including crisis relief (for example financial aid to pay bills), food vouchers, employment services, and relationship counselling. CSOs offer help with issues such as mental illness, homelessness, alcohol and other drug problems, Aboriginal health, at risk youth and family support. CSOs have personal, regular contact, and are a trusted source of services for some of the most socioeconomically disadvantaged subgroups in society (156).

How are CSO clients representative of disadvantaged smokers?

In Australia, CSOs are represented by the Australian Council of Social Services (ACOSS). ACOSS is an advocacy group that represents the interests of those who work in and utilise social welfare services. The annual Australian Community Sector Survey (ACSS), commissioned by ACOSS, provides comprehensive information on the

characteristics of the organisations from the perspective of staff and is the only national survey of the sector.

The 2011 ACSS asked organisations to identify the profile of service users according to a range of characteristics including age, gender, employment status and, where applicable, the type of government payment they received (158). More recent volumes of the ACSS report on the unmet needs of selected groups of CSO service users rather than characteristics of the service users overall, thus the following sections will focus on the results of the 2011 ACSS. Responses to the survey in 2011 were gathered from 746 community sector staff across Australia. Respondents were asked to provide estimates of the proportion of service users and the data shown in Table 2 represents the mean of respondents' estimates. The majority of clients received disability (28%), single parenting pension (23%) or aged pension (19%).

Table 2. Profile of community service users as reported by CSO staff in Australia, 2011 (Adapted from 2011 Australian Community Sector Survey) (158)

Characteristic	Percentage of service users in 2011
Women	57
Unemployed	48
Living with a disability	32
Sole parents	28
Culturally and linguistically diverse backgrounds	20
Aboriginal and/or Torres Strait Islander peoples	16
Foreign citizens	7

Recent research suggests that addressing health and other issues through CSOs may provide contact with people who are missed in typical health settings. More than a third (38%) of CSO clients reported needing health care but not accessing it in the last 12 months (which is rate five times that of the general population) (159). The most frequently reported reason for being unable to access health care was cost (60%).

Are CSOs a good place to target disadvantaged smokers?

As demonstrated above, CSOs have contact with some of the most disadvantaged subgroups in society (155, 157).The prevalence of smoking in clients of CSOs is well above the national Australian average (approximately 61% - 62%) (160, 161). Table 3 provides a summary of the sociodemographic characteristics of smokers who have been recruited from CSOs in two previous studies. Bryant and colleagues carried out extensive pilot work regarding the feasibility and acceptability of CSOs as a setting in which to address smoking (160). They conducted a cross-sectional survey of CSO clients which ran from February to October 2010. Guillaumier et al used cross-sectional surveys and qualitative methods to explore the responses of CSO clients' responses to plain packaging, taxation increases and mass media campaigns (161). Data collection from their cross-sectional survey ran from March to December 2012.

The profiles of these survey participants match the national profile of CSO service users provided in 2011. Aboriginal and Torres Strait Islander peoples were overrepresented in these samples (compared to 2% of the population in New South Wales) (162). Exceptionally low income levels were reported in both samples with 72% - 80% reporting incomes of AUD$400 or lower per week, figures that are well below the current Australian single person 'poverty line' of $500 per week (163). Most of the participants had made an attempt to quit smoking at least once, despite high levels of nicotine dependence as measured by the Heaviness of Smoking Index (HSI; (164). The

profile of smokers accessing services from CSOs suggests that CSOs provide an excellent opportunity to reach various subgroups of the population that experience multiple types of socioeconomic disadvantage and who may be missed in research conducted in typical health settings.

Table 3. Description of the sociodemographic and smoking profile of smokers recruited from CSOs.

Characteristic	Bryant et al's study (160) n = 235 smokers	Guillaumier et al's study (161) n = 354 smokers
	n (%)	
Gender		
Male	142 (60)	138 (39)
Female	93 (40)	216 (61)
Indigenous Australian		
Yes	29 (12)	64 (18)
No	206 (88)	290 (72)
Highest education		
Primary	7 (3)	12 (3)
Secondary	163 (69)	265 (75)
Tertiary	65 (28)	77 (22)
Income source		
Government benefits	Not reported	335 (95)
Paid work	Not reported	13 (4)
Other	Not reported	6 (2)
Weekly income (net)		
<$200	43 (18)	81 (23)
$201-$400	145 (62)	172 (49)
>$400	34 (15)	79 (22)
Prefer not to answer	13 (6)	22 (6)
Marital status		
Married/De facto	32 (14)	87 (25)

Characteristic	Bryant et al's study (160) n = 235 smokers	Guillaumier et al's study (161) n = 354 smokers
	n (%)	
Separated/divorced	54 (23)	103 (29)
Never married/ single/widowed	149 (63)	164 (46)
Smoking related variables		
Heaviness of Smoking Index		
Low (0-2)	86 (37)	135 (38)
Moderate (3-4)	104 (44)	153 (43)
High (5-6)	45 (19)	66 (19)
Ever made a quit attempt (Yes/No)		
Yes	181 (77)	295 (83)
Cigarettes per day (mean, SD)	16.8 (11)	16.4 (11)
Number of quit attempts made in the past 12 months (mean, SD)	2.1 (3)	3.3 (8)

Summary

Overall, there is evidence that smokers of lower SEP are more likely to initiate

smoking, be nicotine dependent, be less likely to express high levels of self-efficacy for

quitting, more likely to report social environments that are conducive to smoking and

less likely to quit successfully compared to smokers of higher SEP. Evidence also

suggests that selected socioeconomically disadvantaged subgroups of the population

exhibit higher smoking prevalence and higher burden of illness, despite comparable levels of interest in quitting. These subgroups include people: who are unemployed; with mental health or substance use problems; from Indigenous communities; experiencing homelessness and people who are sole parents. These subgroups are more likely to experience multiple forms of socioeconomic disadvantage and are less likely to be included in epidemiological or population-wide studies. Evidence for small to moderate effects of smoking cessation programs in these groups have been described elsewhere, however the majority of reviews cite the need for more rigorous data examining what specifically works in promoting smoking cessation within disadvantaged groups.

What is less known about smokers who experience multiple forms of socioeconomic disadvantage are the factors that are associated with successfully quitting, the interplay between smoking and other health behaviours (the most common being alcohol and cannabis use), and the factors that need to be addressed in order to enhance the effectiveness of smoking cessation interventions and the use of cessation aids, and the use of emerging alternative tobacco products, namely electronic nicotine delivery systems (ENDS).

Data collection sources for this thesis

Two cross-sectional surveys formed the basis for data collection for this thesis. The first survey was the baseline survey for a randomised, controlled trial of a smoking cessation intervention in New South Wales, Australia from February 2012 to December 2014. The baseline survey for the trial assessed smoking status, demographic information, alcohol use, smoking related characteristics and psychosocial variables including anxiety and depression and social support in a sample of CSO clients. Clients

were eligible to complete the baseline survey regardless of their smoking status or motivation to quit smoking.

The second cross-sectional survey was carried out in two CSOs in New South Wales, Australia, from October 2013 to July 2014. This survey assessed demographic information, cannabis use, electronic cigarette use and perceived barriers to smoking cessation. Only self-reported current daily or occasional smokers were eligible to complete this survey. Both of these surveys were developed and conducted at different time points for different projects with differing aims. Therefore, while the content of both surveys was similar, they did not measure all of the same constructs.

Using Saunders et al's framework (26), the papers in this thesis will focus on the experiences and characteristics of clients of community service organisations, who represent a subgroup of the Australian population who experience multiple and intense levels of socioeconomic disadvantage in order to increase our understanding of the potential causes of disparities in smoking prevalence. Clients of CSOs include Indigenous peoples; people with mental health problems; people with substance use problems; people who are homeless; and sole parents (158).

1.6 Aims of this thesis:

The aims of this thesis were to provide an exploratory investigation into the factors that inhibit or undermine quitting smoking, with a view to addressing gaps in the research concerning socioeconomically disadvantaged people and smoking. It aimed to provide clear recommendations for the key components of smoking cessation interventions targeted at socioeconomically disadvantaged smokers in order to enhance the effectiveness of existing programs to reduce smoking prevalence and reduce the burden of illness experienced in these groups.

Research questions:

1. What are the characteristic of socioeconomically disadvantaged smokers who were successful at quitting and those who are unsuccessful?

2. What are the common barriers to smoking cessation experienced across selected disadvantaged groups, and which barriers are unique to specific groups?

3. What are the perceived priority barriers to smoking cessation that need to be addressed for socioeconomically disadvantaged smokers?

4. What are the rates of alcohol and cannabis use in socioeconomically disadvantaged smokers and how might they explain the difficulty smokers experience when quitting?

5. How are electronic cigarettes being perceived and used by socioeconomically disadvantaged smokers?

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2. Paper One. What factors are associated with abstinence amongst socioeconomically disadvantaged smokers? A cross sectional survey of reasons for quitting, use of cessation aids and quitting approach.

13. Associated appendices:

13.1 Ethics approval for RCT

13.2 Baseline survey for RCT

Twyman L, Bonevski B, Paul C, Bryant J, West R, Siahpush M, D'Este C, Oldmeadow C, Palazzi K.. What factors are associated with abstinence amongst socioeconomically disadvantaged smokers? A cross sectional survey of smoker characteristics, reasons for quitting, use of quitting support and quitting approach. *Nicotine & Tobacco Research.* Under Editorial Review.

2.1 ABSTRACT

Introduction: This study aimed to compare sociodemographic and psychosocial characteristics, use of cessation aids and abrupt versus gradual quitting approaches between ex-smokers and current smokers, and report ex-smokers reasons for quitting.

Design and Methods: A cross-sectional survey of financially disadvantaged adults attending a community service organisation was conducted in New South Wales, Australia. Sociodemographic and psychosocial factors, use of cessation aids, ex-smokers' reasons for quitting and gradual versus abrupt quit approach were assessed. Chi-squared tests and logistic regression compared characteristics of current smokers and ex-smokers.

Results: Of 905 individuals who completed the survey, 639 (71%) were current smokers, and 107 (12%) were ex-smokers. Ex-smokers were older (OR = 1.03, 95% CI = 1.01, 1.05), more likely to be female (OR = 1.67, 95% CI = 1.06, 2.65), less financially stressed (OR = 0.87, 95% CI = 0.76, 0.99), had lower levels of anxiety and depression (OR = 0.91, 95% CI = 0.84, 0.98), and fewer friends and family who were smokers (ORs ranged from 0.30 - 0.43). Ex-smokers reported health and cost as the main reasons for quitting. Ex-smokers were less likely to use cessation aids and were more likely to report abrupt quitting during their last quit attempt (OR = 4.48, 95% CI = 2.66, 7.54).

Discussion: Lower levels of disadvantage, less smoking in social networks, use of cessation aids and abrupt quitting approaches were associated with being an ex-smoker. Lower use of evidence based methods to quit by disadvantaged ex-smokers requires further exploration.

2.2 INTRODUCTION

Individuals who are socioeconomically disadvantaged are more likely to initiate tobacco smoking, transition to regular smoking (1-3) and to be more highly nicotine dependent (4, 5) than smokers who are more advantaged. Disadvantaged smokers are also less likely to quit smoking successfully (4, 6-8). Other factors that negatively impact on quit success in smokers from the general population include financial stress (7, 9); mental health issues (10); heavy alcohol use (11) and amount of smoking in an individual's social networks (12, 13).

Within the general population, use of evidence based cessation aids including Nicotine Replacement Therapy (NRT) (14), other stop smoking medicines including bupropion and varenicline (15-17), individual, group and telephone based counselling (18-20), and help to quit provided by health professionals (21) increase the likelihood of quitting smoking. Smokers' motivations for quitting have also been associated with likelihood of maintaining smoking cessation. Generally, smokers who report intrinsic reasons for quitting that are related to health or financial concerns are more likely to be successfully quit at follow up (22).

Quitting smoking abruptly or gradually may also impact on the likelihood of quitting successfully. A recent Cochrane review examining the effect of gradual versus abrupt quitting in smokers wanting to quit found no significant difference in cessation rates between the two approaches (23). However, observational studies conducted with smokers not necessarily wanting to quit have reported that gradual quitting is associated with lower likelihood of maintaining smoking cessation (24, 25). Smokers enrolled in cessation trials who quit gradually (as opposed to smokers who attempt to quit gradually on their own) may be more motivated to quit; more likely to use a structured cut down to quit approach with a quit date, and to receive additional behavioural or

pharmacological support (23, 24, 26). Differences in the effectiveness of gradual or abrupt quitting approaches have especially important implications for disadvantaged smokers, as evidence suggests smokers with lower income and lower education levels are more likely to report quitting gradually rather than abruptly during their most recent quit attempt (26).

Due to the lower quit rates in socioeconomically disadvantaged smokers, who represent a group that is hard to reach and retain for research purposes, there is limited data on the characteristics of successful quitters in terms of their sociodemographic and psychosocial characteristics , use of cessation aids or approaches to quitting (27). Examining the differences between socioeconomically disadvantaged smokers and ex-smokers may provide guidance as to what sociodemographic and quitting related factors need to be targeted or further examined in order to enhance quit rates in socioeconomically disadvantaged smokers.

Therefore, in a socioeconomically disadvantaged sample, the current study aimed to:

1. compare sociodemographic and psychosocial variables between ex-smokers and current smokers;

2. compare use of cessation aids between smokers and ex-smokers;

3. identify reasons for quitting reported by ex-smokers;

4. and compare abrupt versus gradual quitting approaches between current smokers and ex-smokers.

This study will provide new evidence on factors that are associated with being an ex-smoker in a socioeconomically disadvantaged, hard to reach subgroup of individuals.

2.3 METHODS

Study design & Setting

A cross sectional survey was conducted at a non-government community service organisation (CSO) in New South Wales, Australia, from February 2012 to December 2013. Methods for recruitment of disadvantaged smokers from hard to reach populations were followed (28). CSOs offer help with issues such as mental illness, homelessness, alcohol and other drug problems, Aboriginal health, at risk youth and family support and provide services including financial aid and food vouchers. Clients of CSOs demonstrate some of the highest rates of social and economic disadvantaged in Australia, including people who are unemployed, people receiving welfare as their main source of income, sole parents, and Aboriginal and Torres Strait Islander peoples (29).

Participants

A trained University qualified Research Assistant assessed eligibility of potential participants in conjunction with CSO staff. Eligibility criteria were: 1) being a current client of the CSO, 2) aged 18 years or older, 3) not under the influence of alcohol or other drugs at time of recruitment, and 4) not too distressed to complete the survey. CSO staff were consulted to ensure participants were well enough to complete the survey. Literacy was not assessed or part of the formal eligibility criteria.

Procedure

Eligible clients were informed about a health survey being conducted at the organisation and were asked to approach the Research Assistant (RA) for more information. Survey completion was taken as consent. The survey was administered via a touchscreen computer. The RA provided assistance in completing the survey where necessary. The survey included 62 items and the mean completion time was 14 minutes (range 5-21 minutes). Participants received a $20 grocery card gift voucher as

reimbursement for completing the survey. Ethics approval was granted by the University of Newcastle's Human Research Ethics Committee (HREC# 2010-1002).

Measures

Smoking status

Self-reported smoking status was assessed using the following question: "Do you currently smoke tobacco products?" with response options 1) Yes, daily, 2) Yes, at least once a week, 3) Yes but less often than once a week and 4) No, not at all. Participants who responded Yes daily, Yes once a week or Yes but less often than once a week and who had answered Yes to the question "Have you smoked at least 100 cigarettes or a similar amount of tobacco in your life?" were defined as current smokers and included in this study. Participants who responded No, not at all and who answered Yes to the question "Have you smoked at least 100 cigarettes or a similar amount of tobacco in your life?" were defined as ex-smokers. Ex-smokers were asked "How long has it been since you quit smoking?" with response options: 1)Less than three months; 2) three to six months; 3) between six and twelve months; 4) between one and two years; 5) between two and five years, 6) more than five years.

Sociodemographic characteristics

Age, gender, marital status, housing, weekly income, highest level of education and Aboriginal or Torres Strait Islander status were assessed for both current and ex-smokers.

Psychosocial characteristics

The following psychosocial characteristics were also assessed for both ex-smokers and current smokers. The Alcohol Use Disorders Identification Test – Short form (AUDIT-C) was used to measure alcohol use (30). Scores of four or more for males (30) and three or more for females (31) indicated heavy drinking. The financial stress scale (32)

assesses participants' experience of financial stress in terms of six measures of financial or material deprivation for example "went without meals". Scores on this scale range from zero to eight, with higher values indicating higher levels of financial stress. The Patient Health Questionnaire – 4 (PHQ4) was used as an ultra-brief screening measure for both anxiety and depression. Higher scores indicate higher likelihood of underlying depressive or anxiety disorder (33). Resilience was measured using the Brief Resilience Scale (BRS) (34) which comprises six items and conceptualises resilience as an individual's way of "bouncing back" after adversity. Higher scores indicate higher levels of resilience. Current and ex-smokers were also asked to estimate the number of friends and family they had who were smokers with response options: 1) None, 2) A few/less than half, 3) About half, or 4) Most or all of them.

Use of cessation aids

Participants were asked whether during their last quit attempt they had used the following cessation aids: NRT – Prescribed; NRT – Over The Counter (OTC); Medication: varenicline (Champix); Medication: buproprion (Zyban); Going to see a GP; Group counselling; Internet support; Exercise; Distractions; Relaxation or meditation; Other; Self-help book/brochure; Telephone support; Herbal/Natural remedies; Acupuncture or hypnosis; Own willpower, no help (35).

Reasons for quitting

Ex-smokers were also administered a modified version of the Reasons for Quitting scale (36, 37). The scale items were slightly modified for ex-smokers (reworded to past tense to refer to reasons why they quit). Four items were added: "I wanted to be a good example to my kids", "To get rid of bad cigarette breath or taste in my mouth"; "It was getting harder to smoke in public" and "I was concerned about exposing others to my cigarette smoke".

Abrupt versus gradual quitting

Participants were asked whether *during their most recent quit attempt* they had 1) stopped smoking suddenly or 2) gradually cut down the number of cigarettes they smoked or 3) could not remember what they did during their last attempt. Current smokers were then asked "If you were thinking of quitting smoking, would you prefer to 1) stop smoking suddenly, 2) gradually cut down the number of cigarettes smoked or 3) have no preference (38).

Data analysis

Descriptive statistics (count and percent, mean (SD) or median (IQR)) are reported for sociodemographic and psychosocial variables, use of cessation aids and gradual quit methods for both smokers and ex-smokers; comparative tests (Chi-squared or Fisher's Exact tests, Independent t-test, or Mann-Whitney U test) were used to investigate differences by smoker status. Descriptive statistics (count and percent) were also calculated for ex-smokers reasons for quitting.

Logistic regression was used to examine the characteristics associated with being an ex-smoker compared to current smoker, and whether abrupt vs gradual quitting was associated with smoker status. The variables examined in logistic regression models were: age, gender, Aboriginal and/or Torres Strait Islander status, highest level of education, risky alcohol consumption, amount of friends and family who were smokers, symptoms of anxiety and depression (total score on PHQ-4), resilience (total score on BRS) and total financial stress score. Smoking status (current versus ex) was also included in the logistic regression examining abrupt versus gradual approaches used to quit. Participants who reported not being able to remember how they quit during their most recent quit attempt were not included in the logistic regression analysis for approach used to quit (n = 60).

Collinearity of variables was checked using Variance Inflation Factors (VIFS) and linearity assumption for continuous variables and the (log) outcome were examined. Crude and adjusted odds ratios, with 95% confidence intervals and Wald p-values were calculated for variables in the model. Variables were considered for removal from the final model if they had a Wald test p-value > 0.2 and their removal did not negatively affect either the fit of the model (assessed by a likelihood ratio test p-value < 0.2 or more than four point increase in Akaike Information Criterion (AIC)) or change the estimates for remaining variables by no more than 10%. SAS 9.4 (SAS Institute Inc., Cary, NC, USA) was used for all analyses.

2.4 RESULTS

Response rates

Of 919 participants who approached the Research Assistant, 905 consented and provided complete survey data (98%). Of the 905 subjects who completed the baseline questionnaire, 639 (71%) were classified as current smokers, 107 (12%) were ex-smokers and 159 (18%) were never smokers. Current and ex-smokers were included in the following analyses (n = 746).

Sociodemographic and psychosocial characteristics of participants

As seen in Table 1, participants reported multiple forms of disadvantage: 82% (n = 579) reporting income of $400 AUD per week or less; well below the Australian single-person 'poverty line' of $500 per week (39); and 93% (n = 694) received government benefits as their main source of income. Individuals self-identifying as Aboriginal and/or Torres Strait Islander made up 16% (n = 118) of participants compared to 2% of the population in New South Wales (40).

Current smokers displayed high levels of nicotine dependence, with 64% (n = 345) scoring moderate to high on the Heaviness of Smoking Index (scores over four). Around a third of current smokers (35%, n = 223) reported high motivation levels to quit (scores over 7 on a 10 point scale). Self-efficacy levels were low with 52% of current smokers (n = 330) reporting they were not at all or slightly sure they would be able to succeed if they attempted to quit (data not presented). One hundred current smokers reported never having made a quit attempt. These smokers were excluded from gradual/abrupt and cessation aid analyses.

The majority of ex-smokers had been quit for six months or longer (n = 76, 72%), with 64% reporting being quit for 12 months or more (n = 68). Less than a third had been quit for less than six months (n = 31, 29%) and 30% (n = 32) had quit more than five years ago. There were no significant differences between ex-smokers who had quit less than six months ago versus those who had quit for six months or longer. Therefore, all ex-smokers were included in modelling regardless of length of time since they had quit. The quit ratio for the sample (number of ex-smokers/number of ever smokers) was 14.3%.

Ex-smoker and current smoker sociodemographic and psychosocial factors

In the multivariable model (see Table 2), participants who were older (OR = 1.03, CI = 1.01, 1.05), female (OR = 1.67, CI = 1.06, 2.65), less financially stressed (0.87, CI = 0.76, 0.99), had lower levels of anxiety and depression (OR = 0.91, CI = 0.84, 0.98), and were less likely to report that about half (OR = 0.43, CI = 0.20, 0.95) or

Table 1. Sociodemographic and psychosocial characteristics overall and by smoking status

Characteristic		Smoking status			
		Ex-smoker (n=107)	Smoker (n=639)	Total (N=746)	p-value
Age	mean (SD) years	43 (14)	38 (11)	39 (12)	<0.01
Gender	Male	40 (37%)	320 (50%)	360 (48%)	0.02
	Female	67 (63%)	319 (50%)	386 (52%)	
Education	Primary school only	12 (11%)	126 (20%)	138 (18%)	0.04
	Secondary or less	59 (55%)	356 (56%)	415 (56%)	
	Tertiary qualifications	36 (34%)	157 (25%)	193 (26%)	
Indigenous status[a]	No	90 (84%)	538 (84%)	628 (84%)	0.98
	Aboriginal and/or Torres Strait Islander descent	17 (16%)	101 (16%)	118 (16%)	
Housing	Own house	7 (6.5%)	20 (3.1%)	27 (3.6%)	0.04
	Rental house	42 (39%)	188 (29%)	230 (31%)	
	Family or friends, hotel/motel, no home, street living	8 (7.5%)	88 (14%)	96 (13%)	
	Supported /government housing	48 (45%)	317 (50%)	365 (49%)	
	Other	2 (1.9%)	26 (4.1%)	28 (3.8%)	
Marital status	Married/living with partner	34 (32%)	86 (13%)	120 (16%)	<0.01
	Separated/divorced	30 (28%)	187 (29%)	217 (29%)	
	Never married or single	42 (39%)	347 (54%)	389 (52%)	
	Widowed	1 (0.9%)	19 (3.0%)	20 (2.7%)	
Income amount	Less than $200 per week	19 (18%)	171 (28%)	190 (27%)	<0.01
	Between $201-$400 per week	51 (49%)	338 (56%)	389 (55%)	
	More than $400 per week	34 (33%)	94 (16%)	128 (18%)	
Income source	Paid employment (full or part time)	12 (11%)	22 (3.4%)	34 (4.6%)	<0.01
	Government pension or benefit	91 (85%)	603 (94%)	694 (93%)	
	Other	4 (3.7%)	14 (2.2%)	18 (2.4%)	
Alcohol risk	Non-drinker	32 (30%)	170 (27%)	202 (27%)	0.12
	Non-risky drinker	23 (21%)	94 (15%)	117 (16%)	
	Risky drinker	52 (49%)	367 (58%)	419 (57%)	
Friends or family who Smoke	None	16 (15%)	56 (8.8%)	72 (9.7%)	<0.01
	A few/less than half	60 (56%)	194 (30%)	254 (34%)	
	About half	17 (16%)	158 (25%)	175 (23%)	
	Most or all of them	14 (13%)	231 (36%)	245 (33%)	
Financial stress	mean (SD) score	4.83 (1.86)	5.66 (1.74)	5.54 (1.78)	<0.01
Anxiety/Depression (PHQ4)	median (IQR) score	4 (1,7)	6 (3,9)	6 (3,9)	<0.01
Resilience	median (IQR) score	3.2 (2.5, 3.7)	3 (2.3, 3.3)	3 (2.3, 3.3)	<0.01

[a]Aboriginal and Torres Strait Islander Status has been collapsed into Indigenous v. not Indigenous due to low cell sizes. It should be noted that Aboriginal and Torres Strait Islander origin represents two distinct cultures. IQR = Inter quartile range, SD = standard deviation.

most or all (OR = 0.30, CI = 0.13, 0.67) of their friends and family were smokers had higher odds of being ex-smokers.

Use of cessation aids

Current smokers were significantly more likely than ex-smokers to have used prescription NRT (24% versus 5%, p <0.01); over the counter NRT (19% versus 9%, p = 0.014); self-help books and brochures (8% versus 1%, p = 0.01); a telephone based quitline (6% versus 0%, p = 0.01) or a visit to the GP (16% versus 7%, p = 0.02) during their most recent quit attempt. Low numbers of ex-smokers prevented multivariable analyses (n = 107, see Table 3). Other comparisons between current and ex-smokers' use of cessation aids did not reach significance in this sample.

Reasons for quitting reported by ex-smokers

The top three most frequently reported reasons for quitting were related to health: sickness (48%); because smoking was hurting participants' health (56%) and because participants felt like smoking was shortening their life (52%). A considerable proportion of participants (45%) also strongly agreed that quitting smoking for financial reasons was a motivation for quitting (see Table 4).

Quit approach (gradual reduction or abrupt cessation)

The majority of ex-smokers (n = 77, 72%) reported quitting abruptly compared to 37% (n = 200) of current smokers who reported quitting abruptly (see Table 3). Approximately half of current smokers (53%; n = 284) reported quitting gradually compared to 23% of ex-smokers (n = 25). In multivariable analysis the odds of using an abrupt (vs gradual) quit approach were higher in ex-smokers (OR = 4.48, CI = 2.67, 7.54; see Table 5). Sixty participants (9%) reported not being able to remember whether they quit gradually or abruptly during their most recent quit attempt and were not included in the multivariate analysis.

Table 2. Association between socio-demographic and psychosocial characteristics and being an ex-smoker (compared to a current smoker)

Characteristic	Comparison	Unadjusted				Adjusted			
		OR	95%CI Lower	95%CI Upper	p-value	OR	95%CI Lower	95%CI Upper	p-value
Age	per year	1.04	1.02	1.01	<0.01	1.03	1.01	1.05	<0.01
Gender					0.02				0.03
	Male	1.00				1.00			
	Female	1.68	1.10	2.56		1.67	1.06	2.65	
Education					0.04				0.07
	Primary school	1.00				1.00			
	Secondary or less	1.74	0.91	3.34	0.10	2.11	1.03	4.34	0.04
	Tertiary qualifications	2.41	1.20	4.82	0.01	2.39	1.11	5.14	0.03
Indigenous					0.98				0.16
	Not Indigenous	1.00				1.00			
	Aboriginal and/or Torres Strait Islander descent	1.01	0.58	1.76		1.56	0.84	2.90	
Alcohol risk					0.12				0.24
	Non-drinker	1.00				1.00			
	Non-risky drinker	1.30	0.72	2.35	0.39	1.71	0.88	3.31	0.11
	Risky drinker	0.75	0.47	1.21	0.24	1.10	0.65	1.86	0.73
Friends or family who Smoke					<0.01				<0.01
	None	1.00				1.00			
	A few/less than half	1.08	0.58	2.03	0.80	1.05	0.54	2.05	0.88
	About half	0.38	0.18	0.80	0.01	0.43	0.20	0.95	0.04
	Most or all of them	0.21	0.10	0.46	<0.01	0.30	0.13	0.67	<0.01
Financial stress	per unit	0.78	0.70	0.87	<0.01	0.87	0.76	0.99	0.03
Anxiety/Depression (PHQ4)	per unit	0.86	0.81	0.92	<0.01	0.91	0.84	0.96	0.01
Resilience	per unit	1.44	1.11	1.87	0.01	1.07	0.79	1.45	0.67

Table 3. Quit approach and use of cessation aids

Characteristic	Class/Statistic	Ex-smoker (n=107)	Smoker (n=539)	Total (N=646)	p-value
		Smoking status			
Quit attempt	Stopped smoking suddenly	77 (72%)	200 (37%)	277 (43%)	<0.01
	Gradually cut down	25 (23%)	284 (53%)	309 (48%)	
	Unable to remember	5 (5%)	55 (10%)	60 (9%)	
Quit preference	Stop smoking suddenly	-	185 (34%)		
	Gradually cut down	-	308 (57%)		
	No preference	-	46 (9%)		
Ex-smoker length of time since quit	Less than six months ago	31 (29%)	-		
	Between six and twelve months ago	8 (8%)	-		
	More than twelve months ago	36 (34%)	-		
	More than five years ago	32 (30%)	-		
Use of cessation aids					
	NRT (prescription)	5 (5%)	122 (24%)	127 (20%)	<0.01
	NRT (over the counter)	9 (9%)	97 (19%)	106 (17%)	0.01
	Medication (Zyban, buproprion)	3 (3%)	39 (8%)	42 (7%)	0.09
	Medication (Champix, varenicline)	17 (17%)	85 (16%)	102 (16%)	0.98
	Self-help book/brochure	1 (1%)	41 (8%)	42 (7%)	0.01
	Herbal/natural remedies	4 (4%)	26 (5%)	30 (5%)	0.80
	Relaxation or meditation	5 (5%)	56 (11%)	61 (10%)	0.06
	Group counselling	0	13 (3%)	13 (2%)	0.14
	Internet support	1 (1%)	8 (2%)	9 (1%)	1.00
	Telephone support (Quitline)	0	29 (6%)	29 (5%)	0.01
	Own willpower, no help	61 (59%)	253 (49%)	314 (51%)	0.05
	Distractions	15 (15%)	106 (20%)	121 (19%)	0.17
	Exercise	21 (20%)	111 (21%)	132 (21%)	0.81
	GP visit	7 (7%)	83 (16%)	90 (14%)	0.02
	Acupuncture or hypnosis	1 (1%)	14 (3%)	15 (2%)	0.49
	Other	12 (12%)	44 (9%)	56 (9%)	0.31

Table 4. Reasons for quitting (Ex-smokers only; n=107)[a]

Quit reasons	Not at all true	A little true	Moderately true	Quite true	Extremely true
Because I was afraid that I would get very sick if I didn't quit smoking (I)	23 (21%)	10 (10%)	8 (8%)	15 (14%)	51 (48%)
To prove that I could quit if I really wanted to (I)	40 (37%)	16 (15%)	12 (11%)	11 (10%)	28 (26%)
Because I felt like smoking was hurting my health (I)	18 (17%)	8 (8%)	6 (6%)	15 (14%)	60 (56%)
To feel in control of my life (I)	28 (26%)	13 (12%)	14 (13%)	17 (16%)	35 (33%)
To show that I could do other things that are more important to me (I)	38 (36%)	13 (12%)	12 (11%)	16 (15%)	28 (26%)
Because I was afraid that smoking would shorten my life (I)	31 (29%)	5 (5%)	7 (6%)	8 (8%)	56 (52%)
So other people would stop nagging me (E)	57 (53%)	18 (17%)	10 (9%)	4 (4%)	18 (17%)
To save the money that I spent on cigarettes (E)	23 (21%)	11 (10%)	10 (9%)	15 (14%)	48 (45%)
Because someone was making me quit (E)	71 (66%)	13 (12%)	9 (8%)	3 (3%)	11 (10%)
So I wouldn't burn holes in clothes or furniture (E)	89 (83%)	10 (9%)	2 (2%)	2 (2%)	4 (4%)
Because people I am close to would have been mad at me if I didn't quit (E)	64 (60%)	15 (14%)	10 (9%)	3 (3%)	15 (14%)
So my house or car wouldn't smell (E)	50 (47%)	22 (21%)	12 (11%)	10 (9%)	13 (12%)
Because I wanted to be a good example to my kids (I)	42 (39%)	5 (5%)	11 (10%)	9 (8%)	40 (37%)
To get rid of bad cigarette breath or taste in my mouth (I)	37 (35%)	19 (18%)	10 (9%)	10 (9%)	31 (29%)
Because it was getting harder to smoke in public places (E)	70 (65%)	19 (18%)	7 (7%)	4 (4%)	7 (7%)
Because I was concerned about exposing others to my cigarette smoke (E)	35 (33%)	10 (9%)	20 (19%)	13 (12%)	29 (27%)

[a]E = extrinsic, I = intrinsic

Table 5. Association with abrupt vs gradual quitting (n = 581)

Characteristic	Comparison	Unadjusted				Adjusted			
		Odds Ratio	95%CI Lower	95%CI Upper	p-value	Odds Ratio	95%CI Lower	95%CI Upper	p-value
Smoking status					<0.01				<0.01
	Smoker	1.00				1.00			
	Ex-smoker	4.37	2.69	7.11		4.48	2.67	7.54	
Age	per year	0.99	0.98	1.01	0.27	1.03	0.99	1.02	0.71
Gender					0.61				0.28
	Male	1.00				1.00			
	Female	1.09	0.79	1.50		1.21	0.85	1.72	
Education					0.45				0.29
	Primary school	1.00				1.00			
	Secondary or less	1.30	0.83	2.02	0.25	1.47	0.91	2.35	0.12
	Tertiary qualifications	1.10	0.67	1.80	0.71	1.35	0.79	2.30	0.27
Indigenous					0.57				0.54
	Not Indigenous	1.00				1.00			
	Aboriginal and/or Torres Strait Islander descent	1.14	0.73	1.78		1.16	0.72	1.89	
Alcohol risk					0.94				0.98
	Non-drinker	1.00				1.00			
	Non-risky drinker	0.93	0.56	1.54	0.77	0.99	0.58	1.71	0.99
	Risky drinker	1.01	0.69	1.48	0.98	0.97	0.64	1.45	0.87
Friends or Family who smoke					0.06				0.53
	None	1.00				1.00			
	A few/less than half	0.84	0.46	1.53	0.57	0.85	0.45	1.62	0.63
	About half	1.37	0.73	2.58	0.32	1.16	0.59	2.28	0.66
	Most or all of them	1.35	0.74	2.49	0.33	1.13	0.58	2.18	0.72
Financial Stress	per unit	1.08	0.99	1.19	0.08	1.05	0.94	1.16	0.42
Anxiety/Depression (PHQ4)	per unit	1.00	0.96	1.05	0.85	0.94	0.89	0.99	0.03
Resilience	per unit	0.77	0.63	0.95	0.012	0.74	0.58	0.94	0.01

2.5 DISCUSSION

This study reports on differences in sociodemographic and psychosocial characteristics and use of cessation aids and approach to quitting between current smokers and ex-smokers who were experiencing multiple forms of socioeconomic disadvantage. Compared to current smokers, ex-smokers reported lower levels of financial stress, lower levels of anxiety and depression, and had fewer friends and family who smoke. Ex-smokers were also more likely to be older and female. Current smokers were consistently more likely to have reported using evidence based aids to cessation than ex-smokers. The three most strongly agreed with reasons for quitting were intrinsic and health related. Ex-smokers were more likely to report using abrupt quit approaches rather than gradual quit approaches.

Characteristics of smokers and ex-smokers

Supporting previous research, this study found that ex-smokers were more likely to report lower numbers of peer and family smoking, as well as lower levels of financial stress, anxiety and depression. Unlike most studies conducted with the general population (41), ex-smokers were more likely to be female and older. While this study was not able to adjust for smoking related variables including nicotine dependence (and thus this finding should be interpreted with caution), this may signal that men and younger people who are disadvantaged may require extra efforts in order to increase their smoking cessation rates.

Supporting previous research, this study found that high numbers of family and friends who were smokers was associated with lower likelihood of being an ex-smoker. The current study extends the earlier work conducted in general population samples by demonstrating that differential effects exist even within a sample experiencing multiple levels of socioeconomic disadvantage. Socioeconomically disadvantaged smokers are

more likely to report higher numbers of friends who smoke (42). Higher numbers of family and friends who smoke may be related to higher levels of perceived acceptability and accessibility in disadvantaged smokers (12, 43); and may also be related to increased chance of relapse through higher exposure to cues to smoke (42).

Ex-smokers consistently reported lower levels of deprivation, anxiety and depression symptoms. Research typically reports that people without anxiety, depression and other mental illness are more likely to successfully quit smoking (10). On the other hand, quitting smoking is also associated with improvements in mental health (44). In the current study we are unable to draw conclusions about causality. Quitting smoking in order to save money was a frequently reported reason for quitting among ex-smokers. Lower levels of financial stress were also associated with higher likelihood of being an ex-smoker. Existing research suggests that smokers who quit experience significant reductions in levels of financial stress (45), but that smokers experiencing high levels of financial stress are less likely to attempt to quit and more likely to relapse (7, 9). It is not clear in the current study whether individuals with lower levels of financial stress were in a better position to quit smoking, or if the individuals who quit smoking had greater disposable income from not purchasing cigarettes and therefore experienced lower levels of financial stress.

Use of evidence based cessation aids

Ex-smokers were consistently less likely to report use of evidence based cessation aids during their most recent quit attempt. There is strong evidence to suggest that use of evidence based cessation aids increases the likelihood of quitting smoking (46). Therefore, it is unlikely that the use of these cessation aids contributed to current smokers being unable to maintain smoking cessation on their most recent quit attempt. It is likely that other factors associated with quit success, such as nicotine dependence,

may also play a role. Smokers who are more heavily dependent on nicotine are more likely to use cessation aids than individuals who are not dependent (47-49), and high levels of nicotine dependence are also associated with lower likelihood of maintaining abstinence (41). Smokers who are socioeconomically disadvantaged are also more likely to have higher levels of nicotine dependence (5). There is a need for prospective studies to increase understanding of use of cessation methods and change in smoker status in disadvantaged groups over time. The current study only asked participants about use of cessation aids on their most recent quit attempt. Thus, it is possible ex-smokers had used cessation aids prior to the current quit attempt.

Furthermore, overall use of evidence based cessation aids to quit was low, reflecting general population findings that suggest most smokers quit unaided (35, 50). Increasing use of evidence based approaches to quit, including NRT and behavioural counselling, may be especially useful for highly disadvantaged smokers who face greater barriers to smoking cessation including higher levels of nicotine dependence (51) and lower levels of access to cessation services (50).

Reasons for quitting

Ex-smokers were most likely to report intrinsic rather than extrinsic motivations to quit smoking. This supports previous research indicating that smokers with more intrinsic reasons for quitting were more likely to be further along the stages of change model (more ready to quit) and more likely to be abstinent for a longer period of time (22, 37).

Abrupt versus gradual quitting

Gradual quitting was preferred by current smokers, which reflects research suggesting that smokers with lower income and lower levels of education were more likely to report quitting gradually on their last quit attempt (26). Moreover, even though

their most recent quit attempt had failed, the majority of current smokers reported gradual cessation as their preferred approach during their next attempt. This has important implications as smokers who quit gradually and are not enrolled in a program that offers structured gradual quitting may be less likely to succeed (23). Structured gradual quit programs that involve setting a quit date and the use of additional behavioural and pharmacological support result in similar outcomes to abrupt quitting approaches (23).

Implications for programs and policy

Interventions designed for disadvantaged smokers should consider smokers' levels of financial stress, the number of smokers in the individual's social networks, identifying smokers' intrinsic reasons for quitting, the enhancement of use of cessation aids and the possibility of providing structured gradual quit approaches. Young people and men who experience multiple types of disadvantage may require additional targeting in order to help them quit.

Overall use of aids to cessation amongst disadvantaged smokers experiencing multiple forms of disadvantage can be enhanced. Additionally, examining disadvantaged smokers reasons for not using aids to cessation may also be explored further. In depth assessment of NRT use and adherence, use in conjunction with smoking and reasons for stopping use should be explored. Barriers to use of cessation aids including pharmacotherapy and behavioural counselling include: perceived cost, perceived effectiveness, and acceptability of these treatments (43). In depth qualitative examination of the quitting methods used by disadvantaged smokers may also be required, as little is known about the most effective way to increase use of and adherence to cessation aids in disadvantaged groups (52).

Gradual quit approaches may be more acceptable to disadvantaged current smokers. Future research should expand on disadvantaged smokers' reasons for preferring gradual quit approaches and their definitions of gradually quitting. Further research is needed in order to identify the smoking related factors associated with gradual quitting preferences in disadvantaged smokers and the effectiveness of gradual approaches for disadvantaged smokers who appear to face numerous barriers to maintaining cessation.

Strengths and limitations

This study provides novel findings regarding the sociodemographic and psychosocial differences between socioeconomically disadvantaged smokers and ex-smokers sociodemographic and psychosocial characteristics, the use of cessation aids and approaches to quitting. This study is one of the first to examine these differences with a large number of individuals experiencing multiple forms of socioeconomic disadvantage and who may be less likely to participate in population based research.

The use of a cross-sectional survey design means that the authors are unable to assess any predictive associations between factors of interest and quitting. For example, levels of nicotine dependence were not assessed for ex-smokers. Nicotine dependence is an important variable to assess in future studies concerned with use of cessation aids and cessation approaches in highly disadvantaged smokers and ex-smokers as higher levels of nicotine dependence may drive both use of cessation aids, choice of abrupt versus gradual cessation approaches and the likelihood of successfully quitting independently. The majority of ex-smokers had been quit for longer than 12 months, therefore recall bias may have impacted on ex-smokers ability to remember use of cessation aids when quitting. Obtaining accurate numbers of client presentations to the service in which this study was carried out was not possible. This limited the ability to

provide an estimate of eligibility rates in this convenience sample. Individual level data on pregnancy status was not assessed, and therefore we were unable to examine any differences in characteristics, use of cessation aids or methods used to quit between pregnant and non-pregnant women.

Conclusions

Even within individuals experiencing multiple forms of disadvantage there are sociodemographic and psychosocial differences between smokers and ex-smokers. Overall, ex-smokers appear to be female, older, and to report less financial stress, decreased symptoms of anxiety and depression, higher resilience scores and social networks that contain more non-smokers. Ex-smokers appear to be less likely to have used aids to cessation and more likely to report abrupt versus gradual cessation approaches, however this needs to be interpreted with caution as we were unable to adjust for nicotine dependence. Intrinsic and health related reasons for quitting were the most commonly reported reasons for ex-smokers.

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3. INTRODUCTION TO PAPER TWO

Paper One provided evidence that while many disadvantaged smokers were attempting to quit smoking, they were not able to maintain abstinence. This may be partly due to some of the social and demographic barriers to smoking cessation experienced by this group. The paper found that even in a sample of socioeconomically disadvantaged smokers, overall ex-smokers displayed higher income and education, and lower levels of financial stress, and anxiety and depression, than those who had not achieved sustained quitting. Paper One also found low levels of use of cessation aids by disadvantaged smokers.

A comprehensive approach to identifying the factors that prevent smoking cessation (both making a quit attempt and maintaining abstinence) in disadvantaged groups may help to inform the development of more effective smoking cessation programs. Synthesising the available literature on the barriers to smoking cessation in disadvantaged groups will allow the identification of commonly experienced barriers that can be addressed in future interventions that target disadvantaged groups. Such a synthesis would also allow the identification of unique barriers that may need to be considered in specific disadvantaged groups. Thus, Paper Two aims to identify the perceived barriers to smoking cessation in six selected vulnerable[1] groups through a systematic review of the qualitative and quantitative barriers literature.

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[1] Note in this chapter we refer to socioeconomically disadvantaged groups as "vulnerable groups" as per BMJ OPEN's publishing requirements

4. Paper Two: Perceived barriers to smoking cessation in selected vulnerable groups: a systematic review of the qualitative and quantitative literature

<u>14. Associated appendices:</u>

14.1 References of full text articles that were excluded

14.2 Summary of included quantitative studies

14.3 Summary of included qualitative studies

14.4 Summary of included mixed methods studies

14.5 Overview of study characteristics

14.6 Quality assessment of qualitative studies

14.7 Quality assessment of quantitative studies

14.8 Detailed results

14.9 Copy of qualitative quality assessment tool

14.10 Copy of quantitative quality assessment tool

14.11 Published manuscript

Twyman L, Bonevski B, Paul C, Bryant J. Perceived barriers to smoking cessation in selected vulnerable groups: a systematic review of the qualitative and quantitative literature. *BMJ Open.* 2014;4(12):e006414.

4.1 ABSTRACT

Objectives: To identify barriers which are common and unique to six selected vulnerable groups: low socioeconomic status; Indigenous; mental illness and substance abuse; homeless; prisoners and at-risk youth.

Design: A systematic review was carried out to identify the perceived barriers to smoking cessation within six vulnerable groups.

Data sources: Medline, EMBASE, CINAHL and PsycInfo were searched using keywords and MeSH terms from each database's inception published prior to March 2014.

Study selection: Studies that provided either qualitative or quantitative (i.e. longitudinal, cross-sectional or cohort surveys) descriptions of self-reported perceived barriers to quitting smoking in one of the six aforementioned vulnerable groups were included.

Data extraction: Two authors independently assessed studies for inclusion and extracted data.

Results: 65 eligible papers were identified: 24 with low socioeconomic groups, 16 with Indigenous groups, 18 involving people with a mental illness, three with homeless groups, two involving prisoners and one involving at risk youth. One study identified was carried out with participants who were homeless and addicted to alcohol and/or other drugs. Barriers common to all vulnerable groups included: smoking for stress management, lack of support from health and other service providers and the high prevalence and acceptability of smoking in vulnerable communities. Unique barriers were identified for people with a mental illness (e.g. maintenance of mental health), Indigenous groups (e.g. cultural and historical norms), prisoners (e.g. living conditions),

people who are homeless (e.g. competing priorities) and at risk youth (e.g. high accessibility of tobacco).

Conclusions: Vulnerable groups experience common barriers to smoking cessation, in addition to barriers that are unique to specific vulnerable groups. Individual-level and community and social network-level interventions are priority areas for future smoking cessation interventions within vulnerable groups.

Trial registration: A protocol for this review has been registered with PROSPERO International Prospective Register of Systematic Reviews [Identifier: CRD42013005761].

4.2 INTRODUCTION

Tobacco use is the leading global cause of avoidable death worldwide (1) and a key modifiable risk factor for the development of a range of diseases, including cardiovascular disease, chronic obstructive pulmonary disease, and some cancers (1).

The prevalence of tobacco smoking is inversely related to socioeconomic position (SEP) in high-income countries (1). For example, in 2010 in Australia, the prevalence of smoking was 24.6% in the lowest socioeconomic areas compared to 12.5% in the highest socioeconomic areas (2). The highest rates of smoking are evident among those who, in addition to low socioeconomic status, have other characteristics that distinguish them from the general population such as Indigenous groups (31% - 51.8%) (3-5); people with a mental illness (31.7-32.4%) (6), those with substance abuse disorders (77%) (7); the homeless (73%) (8); and prisoners (78% - 84%) (9, 10). These groups were selected because they represent a large proportion of those classified as vulnerable to socioeconomic disadvantage (11). It should be noted that although members of vulnerable groups are more likely to be socioeconomically disadvantaged, not all members are. For the purposes of this review, vulnerable groups are defined as groups that are more likely to experience social and material disadvantage due to lower income, cultural differences, and social exclusion (12).

Conflicting evidence exists regarding whether the rates of quit attempts in low SEP are similar to (13, 14) or lower (15-18) than the rates made by smokers in higher SEP. However, the success rate of quit attempts for lower SEP individuals is much lower than the success rate in higher SEP counterparts (14, 19).

There are many reasons quit success may be lower in vulnerable groups (20, 21). Within the health behaviour literature, factors that prevent an individual from undertaking health behaviour change have been referred to as barriers. Barriers are often

conceptualised as either structural or individual psychosocial factors (22). Structural barriers include systems, organisations and the relationship between systems and individuals, for example lack of accessible smoking cessation programs. Individual barriers refer to the subjective experience of the individual, for example physical addiction to nicotine.

This definition of barriers is congruent with the social determinants of health framework (SDHF)(23). The SDHF holds that an individual's health is influenced by factors across many levels, from individual genetic and physical characteristics, social and community networks, to broader influences of culture, socioeconomic determinants and the environment. This framework has been used to examine the determinants of health inequities(24). Because the SDHF classifies determinants of health as individual, social and broader cultural and environmental factors, it also allows the identification of distinct levels of intervention for health policies.

Within the general population, cross-sectional studies have found variation in the most commonly reported barriers to cessation. Enjoyment (79%)(25); cravings (75%) (25); and stress management (36% - 63%) (25, 26) are the most frequently reported barriers. Irritability (39% - 42%) (27); habit (39%) (26); withdrawal symptoms (28% - 48%) (25, 26); fear of failure (17% - 32%) (25, 26) and concern about weight gain (27%-34%) (25-27) are also identified as barriers to cessation.

The effect of socioeconomic position on perceived barriers to quitting was examined in a representative sample (n = 2,133) in the United Kingdom (28). Enjoyment (51%) and stress relief (47%) were the most frequently endorsed motives for continuing to smoke across the sample; however as socioeconomic position decreased, the likelihood of reporting stress management and avoiding boredom as motives to continue to smoke increased. This suggests that smokers from vulnerable groups may

experience barriers to smoking cessation differently than those in the general population (28).

Smoking in vulnerable groups is known to be influenced and perpetuated by a complex range of social, cultural and environmental factors (29) including high acceptability of smoking (30) and more tobacco retail outlets in low socioeconomic areas (31). Two previous studies have reviewed the literature to examine barriers to quitting smoking amongst vulnerable groups. One focussed on Aboriginal pregnant women (32), and one focussed on the barriers to smoking cessation service utilisation amongst low income smokers (33). Both reviews found pro-smoking social norms, inadequate knowledge regarding smoking related risks, and lack of access to appropriate cessation services inhibited participants' ability to quit.

As the term vulnerable applies to multiple discrete groups, it is important to understand which barriers (if any) are unique for example, cultural factors that inhibit smoking cessation may be unique to some Indigenous groups (32). A systematic examination of potential unique barriers would be valuable in order to develop and deliver appropriate suites of intervention techniques for specific vulnerable groups.

Understanding the perceived barriers to quitting is important in order to better understand smoking, relapse and quitting related behaviours, to inform appropriate policy, and facilitate the development of effective tailored smoking cessation interventions. Given the exceptionally high smoking rates and low quit success amongst vulnerable groups, there is a critical need for a systematic and comprehensive review of the literature of the perceived barriers to quitting smoking amongst vulnerable smokers.

Aims

This systematic review aims to provide a comprehensive synthesis of the self-reported barriers to quitting smoking within six vulnerable groups by reviewing the

qualitative and quantitative literature. The review will focus on the perceived, self-reported barriers to smoking cessation in six selected vulnerable groups: low socioeconomic status (low SES), Indigenous, mental illness and substance abuse, homeless, prisoners, and at-risk youth. These groups were selected because they represent a large proportion of those classified as vulnerable to socioeconomic disadvantage (11); who exhibit smoking rates higher than that of the general population (2-10); and who are identified as priority groups targeted for smoking cessation programs and policies by peak health authorities (34-36). Specifically, the review aims to:

a) identify barriers which are common across all vulnerable groups included in the review and

b) identify barriers that may be unique to specific groups.

The results of the review will be used to develop a practical model to help understand the barriers to quitting amongst vulnerable groups and to aid smoking cessation intervention development.

4.3 METHODS

Study design

Guidelines for the reporting of systematic reviews (PRISMA) (37) and qualitative synthesis (ENTREQ) (38) were followed. A protocol for this review was registered with PROSPERO International Prospective Register of Systematic Reviews [Identifier: CRD42013005761].

Databases and search

Medline, EMBASE, CINAHL and PsycInfo were searched using keywords and MeSH terms from each database's inception published prior to March 2014. The reference lists of key articles and reviews were also manually searched in order to identify any other relevant articles. An extensive list of search terms was used in order to ensure that as many relevant articles as possible were captured (See Table 1).

Table 1. Search strategy

1	Tobacco/
2	Tobacco use/
3	Tobacco use cessation/
4	Tobacco smoking/
5	Smoking/
6	Smoking Cessation/
7	Tobacco use cessation/
8	Tobacco dependence/
9	Cigarette smoking/
10	Or/1-9
11	Homeless youth/
12	Homeless persons/
13	Housing/
14	Homeless mentally ill/
15	Homelessness or homeless/
16	Community programs/
17	Or/11-16
18	Prisoner or Prisons/
19	Correctional Health Services/
20	Correctional facilities/
21	Jail/
22	Or/18-21
23	Anxiety/
24	Depression/
25	Schizophrenia/
26	Mentally Ill persons/
27	Mental health/

28	Mental illness/
29	Mental disorder/
30	Mental disease/
31	Mental patient/
32	Mental health services/
33	Substance-related disorders/
34	Drug use/
35	Drug abuse/
36	Alcohol-related disorders/
37	Or/23-36
38	Adolescent behaviour/
39	Juvenile delinquency/
40	Juvenile offenders/
41	Disruptive Behaviors or disruptive behaviours/
42	At-risk youth/
43	At-risk young people/
44	Or/38-43
45	Indigenous/
46	Indigenous health/
47	Indigenous peoples/
48	Indigenous populations/
49	Aboriginal/
50	Aboriginal and Torres Strait Islanders/
51	Inuits/
52	Eskimo/
53	Alaska Native/
54	Indians/

55	Native American/
56	Native Hawaiian/
57	American Indian/
58	Indians, North American/
59	Indians, South American/
60	Indians, Central American/
61	First Nations/
62	Pacific Islander/
63	Maori/
64	Oceanic ancestry group/
65	American Native Continental Ancestry Group/
66	Or/45-65
67	Poverty
68	Social status
69	Social class
70	Low income population
71	Inequalities
72	Socioeconomic status
73	Socioeconomic factors
74	Disadvantaged
75	Underserved
76	Or/67-75
77	Related to smoking cessation/quitting smoking
78	Correlated with smoking cessation/quitting smoking
79	Associated with smoking cessation/quitting smoking

80	That affect smoking cessation/quitting smoking
81	That inhibit smoking cessation/quitting smoking
82	That prevent smoking cessation/quitting smoking
83	Barriers to smoking cessation/quitting smoking
84	Factor$ or Determinant$ or Variable$ or Covariable$ or Predictor$ or Barrier$
85	Or/77-84
86	10 AND 85 AND 17
87	10 AND 85 AND 22
88	10 AND 85 AND 37
89	10 AND 85 AND 44
90	10 AND 85 AND 66
91	10 AND 85 AND 76

Inclusion and exclusion criteria

Studies that provided either qualitative or quantitative (i.e. longitudinal, cross-sectional or cohort surveys) descriptions of perceived self-reported barriers to quitting smoking in low SES groups, Indigenous groups, people with a mental illness or substance abuse problems, people who are homeless, prisoners or at-risk youth were included. See Table 2 for definitions used as inclusion criteria for each vulnerable group. Only studies carried out in high income countries were included as middle and low income countries may present different contextual, political and economic barriers which require separate consideration. Only studies published in English were included as resources required to translate articles were beyond the scope of this review. Intervention studies were excluded, as barriers discussed within these studies related to use of the intervention being tested and not barriers to smoking cessation per se. Studies examining factors associated with quit attempts or success were excluded unless they included results on the perceived barriers self-reported by participants from vulnerable groups. Studies describing *provider* reports of the barriers to the provision of smoking cessation support or treatment, and unpublished grey literature, were also excluded. There were no cut offs for sample size.

Table 2. Inclusion criteria definitions of each group.

Group	Definition
Low socioeconomic status (SES)	Because definitions of low SES vary across high income countries this study used an inclusive definition of low SES. Studies were included if they described participants as being low SES and gave at least one measure of SES. This measure could be income (above/below poverty level); address in deprived neighbourhood etc.
Indigenous groups	The following definition was used to define potential Indigenous studies in accordance with previous studies (39): "the experiences shared by a group of people who have inhabited a country for thousands of years, which often contrast with those of other groups residing in the same country for a few hundred years" (40).
Mental Illness	People with a mental illness were defined as individuals who had been diagnosed with a mental illness, severe mental illness or were described as inpatients or outpatients in a mental health rehabilitation facility. Substance use disorders were also included. All mental illnesses were included.
At-risk youth	At-risk youth were defined as individuals under the age of 21 who have experienced or are experiencing; problems at school; physical, sexual or psychological abuse; mental or physical health problems; economic disadvantage or who have committed a violent or delinquent act (36).
Prisoners	Prisoners included both those currently incarcerated and those ex-prisoners living in the community.
Homeless	Homeless individuals were defined as those individuals described as meeting national criteria for homelessness or those individuals accessing services provided to homeless persons.
Smoker	Smokers were defined as self-reported daily or occasional cigarette smokers. Studies that also assessed ex-smokers were

only included if the majority of participants were current smokers, or if the results were reported by smoking status. Studies were excluded if they focussed solely on ex-smokers or non-smokers.

Data extraction

The titles and abstracts of retrieved publications were assessed by one reviewer (LT) against eligibility criteria and excluded if they did not meet inclusion criteria. A second reviewer (a Research Assistant) independently assessed 20% of the returned abstracts for inclusion with 100% agreement between reviewers. Data from included journal articles was extracted into summary tables independently by one reviewer (LT) and a random 20% checked by a second (Research Assistant). Agreement was again high (97%). Discrepancies were settled by discussion between the reviewers. Data extracted from the articles included: study aims, setting, sample characteristics, response rates, study methodology, data analysis and the barriers identified. Barriers were defined as factors that prevented smoking cessation and/or quit attempts or were reported as primary reasons for continuing to smoke.

Risk of bias in individual studies

Quality assessment was performed independently by all authors, with two reviewers per manuscript. The methodological quality of qualitative studies was assessed using the McMaster Qualitative Criteria Form (41). Quantitative studies were assessed using a tool adapted from the STROBE statement (42). As there is a lack of an agreed, valid and reliable measure to assess the quality of mixed methods studies (43),

both the McMaster guidelines and the adapted quantitative framework were applied to the corresponding qualitative and quantitative components of any mixed methods studies identified.

Synthesis of results

Results were synthesised by vulnerable group using narrative synthesis and inductive data analysis techniques. Narrative synthesis allows the examination of studies that are highly heterogeneous in their research questions, samples and methods (44, 45). In order to avoid potential biases, care was taken to also identify points of difference between studies (46). Where a barrier was reported in more than one study, this was recorded. In quantitative studies, the proportion of respondents reporting each barrier was calculated. Barriers were combined into categories and then classified using the SDHF (23). For the purposes of this review, individual factors were defined as physical or psychological barriers to quitting smoking: for example, the individual's level of nicotine dependence or motivation to quit. Lifestyle factors were defined as health behaviours (including alcohol and other drug use) that impeded an individual's ability to quit. Social and community networks were defined as the impact of an individual's family and friend networks, and the wider community. Living and working conditions encompassed factors including housing, health care, education and employment. The final domain was the broader socioeconomic, cultural and environmental background perceived to influence smoking cessation.

4.4 RESULTS

Search results

After duplicates were removed, 21,767 studies were identified from electronic

searches and a further 27 from manual searches. Of those, 65 studies met inclusion

criteria and were included in the review (see Figure 1). Supplementary file 1 contains a

list of full text articles that were retrieved, reviewed and excluded as per the inclusion

criteria. Two systematic reviews concerning Indigenous Australian pregnant women

(32) and pregnant women (47); and two critical reviews providing summaries of the

barriers to quitting (33, 48) were also identified from hand searches.

Study characteristics

The majority of studies (n = 24) identified barriers to smoking cessation in low SES

groups (30, 49-71), Indigenous groups (n = 16) (72-87), and people with a mental

illness (n = 18) (88-105) including two concerning those with substance use disorders

(101, 104). Three studies reported barriers to quitting within the homeless (106-108)

and two reported barriers within prisoner groups (109, 110). One study with at-risk

youth was identified (111). Two other studies concerning Alaska Native participants

(age range from 11 to 18) (86) and people with a mental illness (age range from 16 to

23) (103) included younger people as participants. One study was identified that was

carried out with participants who were both homeless and addicted to drugs and/or

alcohol (112). Since the study comprised participants that met criteria for inclusion in

two of the vulnerable groups included in this review (both the homeless and mental

illness/substance use groups) this study was included in a seventh category containing

"multiple" participant groups. Supplementary files 2, 3 and 4 summarize the included

quantitative, qualitative and mixed methods studies respectively. An overview of the characteristics of included studies can be found in Supplementary file 5.

Quality assessment of qualitative studies

The results of the quality assessment of qualitative studies are presented in Supplementary file 6. Overall, the quality of studies varied widely. The majority of studies did not explicitly state their study design (n = 38); of those that did, most used Grounded Theory (57, 59, 61, 93, 98, 99). Most studies provided adequate descriptions of the study sites; participants; data collection methods and analysis techniques. Studies generally performed poorly when assessed on four components of trustworthiness, with only 17 studies meeting all four criteria (credibility; transferability; dependability and confirmability) (49, 52, 56, 58, 65, 67, 71, 73, 74, 77, 78, 80, 82, 83, 85, 86, 93). It should be noted that none of the mixed methods studies explicitly described their methodology as mixed methods nor did they report integrating the qualitative and quantitative findings in a systematic way.

Quality assessment of quantitative studies

The results of the quality assessment of quantitative studies are presented in Supplementary file 7. Sample sizes in the quantitative studies ranged from 36 to 500 participants. Response rates ranged from 42% to over 97% (four studies did not provide response rates) (100, 104, 106) . All but one study (104) clearly stated eligibility criteria. All studies stated their outcome a priori and no conflicts of interest were identified. The validity and reliability of survey measures used to assess barriers to cessation were reported in one study (60). Three studies employed techniques such as

pilot testing and input from key stakeholders in developing the tools used (70, 104, 109).

Perceived barriers to smoking cessation

The barriers to quitting smoking endorsed over multiple studies included: smoking for stress management; enjoyment of smoking; addiction to nicotine; habit; social acceptability of smoking; lack of support to quit and access to quit resources; boredom; stressful life factors; pro-smoking living environments; smoking cultural norms and socioeconomic disadvantage. Figure 2 demonstrates the barriers reported in this review categorised by the SDHF. For brevity, the current results section will focus on those barriers that were common across all groups and unique to certain vulnerable groups. Supplementary file 8 provides a detailed description of all of the barriers identified in this review. Table 3 provides a summary of the barriers extracted from the qualitative studies. References of studies that report one or more barriers at a given level of the SDHF are included in Table 3. Table 4 provides a summary of the results of quantitative studies including the proportion of participants endorsing the barrier and the study reference.

Barriers common across all groups

Three barriers were present in all six vulnerable groups included in this review: 1) stress management, 2) lack of support to quit from health professionals and other service providers, and 3) high prevalence and acceptability of smoking within vulnerable communities.

Within the SDHF, stress management was categorised as an individual level barrier. Forty qualitative studies identified stress management as a significant barrier to

smoking cessation (50-56, 58, 59, 61-63, 65, 67-69, 72, 74, 75, 80, 81, 83, 84, 86, 87, 89, 90, 92, 93, 95-97, 99, 100, 103, 105, 108, 110-112). Smoking was used as a coping mechanism (52, 58, 62-65, 69, 74, 89, 90, 92, 97, 99) in reaction to daily stressors as well as the stress inherent in vulnerable lives. Three quantitative studies reported stress management as a barrier to quitting with Maori participants (48%) (79), participants with substance use disorders (39%) (104) and homeless participants (44%) (107). Of note, participants in two studies reported that smoking also directly contributed to the stress experienced by participants (51, 111). Participants also reported using smoking to manage their emotions and mood(58, 65, 72, 83, 84, 90, 93, 98, 103). Twenty three percent of participants from a Maori sample indicated managing emotions was a barrier to quitting (79), 42% of individuals with a substance use disorder (101).

High prevalence and acceptability of smoking within vulnerable communities was categorised as a community and social network level barrier. Eight qualitative (53, 54, 69, 75, 79, 80, 98, 111) and four quantitative (60, 101, 107, 109) studies found that being around other smokers was a barrier to quitting. This finding is reinforced by participants describing the high prevalence of smoking amongst family and friends in 22 studies (30, 51, 52, 56, 62, 68, 69, 72, 74, 76, 81, 83, 85-87, 90, 93, 95, 96, 103, 111, 112) and in the wider community in 18 studies (30, 51, 52, 56, 62, 66, 69, 72, 74, 76, 81, 83, 85-87, 93, 96, 112). Tobacco was readily available and easily accessible within vulnerable communities (51, 62, 66, 76, 83, 90, 91, 111) and smoking was considered to be a highly acceptable (30, 79, 81-83, 85-87) and normalised behaviour (52, 56, 62, 66, 69, 79, 81-83, 85, 87).

Lack of support to quit from health and other service providers to quit was also categorised as a social and community network barrier. Other service providers include management and staff in prisons, homeless shelters and organisations, and members of

the community. Thirteen qualitative studies (52, 55, 56, 58, 74, 77, 83, 86, 91, 92, 95, 108, 112) and one quantitative study (109) reported a perceived lack of support from health professionals regarding smoking cessation. Cases of family members and health professionals actively discouraging quit attempts and encouraging maintenance of smoking due to concerns about the individual's mental health (92, 93, 95, 96, 112) or because smoking was perceived to be the individual's only source of enjoyment (54, 77, 79, 83) were reported. Three studies identified tobacco use by health professionals and others involved in the participants' care as a barrier to cessation (77, 95, 109). Over half (55.9%) of prisoners surveyed reported observing members of staff smoking as a barrier to quitting (109). Studies involving people with a mental illness and prisoners identified use of cigarettes in order to reward or punish behaviour by health professionals and other service providers (93, 95, 96, 110) as a barrier to quitting. Twenty-nine percent of prisoners also indicated that not receiving cessation support from prison staff prevented them from quitting smoking (109). Twenty-six percent of substance abusing individuals reported they did not have enough support to quit. One study involving at risk youth identified smoking being unaddressed by teachers and members of the police force as a barrier to smoking cessation (111).

Table 3. A summary of the self-reported barriers to smoking cessation – qualitative and mixed methods studies by vulnerable group.

Barrier	Low SES (n = 22)	Indigenous groups (n =16)	People with a mental illness (n=13)	Homeless groups (n = 3)	Prisoner groups (n = 2)	At risk youth (n =1)	Multiple groups (n = 1)
Individual and lifestyle factors							
Stress management	(50-59, 61-63, 65-69)	(72, 74, 75, 79, 81, 83, 84, 86, 87)	(89, 90, 92, 93, 95-98, 105)	(108)	(110)	(111)	(112)
Enjoyment	(50, 54-56, 59, 62, 63, 65, 67)	(79, 81-83)	(89, 90, 92-94, 97, 98, 105)			(111)	
Addiction	(49, 50, 54, 57, 59, 67-69)	(72, 74, 75, 81, 83, 84, 86)	(90-92, 98)				
Habit	(50, 57, 65, 68)	(75, 79, 83, 84)	(92, 105)				
Mental health benefits	(58, 67)	(74)	(89, 91-99)				
Weight gain	(30, 49, 52-54, 64, 67)	(72, 74, 84)	(91, 98)				
Competing priorities	(56, 63)	(74, 75, 87)	(89, 91, 98, 99)	(108)			
Rationalisations	(54-56, 58, 61, 67)	(74, 78, 82, 87)	(89, 97)				
Other substance use	(49, 56, 59, 62)	(74, 76, 81, 84)	(89)				(112)
Autonomy	(56, 58, 68)	(83)	(93, 97-99)				
Low confidence	(52, 53, 56, 63, 67, 69)	(73, 84)	(92, 96, 98)				(112)
Cognitive benefits	(51)	(83)	(93-95)				
Loneliness	(52, 59, 65)		(93, 97, 98)				

Barrier	Low SES (n = 22)	Indigenous groups (n =16)	People with a mental illness (n=13)	Homeless groups (n = 3)	Prisoner groups (n = 2)	At risk youth (n =1)	Multiple groups (n = 1)
Low risk of harm	(58)	(87)	(95, 97)				
Low motivation			(92, 94, 97, 98)				
Past failed attempts	(61)	(74)					
Positive smoker image	(30, 57)		(97)				
Social and community networks							
Prevalence and acceptability	(30, 51-54, 56, 62, 66, 68, 69)	(72, 74, 76, 79, 83, 85-87)	(90, 91, 93, 95, 96, 105)	(108)	(110)	(111)	(112)
Lack of social support	(30, 49, 54-56, 58, 64, 67-69)	(74, 75, 77, 79, 83, 84)	(91, 94, 98)	(108)			
Social activity	(30, 49, 53, 57, 62)	(73-75, 79, 85, 87)	(89, 90, 92, 93, 95, 97, 98)				
Lack of health and other professional support	(52, 54-56, 58)	(74, 77, 79, 83, 86)	(91-93, 95, 96)	(108)	(110)	(111)	(112)
Living and working conditions							
Access to quit resources	(52, 55, 56, 61-64)	(72-74, 78, 81, 85, 86)	(93, 96, 98)	(108)	(110)		
Boredom	(50-52, 54-56, 59, 65)	(75, 86)	(90, 94, 95, 97, 99)	(108)	(110)		
Concerns regarding treatment	(50, 52, 56, 58, 61-63, 69)	(72-74, 77, 78, 81, 86)	(91, 93, 96, 105)	(108)			

Barrier	Low SES (n = 22)	Indigenous groups (n =16)	People with a mental illness (n=13)	Homeless groups (n = 3)	Prisoner groups (n = 2)	At risk youth (n =1)	Multiple groups (n = 1)
Stressful factors	(56, 58, 59, 62, 63, 65, 68)	(74, 75, 85)			(110)		
Living and working circumstances	(30, 54, 58)	(74)	(96)				
Cultural, socioeconomic and environmental factors							
Cultural norms	(56, 62)	(72-75, 78, 81-83, 85-87)	(93, 94, 98)		(110)		
Socioeconomic factors	(65)		(97)				

Barriers unique to certain vulnerable groups

Indigenous; prisoner; mentally ill, homeless, and at risk youth reported unique barriers to smoking cessation. Racism, historical factors (74, 75, 85), ceremonial use of tobacco (72, 73, 82, 85, 86), cultural values that promote sharing, kinship, and reciprocity (83), cultural values of pride, independence and self-reliance that affect help seeking behaviour (81, 82), cultural values concerning health and privacy (84), and maintenance of cultural identity (73-75, 82, 83, 85) were identified as barriers within Indigenous groups. Smoking cessation could therefore exclude an individual from fully participating in their culture or potentially challenge family, personal or community relationships.

Living environments and the stressful context of prison presented unique barriers for prisoners, including social isolation, anxiety regarding legal matters, transfers to other prisons, use of cigarettes as a currency, use of cigarettes as a way to

reward or punish behaviour, bullying, missing family and restricted movement throughout the day (110).

Low levels of motivation (92, 94, 97, 98), concerns about ability of cessation services to handle mental health issues (91, 93, 96), identity and belonging (93, 94, 98) and symptom management (88-98) were barriers for people with mental illness.

Competing needs and prioritising need to find shelter/place to live were unique barriers for individual who were homeless (108). Very high levels of accessibility of cigarettes, and the regular practice of selling cigarettes to those under 18 years of age were identified by one study with at risk youth as a unique barrier (111).

Table 4. A summary of the barriers to smoking cessation – reported prevalence of each barrier by vulnerable group for studies using quantitative and mixed methods[ab].

Barrier	Reported prevalence of each barrier N/Total N (%)				
	Low SES groups (n = 2)	Indigenous groups (n = 1)	People with a mental illness (n = 5)	Homeless groups (n = 2)	Prisoner groups (n = 1)
Individual and lifestyle factors					
Stress management		63/130 (48) [79]	30/78 (39) [104]	82/186 (44) [107]	
Relaxation	261/500 (52) [60]	22/130 (17) [79]	13/30 (42) [100] 7/72 (10) [88]		
Enjoyment		33/130 (25) [79]	34/72 (47) [88] 21/105 (20) [90] 30/78 (39) [104]		
Addiction	431/500 (86) [60]	51/130 (39) [79]	56 (53) [90] 10/30 (33) [100]	93/186 (50) [107]	
Cravings			53/78 (68) [104] 47/96 (48) [101]		
Withdrawal symptoms			85/96 (87) [101]		
Habit	411/500 (82) [60]	95/130 (73) [79]	26/72 (36) [88] 20/105 (19) [90] 17/30 (58) [100]		
Perceived Mental Health Benefits		6 – 30/130 (5-23) [79]	21/105 (20) [90] 7 – 8/72 (10-11) [88] 41/78 (53) [104] 41-76/96 (42-78) [101]		
Concentration			27-56/96 (28-55) [101]		
Low levels of motivation	131/350 (38) [70]		46/96 (47) [101]		
Weight gain	69/350 (20) [70]	6/130 (5) [79]	3/72 (4) [88] 39/96 (40) [101]	38/186 (20) [107]	

Barrier	Reported prevalence of each barrier N/Total N (%)				
	Low SES groups (n = 2)	Indigenous groups (n = 1)	People with a mental illness (n = 5)	Homeless groups (n = 2)	Prisoner groups (n = 1)
Other substance use			3/72 (4) [88] 2-8/78 (3-10)[104] 13-40/96 (13-41)[101]		
Problems getting to sleep			23/96 (23) [101]		
Low confidence and perceived difficulty	87 - 202/350 (25 - 58) [70]		22/78 (24)[104]		25/34 (74) [109]
Social and community networks					
High prevalence and acceptability in the community	332/500 (66) [60] 116/350 (33) [70]	5/130 (12) [79]	13/105 (13) [90] 5/72 (7)[88] 34/78 (43)[104]	78/186 (42) [107]	27/34 (79) [109]
Lack of social support	90/350 (26) [70]			48/186 (26) [107] 70-79/98 (71-79) [106]	10/34 (29) [109]
Lack of health and other professional support			3/72 (4) [88]		19/34 (56) [109]
Social activity		44/130 (34) [79]	17/30 (58) [100] 2/72 (3) [88]		
Availability of cigarettes		5/130 (4) [79]	8/105 (8) [90] 5/72 (7) [88]		
Living and working conditions					
Access to quit resources	108/350 (31)[70]				9/34 (27) [109]
Boredom	242/500 (48) [60]	38/130 (29) [79]	9/72 (13) [88] 13/105 (13) [90]		
Stressful factors			4/72 (6) [88]		
Living environments					20 (59) [109]

[a] Decimals rounded to nearest whole number where appropriate.

[b] Numerators/denominators are presented first, followed by proportion (in parentheses), followed by reference.

4.5 DISCUSSION

This is the first systematic review reporting perceived barriers to smoking cessation across a range of vulnerable groups. The findings from 54 qualitative, eight quantitative and three mixed methods studies demonstrate that barriers to quitting smoking operate at multiple levels including individual and lifestyle factors; social and community networks; living conditions; and cultural and socioeconomic factors. These include: smoking for stress management; enjoyment of smoking; addiction to nicotine; habit; social acceptability of smoking; lack of support to quit and access to quit resources; boredom; stressful life factors; pro-smoking living environments; cultural norms and socioeconomic disadvantage. Stress management, lack of support from health professionals and other service providers and the high prevalence and acceptability of smoking in communities were the three barriers common across all six vulnerable groups included in this review. The identification of perceived barriers common across vulnerable groups is an extension of the previous literature.

The identified barriers broadly reflect those reported in two systematic reviews limited to pregnant smokers (47) and Indigenous Australian pregnant smokers (32) and two critical reviews providing summaries of the challenges to cessation amongst low income smokers (33) and low income; rural; homeless; hard core; immigrant and HIV positive smokers (48). Addiction to nicotine, habit, stress management, enjoyment and weight gain are typically reported barriers to smoking cessation within the general population (26-28, 113). No studies were found that directly compared barriers experienced by vulnerable groups and smokers in the general population. To the authors knowledge, only one study has assessed the effect of socioeconomic position on barriers to quitting smoking and identified that decreasing SEP was associated with higher likelihood of reporting stress management and boredom as barriers (28). This review

did not aim to provide direct comparisons between vulnerable groups and the general population due to the heterogeneity of studies. Additionally, comparisons by gender were beyond the scope of this review, but should be considered for further research, as socioeconomic disadvantage has differential effects on males and females (20) and preliminary evidence suggests barriers to cessation may differ by gender (28, 70).

Nevertheless, the novel results of this review indicate that vulnerable smokers report a number of additional barriers to cessation that operate within their social and community networks; living conditions; and wider cultural and socioeconomic contexts. Social and community barriers include: lack of support to quit from both peers and health and other professionals; high prevalence and acceptability of smoking within vulnerable communities and smoking as a social activity. Living conditions include: stressful factors; pro-smoking living and working circumstances; lack of access to quit resources; social and geographical isolation and boredom. Cultural norms and socioeconomic disadvantage also presented barriers to quitting.

Main barriers identified across <u>all</u> vulnerable groups

Stress management

Stress management was a frequently reported individual level barrier. Smokers typically demonstrate higher levels of stress and low mood than non-smokers and ex-smokers (114-116). Smoking may provide a coping mechanism for individuals who are prone to higher levels of stress (117-119) or smoking may act as a stressor due to neurobiological processes or through the experience of withdrawal symptoms (119). Stressors associated with vulnerable groups (for example unemployment, financial stress, and poverty) may compound stress levels within vulnerable groups. Given that vulnerable smokers may be more likely to report smoking in order to relieve stress (28)

incorporating stress management techniques into interventions targeted at vulnerable groups may help to increase cessation.

Lack of support to quit from health professionals and other service providers

At the social and community level, a lack of support to quit from health professionals and other service providers was identified. This reflects research that suggests smokers from low SEP are less likely to receive advice to quit from a healthcare provider than their more higher SEP counterparts (120), despite evidence demonstrating brief advice can increase the likelihood of successful quitting (121, 122). Both organisational and individual factors affect the provision of quit advice by health and other service providers. These include lack of time, confidence, knowledge and counselling skills (123). Efforts should be focussed on improving health professionals' ability to offer quit advice and may benefit from examining how best to ensure compliance to existing guidelines that provide clear recommendations on identifying individuals who are at higher risk of smoking and addressing the unique issues that these individuals face.

Tailoring interventions to the specific needs of vulnerable groups may be effective. Tailored interventions for behaviour change have been found to be effective compared to no intervention or dissemination of guidelines or educational materials alone (124). Given that this review identified three common barriers across the six vulnerable groups include in this review, we argue that subsequent smoking cessation interventions in vulnerable groups should seek to address these factors. Programs should include specific modules on stress management techniques and how best to combat stress in vulnerable groups as well as educating smokers about how stress relief and relief from nicotine withdrawal symptoms can be confounded.

Smoking cessation interventions should be designed to maximise participation by vulnerable groups, addressing the key barriers around acceptability and access to interventions. Utilising existing services and organisations that are highly accessed by vulnerable groups and are a trusted source of help for vulnerable groups is also necessary. There is accumulating evidence that social and community service organisations (SCSOs) are well placed to provide brief smoking cessation advice to highly vulnerable clients (125, 126).

High prevalence and acceptability of smoking

The high prevalence and social acceptability of smoking within vulnerable communities was frequently reported. Considerable measures have been taken to address the denormalisation of smoking in the general population through regulation and legislative changes such as restrictions in advertising, smoke-free environment policies and point of sale restriction (1, 127, 128). Participants who were homeless, experiencing mental illness and prisoners cited a lack of restrictions on smoking within their living environments (or lack of enforcement of existing policies) as a factor that reinforced their smoking. While there are challenges associated with their implementation, smoke free areas can be successfully implemented within mental health treatment centres and prisons (129-131) and there is potential to extend these restrictions to homeless shelters and public housing developments.

Efforts to encourage the denormalisation of smoking in the environments of vulnerable communities require further exploration. Providing access to acceptable and effective behavioural and pharmacological supports should ensure that denormalisation does not result in compounding stigma and further isolating vulnerable groups (127, 132).

Barriers specific to certain groups

Indigenous groups

Indigenous groups identified unique stressors linked to smoking including racism and historical factors; cultural practices including ceremonial use of tobacco and cultural values that promote sharing, kinship and reciprocity and the importance of smoking as a way to maintain cultural identity. Cultural values also had effects on the willingness of Indigenous participants to access smoking support services. Certain Indigenous groups may be less likely to receive advice to quit or engage with services designed to aid in cessation (133). However, it is important to note that smoking cessation programs have been shown to be effective within Indigenous groups (134, 135). Culturally appropriate interventions tailored to the needs of Indigenous smokers should continue to be developed, implemented and evaluated. These programs should acknowledge the cultural significance of tobacco use and the important historical and social factors associated with Indigenous groups and smoking (136).

Prisoners

Prisoners identified unique stressors within their living conditions that contributed to their smoking including social isolation, anxiety regarding legal matters and transfers to other prisons. A recent multicomponent randomised controlled trial that included improving stress management skills in prisoners (137, 138) found similar point prevalence abstinence rates as another trial conducted with prisoners (9) and other community based studies. Thus, smoking cessation programs can be effective even in prison environments that are highly conducive to smoking and should form a part of routine care within prison systems.

People with a mental illness

Low motivation to quit smoking was only reported in studies involving smokers with a mental illness. This contradicts research showing no difference in motivation to

quit between those with severe mental illness and the general population (139). A recent review concluded there is some evidence to suggest that individuals diagnosed with a psychotic disorder are slightly less motivated to quit than those diagnosed with depression (139). Possible reasons for this include the symptoms associated with schizophrenia (including amotivation), management of side effects of medications (including Parkinsonism), limited support systems, low perceived vulnerability to smoking related disease, lack of alternate coping mechanisms and poverty (139, 140). Information on the diagnoses of participants was only reported in one of the studies reporting motivation as a barrier in this review (92) where the majority of participants were diagnosed with a psychotic disorder. However, other studies did not provide information on participants' diagnoses and further exploration is beyond the scope of this review.

Symptom management also presented a significant barrier within studies concerning people with a mental illness. There is evidence to suggest that biochemical processes between nicotine and other substances in tobacco improve some symptoms of mental illness (140). Additionally, smokers with a mental illness may be more likely to misattribute their withdrawal symptoms as recurring mental illness symptoms. Further investigation and education regarding cessation and symptom management with people with a mental illness is warranted. Integrating smoking cessation care with mental health and addiction treatments can be effective at promoting cessation rates in groups with mental illness (130, 131). However, future studies need to investigate ways to maintain long term smoking cessation as well as systems-level changes that may support smoking cessation in people with mental illness (141, 142).

Barriers to smoking cessation in vulnerable groups: a model

Figure 2 visually demonstrates the broad range of barriers to cessation reported by vulnerable groups, many of which exist outside of the realm of the individual. This model demonstrates the interconnectedness of individual and lifestyle factors with the wider social and community factors, living conditions and cultural, socioeconomic and environmental factors. The two darker spheres holding social and community networks and individual and lifestyle factors identify those factors that are potentially modifiable through short term health behaviour change interventions. This model does not provide an exhaustive list of all of the factors that prevent vulnerable individuals from smoking cessation. It does provide a framework for understanding the perceived self-reported barriers to quitting smoking identified in this review.

Strengths and limitations

This synthesis of the literature provides evidence of the perceived barriers to smoking cessation by examining the methodological quality of studies and comparing between and within selected vulnerable groups. However, this review has some limitations. While the overall quality of the studies included in this review was acceptable, most qualitative studies failed to provide information regarding the trustworthiness of the research and most quantitative studies failed to provide information on the validity and reliability of the survey measures used to assess barriers. Strategies for enhancing the trustworthiness of qualitative research have been concisely summarised (143) and future qualitative studies should seek to employ these strategies where possible. Future quantitative studies should seek to report at least brief psychometric properties of survey measures used to assess barrier to smoking cessation, including reliability and validity. Of quantitative studies included, the majority used
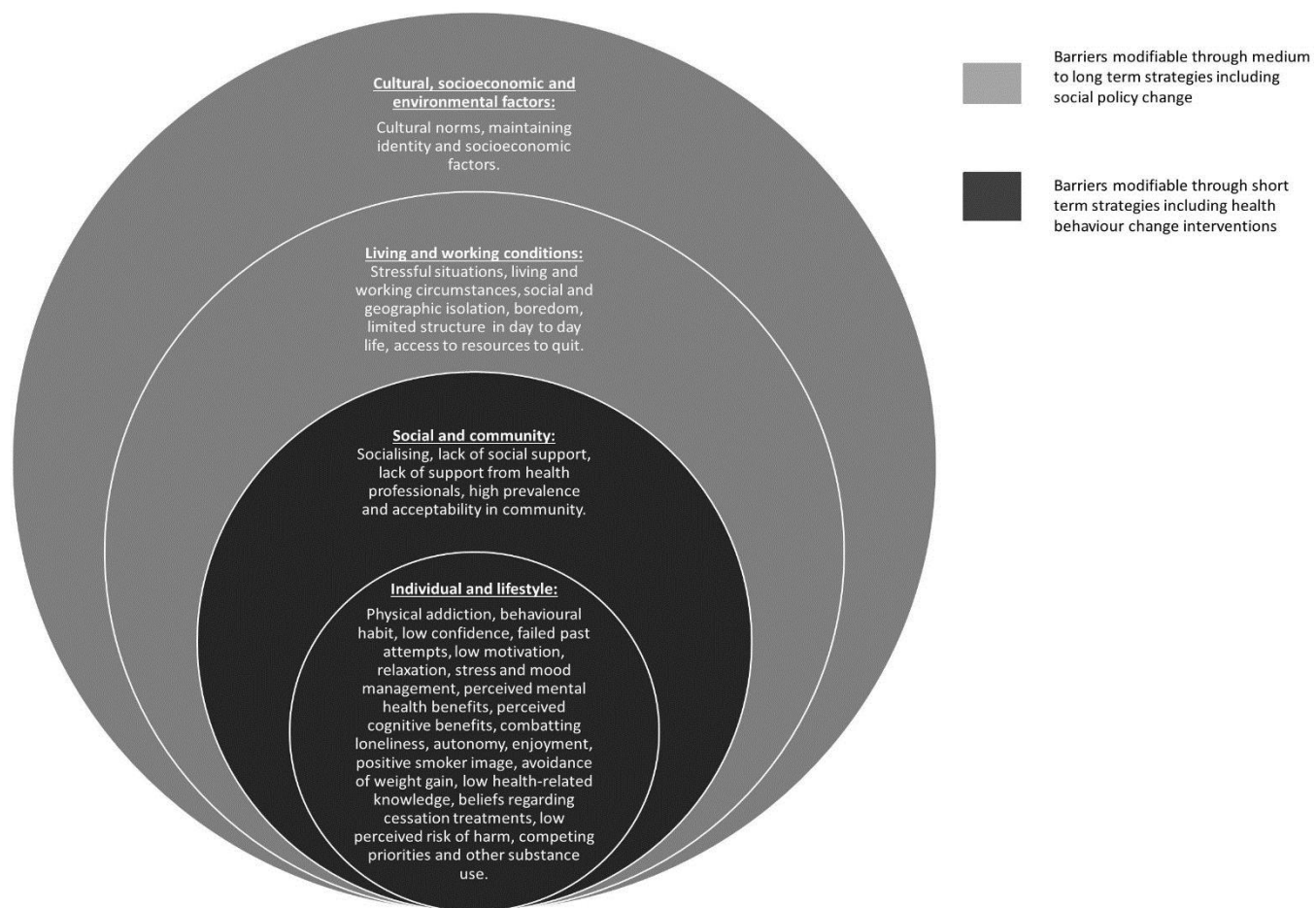
Figure 2. Model of the perceived barriers to smoking cessation identified within six vulnerable groups.

convenience samples. It is not generally feasible to target vulnerable and hard to reach

populations using random population sampling procedures. This limits the

generalizability and transferability of the included studies to wider vulnerable

populations. Nevertheless, the agreement in findings between qualitative studies does

suggest that these results are robust.

The nature of the studies included in this review means that no weight is given

to the different barriers and the authors cannot provide comment on which, if any,

barriers should be made a priority to target in smoking cessation interventions with

vulnerable groups. Given limited resources and funds, addressing all barriers is rarely

possible. Future research is needed to identify those barriers which are most important

to address first and to prioritise resourcing and intervention development.

The results of this review were broadly categorised according to the SDHF,

however these categories are not mutually exclusive and certain barriers were able to be

included in multiple categories (for example stress and stressful factors could be

categorised as either individual level barriers or barriers within the living conditions

level). The reviewed studies do not directly clarify whether the nature of stress

experienced in vulnerable groups is personal or contextual. Constructs such as coping

and resilience (144, 145) have been hypothesised as mediators between stress and

smoking in low socioeconomic groups (146).

Similarly, as this review sought to provide a summary of vulnerable smokers'

perceived self-reported barriers to cessation, other barriers which may be important

determinants of quit attempts and success were not considered. Barriers such as the

knowledge and attitudes of staff and health professionals and the capacity of services to

offer smoking cessation programs, which have been identified within the literature

(123), should also be considered when examining the challenges facing vulnerable groups.

This review was only able to identify five studies that examined the barriers to quitting smoking within prisoner (n=2 studies) and homeless (n=3) groups and one study focussing on at-risk youth. These results indicate more research is required with these groups to examine the barriers to smoking cessation. More studies investigating the barriers to cessation within these groups may lead to identification of additional common and unique barriers across vulnerable groups. Additionally, this review was limited to studies conducted within one of six vulnerable groups. Other groups that show high rates of smoking include lesbian, gay, bisexual and transgender groups (147); culturally and linguistically diverse groups (148); and rural and remote communities (149). The authors acknowledge the disparity in smoking prevalence in these groups, however their inclusion would have increased the breadth of the review to a level that would be too broad and complex to be useful. These groups may experience barriers to cessation different to those experienced by the groups included in this review. It should also be noted that individuals within the included groups often experience multiple forms of disadvantage for example people who are homeless are more likely to experience a mental illness (150) and Indigenous communities are more likely to be overrepresented in lower socioeconomic positions (3).

Conclusions

These results support findings that vulnerable groups experience common barriers to smoking cessation, and also barriers which are unique to specific vulnerable groups. Stress management, high prevalence and acceptability of smoking and lack of support to quit were identified as priority areas for cessation research, program implementation and policy change. Many of the barriers identified within this review

are modifiable through short term health behaviour change strategies. For heterogeneous groups of vulnerable individuals, intervention development should seek to address those barriers common to all vulnerable groups identified in this review. For relatively homogenous groups of vulnerable individuals, interventions should seek to address the unique barriers faced by those groups in addition to those barriers identified as common to all vulnerable groups.

These findings, coupled with lower success rates in quitting within vulnerable groups relative to the success rates in more advantaged groups (14, 19), suggest that interventions with vulnerable groups need to address wider social, community and cultural factors as well as individualised cessation support. Addressing the predictors of cessation found within the general population such as nicotine dependence and enjoyment remain important for vulnerable groups.

4.6 References

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5. INTRODUCTION TO PAPER THREE

The data in Paper Two indicated that smokers in disadvantaged groups experienced a broad range of barriers to achieving abstinence, from the individual to the broader social, community and cultural contexts. Additionally, the paper found that smoking in order to relive stress, a lack of access to smoking cessation resources and the high prevalence and acceptability of smoking within disadvantaged groups were the barriers that were common to the six selected disadvantaged groups examined.

Given that there were a large number of barriers identified, it may be valuable to identify the most important barriers to address that might most help smokers to quit, and to target these barriers as a first priority with highest likelihood of impact. Such information may be useful in public health systems and non-government organisations where resources and funds for tobacco control are very limited. There are a range of approaches to priority setting (1). Further, the perceptions of individuals most likely to experience benefit from the priority setting tasks should inform the priority setting process (1).

A study carried out in 2003 (n = 1,544) in Wisconsin, US asked smokers from the general population to report the "main" barrier to quitting in addition to rating a predefined list of barriers (2). Enjoyment (79%) and craving (75%) were the most frequently reported barriers while enjoyment (21%) and loss of stress relief (20%) were most frequently reported "main" barriers. To date, no studies have asked *disadvantaged* smokers to <u>rank</u> the barriers to smoking cessation they experience, in order to prioritise strategies and intervention components around these. Therefore the present study aimed to identify the prevalence of barriers within a sample of disadvantaged smokers using a valid and reliable measure, identify those barriers ranked as most important to quit smoking and identify the factors associated with the top three ranked barriers.

5.1 References

1. Carter R, Vos T, Moodie M, Haby M, Magnus A, Mihalopoulos C. Priority setting in health: origins, description and application of the Australian Assessing Cost-Effectiveness initiative. Expert Rev Pharmacoecon Outcomes Res. 2008;8(6):593-617.

2. Theobald W, Smith S, Fiore M. Barriers to quitting smoking. Wisconsin: Center for Tobacco Research Intervention, University of Wisconsin Medical School, 2005.

6. Paper Three: What are the most important barriers? A ranking survey of socioeconomically disadvantaged smokers' barriers to stopping smoking

15. Associated appendices:

15.1 Ethics Variation

15.2 Information Statement

15.3 Campbelltown Barriers Survey

15.4 Supplementary file 1. Barriers scale

15.5 Supplementary file 2: Confirmatory factor analysis results

Twyman L, Bonevski B, Paul C, Bryant J, Oldmeadow C, Palazzi K, Guillaumier A. What are the most important barriers? A ranking survey of socioeconomically disadvantaged smokers' barriers to stopping smoking. *Drug & Alcohol Review*. Under Editorial Review

6.1 ABSTRACT

Introduction and Aims: This study aimed to identify a) the prevalence of self-reported barriers; b) the barriers ranked as most important to address in order to quit smoking; and c) the sociodemographic and smoking related characteristics associated with the three highest ranked barriers to cessation.

Design and Methods: A cross sectional survey of adult welfare recipients who were current smokers was carried out in two community service organisations in New South Wales, Australia from October 2013 to July 2014. Participants were presented with a randomised list of 38 barriers to quitting and asked to rate each item on a scale of zero (not a barrier) to three (large barrier). Of those barriers rated as large, participants were asked to rank the three highest. Sociodemographic and smoking characteristics were also measured.

Results: In total, 369 current smokers completed the survey (77% response rate). Addiction (54%), smoking to manage stress (47%) and anxiety/depression (39%) were the three most frequently-reported barriers to cessation. The top three highest ranked barriers were addiction (38%), dealing with stress (12%) and enjoyment (8%). Increasing nicotine dependence (OR = 1.49, CI = 1.23, 1.80) and decreasing self-efficacy levels (OR = 0.32, CI = 0.14, 0.70) were associated with reporting addiction to smoking as a barrier, while increasing age was associated with reporting enjoyment of smoking as a barrier (OR = 1.06, CI = 1.01, 1.10).

Discussion and Conclusions: Addiction, stress and enjoyment were priority barriers for socioeconomically disadvantaged, Australian smokers who require dedicated interventions to aid cessation.

6.2 INTRODUCTION

Socioeconomically disadvantaged groups are those who are more likely to experience lower income, material or cultural deprivation, and social exclusion (1). In high income countries, the prevalence of smoking amongst disadvantaged groups is higher than in groups who do not experience such disadvantage. For example, people with, the lowest levels of income (25% - 30%) (2); a mental illness (32%) (3); alcohol and other substance use disorders (4); people who are homeless (73%) (5); Indigenous groups (31% - 52%) (6-8); and prisoners (78% - 84%) (9, 10) demonstrate far higher rates of smoking than those found in the general population (13 – 19%) (11-14).

Cessation rates are lower for socioeconomically disadvantaged smokers (15-17), which contributes to the disparity in smoking prevalence (15, 18). Effective smoking cessation interventions for smokers from socioeconomically disadvantaged groups are critically needed. When designing interventions for smoking cessation for socioeconomically disadvantaged groups, it is important to identify and address any barriers to cessation. Interventions that consider and address barriers to behaviour change are more likely to be effective in achieving change (19) and incorporation of perceived barriers is a recommended inclusive, participatory approach to intervention development (20, 21). An inclusive approach is particularly important with smokers from disadvantaged groups who have historically been under-represented in smoking cessation research and currently represent the largest groups of smokers in many high income countries (22).

A recent systematic review of 65 qualitative and quantitative studies (Chapter 2) that examined the perceived barriers to smoking cessation identified common barriers across six selected disadvantaged groups (low income; Indigenous; mental illness; homeless; prisoners and at risk youth). The barriers common to these groups were stress

management; high prevalence and acceptability of smoking in disadvantaged communities; and lack of access to resources to quit smoking (23). Unique barriers were identified for certain groups, for example, some Indigenous groups use tobacco for cultural/traditional practices and face tobacco use within a context of historical and social factors including racism, discrimination and colonisation (23).

This review identified a broad range of barriers experienced by socioeconomically disadvantaged smokers, however, the studies included in the review were limited in providing suggestions as to which, if any, barriers should be prioritised in smoking cessation interventions. No previous studies have asked disadvantaged smokers to rank those barriers in order of importance to help them quit. Prioritising the barriers to cessation allows identification of the most potent barriers in a system where resources and funds are limited and where the potential barriers to cessation are numerous (24).

Often barriers are context specific and differences in perceived barriers according to smokers sociodemographic and smoking characteristics have been documented (25-27). Enjoyment of smoking as a barrier has been associated with older age; male gender; higher social grade; and not having made a quit attempt in the past 12 months (25). Stress relief has been associated with younger age, female gender, lower social grade; higher nicotine dependence scores and making a quit attempt in the past 12 months (25). Female smokers are more likely to report greater perceived difficulty quitting (26) and weight concerns as barriers to quitting smoking (27). Identifying the factors that are associated with the most frequently prioritised barriers may help to further tailor cessation services and messages (20).

Thus, within a sample of socioeconomically disadvantaged smokers, this study aimed to identify a) the prevalence of self-reported barriers; b) the barriers ranked as

most important to address in order to quit smoking; and c) the sociodemographic and smoking related characteristics associated with the three highest ranked barriers to cessation.

6.3 METHODS

Study design and setting

A cross sectional survey was conducted at two non-government community service organisations (CSO) in New South Wales, Australia, from October 2013 to July 2014. In Australia, CSOs provide financial and material assistance to clients experiencing financial hardship. Recruitment through CSOs was conducted in accordance with best practice evidence for recruiting hard to reach groups (28). CSOs exist across the country, service high numbers of disadvantaged people, and provide similar services, thus providing a representative sample of people experiencing high levels of socioeconomic disadvantage in Australia (29).

Participants

Eligible participants were 1) clients of the CSO, 2) aged 18 years or older and 3) current daily or occasional smokers. CSO clients who presented agitated, distressed, or under the influence of alcohol or other drugs were ineligible to participate. Self-reported smoking status was assessed using the following two items 1) "Do you currently smoke tobacco products? " with the following response options a) Yes daily b) Yes at least once a week c) Yes but less often than once a week and d) No, not at all and 2) "Have you smoked at least 100 cigarettes or a similar amount of smoking in your life?" a) Yes b) No or c) Not sure. Current smokers were defined as self-reported daily or occasional smokers who had smoked at least 100 cigarettes in their lifetime.

Procedure

CSO staff informed all clients about a health survey being conducted at the organisation and clients were asked to approach the Research Assistant (RA) for more information. RAs assessed client eligibility. Survey completion was taken as consent. The survey was administered via a touchscreen computer which has previously been found to be acceptable, reliable and valid amongst CSO clients and similar populations (30). The RA provided assistance in completing the survey where necessary. Participants received a $10 grocery voucher as reimbursement for completing the survey. Ethics approval was granted by the University of Newcastle's Human Research Ethics committee.

Measures

The survey included 40 questions and the mean completion time was 16.2 minutes (range 2.5 – 21.3 minutes).

Outcome variable – Assessing Barriers to Cessation in Disadvantaged smokers Scale (ABCDS)

Due to a lack of relevant quantitative scales, a survey instrument assessing barriers to cessation was developed following a comprehensive systematic review of the perceived factors that prevent smoking cessation in disadvantaged groups (23), adaptation of an existing barriers scale (31) and the results of focus groups with disadvantaged smokers (32).

The ABCDS scale consisted of 38 items organised into 10 pre-determined subscales based on existing literature (addiction; motivational factors; perceived benefits of smoking; beliefs regarding smoking cessation; lifestyle factors; social support; high prevalence in community; living and working conditions; access to resources to quit; cultural factors). Presentation order of items was randomised. Participants were asked "Please rate the following items in terms of how much they are

a barrier to you quitting smoking:" with response options: "Not a barrier"; "Small barrier"; Medium barrier"; "Large barrier"; "Not applicable". The scale was scored from zero (not a barrier) to three (large barrier), with "Not applicable" also scored as zero (31).

Participants were then presented with an on-screen list of the barriers they rated as "large" and asked: "Please rank the following barriers from one to three in terms of how important they are to address before you can quit smoking". If participants had selected less than three "large" barriers, they were instructed to rank their chosen large barriers from one to two, or skipped the ranking step as appropriate (see Supplementary file 1).

The scale demonstrated good psychometric properties. Cronbach's alpha revealed good internal consistency (standardised alpha = 0.93). Confirmatory factor analysis showed all barrier items significantly loaded onto the specified 10 pre-determined factors (all $p<0.001$) with moderate-very high correlations (R^2 between 0.27 and 0.99) and moderate fit statistics (see Supplementary file 2/Appendix 15.5).

Covariate measures

Age, gender, highest level of education and Indigenous status (Aboriginal and/or Torres Strait Islander status) were assessed.

Number of quit attempts made in the last 12 months was assessed by asking participants who reported yes to ever making a quit attempt: "How many serious attempts to stop smoking have you made in the last 12 months? By serious attempt I mean you decided that you would try to make sure you never smoked again." and respondents entered the frequency (33). Participants who had made at least one quit attempt in the last 12 months were distinguished from those who had not.

Self-efficacy was measured by asking "If you decided to give up smoking completely in the next 6 months, how sure are you that you would succeed?" a) Not at all sure, b) Slightly sure, c) Moderately sure, d) Very sure, or e) Extremely sure(33). Not at all/slightly sure and very/extremely sure were collapsed to represent "low" and "high" self-efficacy respectively (33). Participants were asked on a 10 point scale: "Please rate your current motivation to give up smoking" (1 = very low motivation, 10 = very high motivation)(34). Nicotine dependence was measured using the two-item Heaviness of Smoking Index (HSI) (35).

Self-reported cannabis use was assessed using a modified item adapted from the Opiate Treatment Index-Cannabis scale (36). Participants were first asked if they had ever used cannabis (marijuana, dope, grass, hash, pot). Participants who reported using cannabis at all in the past four weeks were distinguished from those who had not used cannabis in the past four weeks and those who reported never using cannabis.

Data analysis

Descriptive statistics of socio-demographic and smoking, alcohol, and mental health variables are presented by counts and percentages for categorical variables and means (standard deviation) or median (IQR) for continuous variables, depending on distribution. Descriptive counts (percentages) are presented for the 38 barriers. Logistic regression models were used to explore the associations between participant characteristics and smoking cessation barriers; in order to limit the number of statistical tests we restricted attention to the three barriers ranked as most important in order for smoking cessation to occur. Variables describing participant characteristics were chosen a priori based on existing literature and clinical relevance and included: age, gender, Indigenous status, education, HSI score, quit attempt made in last 12 months, motivation to quit, self-efficacy to quit, and cannabis use in the last month. All variables

of interest were included in regression modelling and a backwards selection method was used to create a parsimonious model. Consideration was made at each step that the degree of association of each variable in the model was clinically relevant and that the removal of each non-significant variable did not negatively affect either the fit of the model (measured by significant change in likelihood ratio test or more than four point increase in Akaike Information Criterion) or change the estimates for remaining variables by no more than 10%. Collinearity of variables was checked using VIFs and linearity assumption for continuous variables and the (log) outcome were examined. Crude and adjusted odds ratios with 95% confidence intervals and p-values are presented for variables in the model. Significance was determined *a priori* at p<0.05. SAS 9.4 was used for all analyses (37).

6.4 RESULTS

Response rate

Of the 606 clients attending the two centres during the study period, 478 (78%) clients were eligible to take part and invited to see the RA for more information about the study. The main reason for ineligibility was being a non-smoker (n=96). Of eligible clients, 369 (77%) completed surveys.

Sociodemographic and smoking characteristics of the sample

As seen in Table 1, the sample was currently experiencing multiple forms of disadvantage. The sample displayed exceptionally low income with 71% (n = 261) reporting income well below the Australian single-person 'poverty line' of $500 per week (38) and 91% (n = 337) dependent on government benefits as their main source of income. Individuals self-identifying as Aboriginal and/or Torres Strait Islander made up 21% (n = 60) of the sample compared to 2% of the population in New South Wales

Table 1. Demographic and smoking characteristics of participants.

Characteristic	Total (N=369)
Age in years (mean, SD)	40 (11)
Gender	
Male	150 (41%)
Female	219 (59%)
Aboriginal and/or Torres Strait Islander Status	78 (21%)[a]
Highest level of education	
Primary school	61 (17%)
Secondary or less	236 (64%)
Tertiary qualifications	72 (20%)
Housing status	
Own house	11 (3%)
Rental house	142 (38%)
With family or friends/Hotel, Motel/No home, street living	53 (14%)
Supported accommodation/government housing	152 (41%)
Other	11 (3%)
Income amount	
Less than $200 per week	100 (29%)
Between $201-$400 per week	161 (47%)
More than $400 per week	78 (23%)
Cannabis use in previous month	
Yes	104 (28%)
No	265 (72%)

[a]Aboriginal and/or Torres Strait Islander status was collapsed into Indigenous versus non-

Indigenous for all analyses due to low cell numbers

(39). The sample was also characterised by high levels of nicotine dependence and low levels of self-efficacy (Table 2).

Prevalence of all barriers

Addiction (55%, n = 201), dealing with stress (47%, n = 173), managing anxiety or depression (39%, n = 145) and relaxation (39%, n = 142) were the most frequently reported 'large' barriers to cessation (see Table 3). A considerable minority of participants also indicated that being unable to manage withdrawal symptoms (36%, n = 133), experiencing too many stressful life events (36%, n = 132) and the cost of patches or other forms of NRT (30%, n = 111) were barriers to cessation. A proportion of participants (16%, n = 58) did not rate any barriers as large and thus were not asked to identify the most important barrier to quitting.

Top ranked "large" barriers

Addiction to smoking (38%, n = 119), smoking to deal with stress (12%, n = 37) and enjoyment of smoking (8%, n = 25) were the three "large" barriers ranked as the most important in order to quit smoking.

Characteristics associated with each of the top ranked barriers

The results of the logistic regressions are reported in Table 4. Higher levels of nicotine dependence were associated with higher odds of reporting addiction to smoking as a barrier (OR = 1.49, CI = 1.23, 1.80) while higher levels of self-efficacy were associated with lower odds of reporting being addicted to smoking as a barrier (OR = 0.32, CI = 0.14, 0.70). No variables were significantly associated with reporting stress management as the most important barrier to address. Increasing age was associated with higher odds of reporting enjoyment as a barrier to smoking cessation (OR = 1.06, CI = 1.01, 1.10).

Table 2: Smoking related and cannabis characteristics of the sample

Characteristic	Total (N=369)
Smoking status	
Daily	338 (92%)
Occasional	31 (8%)
Heaviness of Smoking Index (mean, SD)	
Low (0-2)	135 (37%)
Moderate (3-4)	167 (46%)
High (5-6)	64 (17%)
mean (SD)	3 (2)
Number of cigarettes smoked per day mean (mean, SD)	15.9 (10)
Lifetime quit attempts (Yes)	303 (82%)
At least one quit attempt in past 12 months	
Yes	232 (77%)
No	137 (33%)
Motivation to quit (mean, SD)	5.4 (2%)
Self-efficacy levels	
Low	202 (55%)
Moderate	100 (27%)
High	67 (18%)
Cannabis use in previous month	
Yes	104 (28%)
No	265 (72%)

Table 3. Barriers to smoking cessation (total n = 369)

Barrier (scale domain)	Not a Barrier (0)	Small Barrier (1)	Medium Barrier (2)	Large Barrier (3)
I am addicted to smoking (Addiction)	54 (14.6%)	44 (11.9%)	70 (19%)	201 (54.5%)
Smoking helps me deal with stress (Perceived benefits)	46 (12.5%)	60 (16.3%)	90 (24.4%)	173 (46.9%)
Smoking helps me manage anxiety or depression (Perceived benefits)	77 (20.9%)	73 (19.8%)	74 (20.1%)	145 (39.3%)
Smoking helps me to relax (Perceived benefits)	55 (14.9%)	68 (18.4%)	104 (28.2%)	142 (38.5%)
I won't be able to manage the withdrawal symptoms (e.g. cravings, irritability) (Addiction)	76 (20.6%)	53 (14.4%)	107 (29%)	133 (36%)
There are too many stressful events in my life (Living conditions)	78 (21.1%)	57 (15.4%)	102 (27.6%)	132 (35.8%)
The patches/gum etc. are too expensive (Access to resources)	150 (40.7%)	45 (12.2%)	63 (17.1%)	111 (30.1%)
I enjoy smoking (Perceived benefits)	80 (21.7%)	78 (21.1%)	102 (27.6%)	109 (29.5%)
Smoking helps me manage my emotions (Perceived benefits)	79 (21.4%)	78 (21.1%)	105 (28.5%)	107 (29%)
If I quit I will gain weight (Perceived benefits)	146 (39.6%)	60 (16.3%)	68 (18.4%)	95 (25.7%)
It is too hard for me (Motivational factors)	83 (22.5%)	79 (21.4%)	116 (31.4%)	91 (24.7%)
There are other priorities I should be focussing on (Beliefs regarding smoking and cessation)	123 (33.3%)	66 (17.9%)	90 (24.4%)	90 (24.4%)
Other medications Zyban (buproprion) and Champix (varenicline) are too expensive (Access to resources to quit)	187 (50.7%)	38 (10.3%)	55 (14.9%)	89 (24.1%)
I don't have the willpower (Motivational factors)	87 (23.6%)	83 (22.5%)	112 (30.4%)	87 (23.6%)
I am not motivated (Motivational factors)	96 (26%)	66 (17.9%)	121 (32.8%)	86 (23.3%)

Barrier (scale domain)	Not a Barrier (0)	Small Barrier (1)	Medium Barrier (2)	Large Barrier (3)
Most of the people in my community are smokers (High prevalence in community)	151 (40.9%)	49 (13.3%)	84 (22.8%)	85 (23%)
Most of my friends and family/the people I live with are smokers (High prevalence in community)	152 (41.2%)	52 (14.1%)	80 (21.7%)	85 (23%)
I smoke for something to do (Perceived beneifts)	122 (33.1%)	80 (21.7%)	83 (22.5%)	84 (22.8%)
I don't think smoking is that bad for me (Beliefs regarding smoking and cessation)	171 (46.3%)	59 (16%)	55 (14.9%)	84 (22.8%)
Other medications like Zyban (buproprion) and Champix (varenicline) have bad side effects (Access to resources to quit)	204 (55.3%)	40 (10.8%)	53 (14.4%)	72 (19.5%)
I wouldn't succeed (Motivational factors)	102 (27.6%)	83 (22.5%)	114 (30.9%)	70 (19%)
Smoking helps my concentration (Perceived benefits)	133 (36%)	90 (24.4%)	79 (21.4%)	67 (18.2%)
The patches/gum etc. don't work (Access to resouces)	191 (51.8%)	54 (14.6%)	60 (16.3%)	64 (17.3%)
The patches/gum etc. have bad side effects (Access to resources)	197 (53.4%)	49 (13.3%)	63 (17.1%)	60 (16.3%)
I don't have the confidence (Motivational factors)	113 (30.6%)	92 (24.9%)	104 (28.2%)	60 (16.3%)
I know other people who were smokers who never got sick (Beliefs regarding smoking and cessation)	171 (46.3%)	60 (16.3%)	83 (22.5%)	55 (14.9%)
Smoking is acceptable in my community (High prevalence in community)	183 (49.6%)	56 (15.2%)	75 (20.3%)	55 (14.9%)
Smoking helps me socialise (Perceived benefits)	163 (44.2%)	84 (22.8%)	70 (19%)	52 (14.1%)
I don't have any alternatives to smoking (Lifestyle factors)	176 (47.7%)	66 (17.9%)	75 (20.3%)	52 (14.1%)
Smoking is a part of my culture (Culture)	229 (62.1%)	46 (12.5%)	43 (11.7%)	51 (13.8%)

Barrier (scale domain)	Not a Barrier (0)	Small Barrier (1)	Medium Barrier (2)	Large Barrier (3)
Smoking makes me feel in control (Perceived benefits)	147 (39.8%)	90 (24.4%)	83 (22.5%)	49 (13.3%)
Other medications like Zyban (buproprion) and Champix (varenicline) don't work (Access to resources)	236 (64%)	36 (9.8%)	49 (13.3%)	48 (13%)
Smoking helps me avoid other drugs (Lifestyle factors)	237 (64.2%)	36 (9.8%)	55 (14.9%)	41 (11.1%)
I don't know where to go to get help to quit smoking (Access to resources)	240 (65%)	48 (13%)	41 (11.1%)	40 (10.8%)
I wouldn't get support from family or friends to quit (Social support)	208 (56.4%)	53 (14.4%)	77 (20.9%)	31 (8.4%)
I wouldn't fit in if I stopped smoking (High prevalence in community)	250 (67.8%)	57 (15.4%)	34 (9.2%)	28 (7.6%)
I wouldn't get any help from health professionals to quit (Social support)	201 (54.5%)	77 (20.9%)	67 (18.2%)	24 (6.5%)
People would judge me if I asked for help quitting smoking (Access to resources)	259 (70.2%)	47 (12.7%)	46 (12.5%)	17 (4.6%)

Table 4. Adjusted odds ratio estimates of characteristics associated with each of the top three most important barriers reported. (Total n =311)

		Addicted to smoking (n = 116)			Stress management (n = 37)			Enjoyment (n = 25)		
Characteristic		**Adjusted**			**Adjusted**			**Adjusted**		
Characteristic	**Comparison**	**Odds Ratio**	**95%CI Lower**	**95%CI Upper**	**Odds Ratio**	**95%CI Lower**	**95%CI Upper**	**Odds Ratio**	**95%CI Lower**	**95%CI Upper**
Age	continuous	1.002	0.979	1.026	0.974	0.939	1.010	1.055	1.012	1.099
Gender	Female vs Male	1.283	0.749	2.197	0.995	0.475	2.085	1.662	0.562	4.916
Indigenous	Aboriginal and/or TSI vs No	0.957	0.512	1.787	1.721	0.777	3.811	.	.	.
HSI	continuous	1.490	1.232	1.803	1.017	0.796	1.299	0.980	0.719	1.336
Quit attempt in last 12 months?	Yes vs No	0.698	0.367	1.325	1.244	0.442	3.502	0.893	0.272	2.933
Motivation to quit	continuous	1.128	0.994	1.279	1.104	0.934	1.305	.	.	.
Education		.	.	.	.	.	.	.	.	.
	Secondary or less vs Primary school	1.479	0.721	3.032	.	.	.	.	.	.
	Tertiary qualifications vs Primary school	2.160	0.925	5.045	.	.	.	.	.	.
Self-efficacy of quitting		.	.	.	.	.	.	.	.	.
	Moderate vs Low	0.686	0.374	1.261	.	.	.	.	.	.
	High vs Low	0.315	0.143	0.695	.	.	.	.	.	.
Cannabis use in last month	Yes vs No	0.874	0.492	1.554						

6.5 DISCUSSION

The barriers to smoking cessation identified as large by almost half of all socioeconomically disadvantaged smokers sampled were addiction and stress management. Addiction to smoking, stress management and enjoyment were reported as the top three most important barriers participants wanted to address in order to quit. Higher levels of nicotine dependence and lower levels of self-efficacy were associated with reporting addiction to nicotine as the top barrier to quitting, while increasing age was associated with reporting enjoyment of smoking as the most important barrier to quitting. No significant factors emerged that were associated with reporting stress as a top three barrier to quitting.

Addiction (including withdrawal symptoms) and stress management are often reported as the most common barriers in surveys conducted with disadvantaged smokers (40-43). It is unclear whether similarities between the results of this study and studies conducted in other high income countries were found because disadvantaged smokers experience similar barriers to smokers from more advantaged backgrounds, or if the current sample of disadvantaged smokers was similar to disadvantaged smokers included in other studies.

However, the current study is the first to examine the relative weight (importance) of these barriers compared to other barriers for smokers. From these results, interventions and policy that address addiction, stress management and enjoyment of smoking will be addressing priority barriers for socioeconomically disadvantaged smokers. It is likely that the most import and most frequently reported barriers found in the current study interact to create an environment that inhibits smoking cessation (23).

Higher levels of nicotine dependence are a consistent predictor of relapse to smoking (44), partly because higher levels of nicotine dependence are associated with stronger withdrawal symptoms when trying to quit smoking (45, 46). Stronger withdrawal symptoms and lower likelihood of maintaining quit attempts may lead to decreased levels of self-efficacy, which may in turn lower likelihood of subsequent quit attempts (47).

Smokers may be mistakenly attributing relief of withdrawal symptoms as stress management, management of anxiety or depression, enjoyment and relaxation (48, 49). Stress management is a commonly reported barrier to cessation, despite evidence that once smokers cease smoking they report lower stress levels. It is important to note that smokers from some disadvantaged groups report that smoking exacerbates their stress levels (50, 51). Further research on the patterns and sources of stress experienced by disadvantaged smokers and the impact of stress management interventions (including referral for anxiety and depression) on levels of stress and smoking cessation outcomes.

Individuals who are older may have been smoking for longer, and thus may have higher levels of nicotine dependence (52, 53). It may also be difficult to distinguish enjoyment of smoking from relief of withdrawal symptoms; although smoking has other perceived benefits; including time out, chance to socialise with friends, and providing relief from boredom (23).

Thus, it appears withdrawal symptoms, including the frequency and strength of urges to smoke, changes in irritability and mood, and physiological symptoms experienced when withdrawing from smoking may play a pivotal role in the perceived barriers to smoking cessation for disadvantaged smokers. A main method used to manage nicotine withdrawal symptoms is NRT (54). However, the perceived cost of NRT remains a barrier to cessation for socioeconomically disadvantaged smokers,

despite the availability of subsidised NRT patches via the Pharmaceutical Benefits Scheme in Australia. The assessment of withdrawal symptoms in this scale was broad and a more detailed examination of withdrawal symptoms in disadvantaged groups, including cravings which has been implicated in failed cessation attempts (55), is warranted.

Strengths and limitations

The main strength of this cross-sectional survey is the recruitment of a large sample of socioeconomically disadvantaged smokers with high rates of homelessness, poverty and indigenous status, often referred to as hard-to-reach (1, 28). This was achieved by approaching smokers through a CSO. However, this also means that the conclusions are limited to similar populations of disadvantaged Australian smokers seeking assistance from CSOs and may be less generalizable to other countries.

The barriers scale developed for this study assessed a comprehensive list of barriers, including individual and environmental barriers. The survey is the first to rank the most important barriers to cessation for disadvantaged smokers, allowing resources to be targeted to the barriers that may allow the greatest likelihood of cessation. Further evaluation of the scale including examining its predictive validity as well as how it performs with other disadvantaged groups, such as addictions populations or Indigenous people, is warranted.

This study was not designed to provide direct comparisons between disadvantaged and non-disadvantaged smokers. Future studies could compare results of this scale on indicators of disadvantage, to help identify how barriers might contribute to the current disparity in smoking prevalence rates.

Implications

These results have implications for the content of smoking cessation programs. Education on skills and strategies for stress management and the link between smoking and increased stress, are important components to include in cessation interventions for smokers experiencing social disadvantage. However there is dearth of evidence of the effectiveness of such strategies at improving cessation. It is also important to continue to address smoking within the context of the social determinants of health, and the known stressors including unemployment, lower levels of education, and homelessness within disadvantaged communities.

Smoking cessation programs that provide NRT at no or low cost will overcome barriers related to perceptions of addiction and withdrawal symptoms. Combination therapies which address immediate cravings as well as longer-term withdrawal symptoms will most likely to assist in addressing addiction and withdrawal. Interventions aimed at increasing use of NRT should also educate on correct use of NRT, including managing NRT use expectancies.

When addressing smoking with older smokers, clinicians may need to take into account enjoyment of smoking and the longer length of time spent smoking (and potentially higher levels of dependence and higher number of positive associations to address). Considering alternative sources of enjoyment and discussing enjoyment of smoking within the context of the negative effects of smoking may be useful for smokers who report high levels of enjoyment of smoking.

Conclusion

Addiction, stress and enjoyment were identified as priority barriers for socioeconomically disadvantaged, Australian smokers. Interventions targeted at disadvantaged groups should address these barriers. In turn, this may contribute to a

decrease in prevalence of smoking in people receiving welfare who typically experience multiple forms of disadvantage.

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7. INTRODUCTION TO PAPERS FOUR AND FIVE

Findings from Papers One, Two and Three identified that barriers to smoking cessation for socioeconomically disadvantaged smokers occur on all levels of the Social Determinants of Health Framework (SDHF). The following papers aimed to take a closer look at the impact of other lifestyle factors on socioeconomically disadvantaged smokers continued smoking and quitting. Alcohol and cannabis were chosen as a focus because they represent the two most common non-tobacco substances reportedly used by smokers (1-3).

Use of tobacco concurrently with either heavy alcohol consumption or regular cannabis use compounds the negative health outcomes associated with smoking. For example, smoking tobacco and heavy alcohol consumption is linked to worsened health outcomes compared to use of either substance alone (e.g. increased risk of head and neck cancers) (4). Smoking tobacco and cannabis is associated with an increased risk of respiratory distress (5) and reduced lung functioning than use of either substance alone (6).

Additionally, heavy alcohol consumption and regular cannabis use have been implicated in relapse back to smoking while making a tobacco quit attempt. While the evidence is mixed (7, 8), regular cannabis use seems to be negatively associated with lower likelihood of maintaining smoking cessation (9-12). Heavy alcohol consumption is associated with lower likelihood of maintaining cessation (13-15). In a cross-sectional survey conducted with those aged $22 - 35$ years old in France (n = 1103), cannabis use and problematic cannabis use were more likely to be associated with lower socioeconomic position (combined measure of SEP that included education, occupation, and unemployment) (16). People with higher levels of education (college degree) and people whose occupational status was professional (with or without a degree) were less

likely to drink heavily or smoke marijuana than people without a college degree or other types of occupation (17). Relatively little is known about *socioeconomically disadvantaged smokers* risky alcohol consumption and cannabis use practices.

Data regarding the prevalence of these behaviours in samples of disadvantaged smokers will help to inform interventions. Thus, Paper Four[2] outlines the sociodemographic and psychosocial factors associated with concurrent heavy alcohol and tobacco smoking, or use of either heavy alcohol or tobacco smoking alone compared to the individuals who neither used heavy levels of alcohol nor tobacco. Paper Five (from the second cross-sectional survey) outlines the use of cannabis within a sample of disadvantaged tobacco smokers and extends the literature by examining the possible mediation effect of motivation to quit between cannabis use and length of previous tobacco quit attempt.

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[2] Paper Four is currently under review at Substance Use and Misuse. A response to reviewers comments made has been included in this thesis (see Appendix 16.1)

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8. Paper Four: Factors associated with concurrent tobacco smoking and heavy alcohol consumption within a socioeconomically disadvantaged Australian sample

16. Associated appendices:

16.1 Reviewers comments and response to reviewers' comments

The definitive version is available at:

http://www.tandfonline.com/doi/full/10.3109/10826084.2015.1122065

Twyman L, Bonevski B, Paul C et al. Factors Associated With Concurrent Tobacco Smoking and Heavy Alcohol Consumption Within a Socioeconomically Disadvantaged Australian Sample Substance Use & Misuse 2016;51:459-470. 10.3109/10826084.2015.1122065. Copyright ©2016, Substance Use and Misuse (The Taylor and Francis Group).

Twyman L, Bonevski B, Paul C, Bryant J, West R, Siahpush M, D'Este C, Oldmeadow C, Palazzi K. Factors associated with concurrent tobacco smoking and heavy alcohol consumption within a socioeconomically disadvantaged Australian sample. *Substance Use and Misuse.* Under Editorial Review.

8.1 ABSTRACT

Background: Tobacco use and heavy alcohol consumption occur more frequently in socioeconomically disadvantaged groups. Little is known about the sociodemographic and psychosocial factors associated with use of alcohol and tobacco in disadvantaged groups in comparison to low risk users.

Objectives: This study aimed to compare the characteristics of low risk users with: disadvantaged smokers only; disadvantaged heavy drinkers only; and disadvantaged concurrent smokers and heavy drinkers.

Methods: A cross-sectional survey of socioeconomically disadvantaged adult clients attending a community welfare agency assessed tobacco use, alcohol use, demographic and psychosocial variables. Multivariable analysis using multinomial logistic regression was carried out.

Results: The sample consisted of 835 participants; 40% (n = 331) were concurrent users, 31% were smokers only (n = 252), 11% were heavy drinkers only (n = 93) and 18% were low risk users (n = 149). Compared with those who neither smoked nor consumed alcohol heavily, concurrent users were more likely to be younger, have only some contact with family, have more friends and family who were smokers, have no fixed home address, live alone, and have higher levels of financial stress. Most of these factors were shared by individuals who were smokers only. Factors associated with heavy drinkers only were frequent contact with family and having more friends and family who were smokers.

Conclusion: Among those Australians who suffer severe economic hardship, being a concurrent smoker and heavy drinker appears to be associated with more isolated living conditions and financial stress but some contact with family.

8.2 INTRODUCTION

Smoking and excessive alcohol consumption are both major avoidable risk factors for morbidity and mortality (1). Concurrent use of alcohol and tobacco compounds the risk of negative health outcomes (2, 3), for example the risk of developing mouth and throat cancer is six times greater for those who use alcohol, seven times greater for those who use tobacco and 38 times higher for those who use both substances concurrently (4).

People who smoke tobacco also drink alcohol more frequently and more heavily than non-smokers (5-7). Drinkers are also more likely to be smokers (7-9) with higher rates of drinking often co-occurring with higher rates of smoking (7, 9-11). A population survey in the USA found that 22% of adults were concurrent heavy drinkers and smokers (7). In an international sample of current smokers, 6% were heavy drinkers (12). This relationship is also found in clinical samples with smoking rates high amongst people receiving treatment for alcohol dependence (13). In an Australian study conducted with large sample of adults aged 45 years and older, younger age (45-64 years compared with 65 and over), being male, and reporting higher levels of psychological distress was associated with concurrent use (14).

Both heavy drinking and smoking are associated with socioeconomic position (SEP) (15). Groups who experience multiple forms of disadvantage such as low educational attainment, unemployment, homelessness, social isolation and mental illness (16, 17) experience the highest rates of smoking and heavy drinking, when measured independently. Limited research has examined concurrent smoking and heavy drinking in socioeconomically disadvantaged populations, especially as they might relate to psychosocial factors and in comparison to use of either substance alone or use of neither substance. One study found being male, younger and having a secondary

school or lower level of education was associated with greater likelihood of smoking and heavy drinking in a sample of community service organisation clients (18).

This study aims to 1) describe the smoking and drinking behaviours in a socioeconomically disadvantaged sample and 2) examine the socio-demographic and psychosocial factors associated with a) concurrent smoking and heavy drinking, b) smoking alone, and c) heavy drinking alone, in comparison to non-heavy drinking and no smoking. The target group is a socioeconomically disadvantaged sample because previous research has shown that rates of each of smoking or heavy drinking are high amongst disadvantaged groups. Identifying those factors associated with concurrent use, as well as use of one substance, has important implications for the design of public health campaigns and interventions within socioeconomically disadvantaged groups.

8.3 METHODS

Study design

A cross-sectional survey was conducted from February 2012 to December 2013 in a non-government community based welfare agency in New South Wales, Australia. This community based welfare agency provides a wide range of material and financial assistance to clients experiencing high levels of disadvantage. CSOs offer help with issues such as mental illness, homelessness, alcohol and other drug problems, Aboriginal health, at risk youth and family support. They provide a wide range of services to clients including crisis relief (for example financial aid to pay electricity bills), food vouchers, employment services, and relationship counselling. Clients of CSOs represent some of the groups most likely to experience socioeconomic disadvantage, including sole parents, people living with a disability, people who are of Aboriginal or Torres Strait Islander origin and people who are currently unemployed (19).

Sample

Welfare agency staff identified eligible participants as those who were a) clients of the welfare agency, b) aged 18 years or older, and c) not presenting with an uncontrolled mental illness or under the influence of alcohol or other drugs. This survey included a range of questions for a number of sub-studies. The larger sample size was required for all the analyses.

Procedure

Eligible clients attending the service were informed about a health research survey being conducted in the centre. A Research Assistant (RA) assessed potential participants for eligibility. Participants completed a 62 item survey administered via a touchscreen computer, using Digivey software (20). The use of touchscreen computers is a valid and acceptable method of collecting data in this setting (21). The mean completion time was 14 minutes (range 5-21). The RA provided assistance in completing the survey where necessary. Completion of the survey was taken as consent (22). Participants were reimbursed for their time with a $20 supermarket voucher. Ethics approval for this study was granted by the University of Newcastle Human Research Ethics Committee.

Outcome Measures

Smoking status: Self-reported smoking status was assessed using the following two items 1) "Do you currently smoke tobacco products? " with the following response options: a) Yes daily b) Yes at least once a week c) Yes but less often than once a week and d) No, not at all and 2) "Have you smoked at least 100 cigarettes or a similar amount of smoking in your life?": a) Yes b) No or c) Not sure. Current smokers were defined as self-reported daily or occasional smokers who had smoked at least 100 cigarettes in their lifetime.

Alcohol use: The Alcohol Use Disorders Identification Test – Short form (AUDIT-C) was used to measure alcohol use (23). Scores of four or more for males (23) (sensitivity = 99%, specificity 60%) and three or more for females (24) (sensitivity: 66%, specificity 94%) indicated heavy drinking.

2.5 Explanatory variables

Sociodemographic variables: Age, gender, highest level of education, marital status, weekly net income amount, type of housing, and Indigenous status were assessed.

Financial stress: The financial stress scale (25) assesses participants' experience of financial stress in terms of six measures of financial or material deprivation for example "being unable to heat home". Scores on this scale range from zero to eight, with higher values indicating higher levels of financial stress.

Depression and anxiety: The Patient Health Questionnaire – 4 (PHQ4) was used as an ultra-brief screening measure for both anxiety and depression. Higher scores indicate higher likelihood of underlying depressive or anxiety disorder (26).

Social contact: Social contact was measured using two items "How often are you in contact with any members of your family- including visits, phone calls, letters, or emails?" and "How often are you in contact with any friends- including visits, phone calls, letters, or emails?". Response options were: a) Nearly every day b) 3-4 days per week c) 1 -2 days per week d) 1 -3 days per month e) Less than once a month f) Never g) No family/friends (27).

Social support: Social support was measured using two items "How many family members can you rely on if you have a serious problem?" and "How many friends can you rely on if you have a serious problem?". Response options were: a) No

family/friends I can rely on b) 1-2 family members/friends c) 3 – 4 family members/friends d) More than 5 family members/friends (27).

Friends and family who were smokers: The smoking status of friends and family members was assessed by asking participants "How many of your friends and family smoke?". Response options were: a) None, b) A few/less than half, c) About half, or d) Most or all of them.

Resilience: Resilience was measured using the Brief Resilience Scale (BRS) (28). The BRS comprises 6 items and conceptualises resilience as an individual's way of "bouncing back" after adversity. Higher scores indicate higher levels of resilience.

Data analysis

Participants were classified into one of four groups based on self-reported smoking and alcohol use.

Concurrent users

Participants who were self-reported smokers (either daily or occasional) who met AUDIT-C cut off scores for heavy drinking were classified as concurrent users. Daily and occasional smokers were grouped together because there is evidence that even occasional smoking is associated with negative health outcomes (29).

Smokers only

Self-reported smokers who did not meet the AUDIT-C criteria for heavy drinking were classified as smokers only.

Heavy drinkers only

Participants who met the criteria for heavy drinking but who reported being a non-smoker were classified as heavy drinkers only.

Low risk users

Participants who reported being non-smokers and who did not meet the criteria for heavy drinking or who abstained from alcohol were classified as low risk users. Low level alcohol drinkers were included with those who abstained from alcohol because this level of alcohol consumption does not lead to adverse health and social consequences.

Descriptive statistics are presented as counts and percentages for categorical variables and means (standard deviation) or median (interquartile range; IQR) for continuous variables, depending on distribution. The prevalence of smoking and alcohol use and the concurrent use of both substances were estimated as percentages with 99% confidence intervals. Comparison of characteristics between groups was performed using Chi-squared (categorical), ANOVA or Kruskal-Wallis (continuous) tests as appropriate.

The following variables were examined in analyses: age, gender, education, Indigenous status, housing, marital status, income amount, social contact with friends and family, social support from friends and family, total financial stress score, depression and anxiety (PHQ4 score), total resilience score and estimated amount of friends/family who smoke. Multinomial logistic regression was used to examine the socio-demographic and psychosocial variables associated with the four outcome groups. All variables of interest were included in regression modelling and a backwards selection method was used to create a parsimonious model. Variables were only removed if their removal did not negatively affect either the fit of the model (measured by significant change in likelihood ratio test or more than four point increase in AIC) or change the estimates for remaining variables. To account for the number of comparisons made in the analysis, the significance level was set at $\alpha=0.01$; SAS 9.3 (SAS Institute Inc., Cary, NC, USA) was used to for all analyses.

8.4 RESULTS

Characteristics of participants

Of the 861 eligible clients, 846 consented to participate and 825 completed the survey in full (96% completion rate). Table 1 provides the smoking and drinking profiles of participants. Overall, 63% (n = 518) of the sample were daily smokers and a further 8% (n = 8%) occasional smokers. Around half of the sample (51%, n = 424) met AUDIT-C criteria for heavy drinking. Concurrent smokers and heavy drinkers made up 40% of the sample (n = 331).

Table 2 provides the demographic information for the sample overall and by alcohol/smoking status. The sample was highly socioeconomically disadvantaged. The sample displayed exceptionally low levels of income, with 82% (n = 647) reporting income well below the Australian single-person 'poverty line' of $500 per week (30). The majority of participants received government welfare as their main source of income (92%, n = 767) and 18% had completed less than a secondary school level of education (n = 153). Aboriginal and Torres Strait Islander peoples were overrepresented, making up 15% of the sample compared to 2.2% of the population in New South Wales (31).

Table 3 provides psychosocial information for the sample overall and by alcohol/smoking status. Over half of the sample had at least weekly contact with family (59%, n = 498) and friends (61%, n = 541). Slightly less than a third of participants reported having no friends (31%, n = 260) or family (30%, n = 252) to rely on. Mean depression symptom scores on the PHQ4 and mean financial stress scores on the financial stress scale were higher than those found in general population samples (26, 32), while total resilience scores were lower than those found within general population samples (28).

Factors associated with concurrent use, smoking only, or heavy drinking only compared to low risk users

The results of the multinomial regression are presented in Table 4. Compared to low risk users, concurrent users were younger (OR = 0.96, 99% CI = 0.93, 0.98), had more friends and family who were smokers (ORs ranged from 2.9 to 19.4), were homeless or reported their housing status as "Other" (compared to owning their own house; OR = 5.8, 99% CI = 1.1, 31.2) and were not living with a partner (OR = 2.2, 99% CI = 1, 4.8). For every one unit increase in financial stress, the odds of being a concurrent user increased by 25% (99% CI = 1.1, 1.5). Factors associated with being a smoker only compared to being a low risk user were higher financial stress score (OR 1.24, 99% CI = 1.04, 1.47) and more friends and family who were smokers (ORs ranged from 2.5 to 12.9).

Participants who had higher odds of being heavy drinker than being a low risk user reported that most/all of their friends and family were smokers (compared to none of their friends/family being smokers; OR = 6.4, 99% CI = 1.5, 27). All other factors were non-significant.

Table 1. Prevalence of smoking and alcohol use within this sample

Characteristic		Total (N=825)	
		n (%)	99% CI
Smoking Status	Non-smoker	144 (17%)	14% - 21%
	Ex-smoker	98 (12%)	9% - 15%
	Occasional smoker	65 (8%)	5% -10%
	Daily smoker	518 (63%)	58% - 67%
Alcohol Use	Non-drinker	252 (31%)	26% - 35%
	Non-heavy drinker	149 (18%)	15% - 22%
	Heavy drinker	424 (51%)	47% - 56%
Smoking status and alcohol use	Concurrent user	331 (40%)	36% - 45%
	Smoker only	252 (31%)	26% - 35%
	Heavy drinker only	93 (11%)	8% - 14%
	Low risk user	149 (18%)	15% - 22%

Table 2. Demographic characteristics of study participants compared between the four smoking and alcohol groups.

Characteristic		Low risk user (n=149)	Heavy drinker only (n=93)	Smoker only (n=252)	Concurrent user (n=331)	Total (N=835)	p-value[a]
		n (%)	n (%)	n (%)	n (%)	n (%)	
Age	mean (SD)	43 (14)	39 (12)	40 (10)	37 (11)	39 (12)	<0.001
	median (min, max)	43 (18, 83)	38 (18, 66)	40 (18, 78)	37 (18, 86)	39 (18, 86)	<0.001
Gender	Male	52 (35%)	34 (37%)	125 (50%)	169 (51%)	383 (46%)	0.002
	Female	97 (65%)	59 (63%)	127 (50%)	162 (49%)	452 (54%)	
Indigenous status	Non-Indigenous Australians	129 (87%)	79 (85%)	219 (87%)	272 (82%)	706 (85%)	0.394
	Indigenous Australians	20 (13%)	14 (15%)	33 (13%)	59 (18%)	129 (15%)	
Education	Primary school	22 (15%)	15 (16%)	56 (22%)	60 (18%)	153 (18%)	0.009
	Secondary or less	73 (49%)	40 (43%)	130 (52%)	190 (57%)	441 (53%)	
	Tertiary qualifications	54 (36%)	38 (41%)	66 (26%)	81 (24%)	241 (29%)	
Income Amount	Less than $200 per week	26 (18%)	15 (16%)	61 (26%)	101 (32%)	205 (26%)	<0.001
	Between $201-$400 per week	82 (58%)	49 (53%)	135 (57%)	169 (54%)	442 (56%)	
	More than $400 per week	34 (24%)	28 (30%)	41 (17%)	43 (14%)	147 (19%)	
Income Source	Paid employment (either full or part time)	5 (3.4%)	18 (19%)	11 (4.4%)	10 (3.0%)	44 (5.3%)	<0.001
	Government pension or benefit	137 (92%)	71 (76%)	234 (93%)	315 (99%)	767 (92%)	
	Other	7 (4.7%)	4 (4.3%)	7 (2.8%)	6 (1.8%)	24 (2.9%)	
Marital Status	Married/Defacto/Living with Partner	39 (26%)	27 (29%)	37 (15%)	43 (13%)	147 (18%)	<0.001
	Not living with a partner	110 (75%)	66 (71%)	215 (85%)	288 (87%)	679 (82%)	
Housing	Own house	16 (11%)	10 (11%)	12 (4.8%)	7 (2.1%)	45 (5.4%)	<0.001
	Rental house	59 (40%)	46 (49%)	67 (27%)	98 (30%)	273 (33%)	
	With family or friends/Hotel, Motel/No home, street living/Other	10 (8%)	9 (10%)	49 (19%)	58 (18%)	126 (15%)	
	Supported accommodation/government housing	64 (43%)	28 (30%)	124 (49%)	168 (51%)	391 (47%)	

Characteristic		Low risk user (n=149)	Heavy drinker only (n=93)	Smoker only (n=252)	Concurrent user (n=331)	Total (N=835)	p-value[a]
		Smoking/Alcohol Group					
		n (%)	n (%)	n (%)	n (%)	n (%)	
Total Financial Stress Score	mean (SD)	4.65 (1.91)	5.14 (1.80)	5.62 (1.76)	5.74 (1.75)	5.44 (1.83)	<0.001
	median (min, max)	5.00 (1.00, 8.00)	5.00 (1.00, 8.00)	6.00 (0.00, 8.00)	6.00 (0.00, 8.00)	6.00 (0.00, 8.00)	<0.001

[a] Comparison of characteristics between groups was performed using Chi-squared (categorical), ANOVA or Kruskal-Wallis (continuous) tests as appropriate.

Table 3. Psychosocial characteristics of study participants compared between the four smoking and alcohol groups.

		Smoking/Alcohol Group					
		Low risk user (n=149)	Heavy drinker only (n=93)	Smoker only (n=252)	Concurrent user (n=331)	Total (N=835)	p-value[a]
		n (%)	n (%)	n (%)	n (%)	n (%)	
Contact with Family	Never/No family	22 (15%)	11 (12%)	39 (15%)	54 (16%)	127 (15%)	<0.001
	1-3 days a month/Less than once a month	22 (15%)	21 (23%)	62 (25%)	102 (31%)	210 (25%)	
	1-2 days a week	20 (13%)	23 (25%)	48 (19%)	63 (19%)	154 (18%)	
	Nearly every day/3-4 days a week	85 (57%)	38 (41%)	103 (41%)	112 (34%)	344 (41%)	
Contact with Friends	Never/No friends	22 (15%)	11 (12%)	49 (19%)	50 (15%)	133 (16%)	0.024
	1-3 days a month/Less than once a month	33 (22%)	12 (13%)	62 (25%)	53 (16%)	161 (19%)	
	1-2 days a week	36 (24%)	21 (23%)	45 (18%)	68 (21%)	172 (21%)	
	Nearly every day/3-4 days a week	58 (39%)	49 (53%)	96 (38%)	160 (48%)	369 (44%)	
Family You Can Rely On	No family I can rely on	44 (30%)	25 (27%)	80 (32%)	100 (30%)	252 (30%)	0.571
	1-2 family members	69 (46%)	46 (49%)	127 (50%)	173 (52%)	420 (50%)	
	3 or more family members	36 (24%)	22 (24%)	45 (18%)	58 (18%)	163 (20%)	
Friends You Can Rely On	No friends I can rely on	53 (36%)	22 (24%)	90 (36%)	93 (28%)	260 (31%)	0.226
	1-2 friends	69 (46%)	53 (57%)	122 (48%)	173 (52%)	424 (51%)	
	3 or more friends	27 (18%)	18 (19%)	40 (16%)	65 (20%)	151 (18%)	
Friends or Family who Smoke	None	43 (29%)	12 (13%)	26 (10%)	22 (6.6%)	105 (13%)	<0.001
	A few/Less than half	70 (47%)	49 (53%)	88 (35%)	91 (27%)	301 (36%)	
	About half	27 (18%)	16 (17%)	54 (21%)	91 (27%)	189 (23%)	

		Smoking/Alcohol Group					
		Low risk user (n=149)	**Heavy drinker only (n=93)**	**Smoker only (n=252)**	**Concurrent user (n=331)**	**Total (N=835)**	**p-value[a]**
		n (%)	**n (%)**	**n (%)**	**n (%)**	**n (%)**	
	Most or all of them	9 (6.0%)	16 (17%)	84 (33%)	127 (38%)	240 (29%)	
PHQ4	mean (SD)	4.46 (3.83)	4.91 (3.63)	6.04 (3.68)	6.21 (3.53)	5.69 (3.70)	<0.001
	median (min, max)	4.0 (0.0, 12.0)	4.00 (0.0, 12.0)	6.00 (0.0, 12.0)	6.00 (0.0, 12.0)	5.0 (000, 12.0)	<0.001
Total Resilience Score	median (min, max)	3.0 (1.0, 5.0)	3.17 (1.0, 4.5)	3.00 (1.0, 5.0)	2.83 (1.0, 5.0)	3.0 (1.0, 5.0)	0.012
	mean (SD)	2.97 (0.83)	3.07 (0.72)	2.80 (0.78)	2.86 (0.77)	2.88 (0.78)	0.018

[a] Comparison of characteristics between groups was performed using Chi-squared (categorical), ANOVA or Kruskal-Wallis (continuous) tests as appropriate

Table 4. Adjusted odds ratio estimates for low risk user vs other alcohol and smoking groups

Characteristic	Heavy drinker only vs. Low risk user OR (99% CI)	Smoker only vs. Low risk user OR (99% CI)	Concurrent user vs. Low risk user OR (99% CI)	p-value[a]
Age				<0.001*
continuous	0.97 (0.94, 1.01)	0.98 (0.95, 1)	0.96 (0.93, 0.98)*	
Total Financial Stress Score				0.003*
continuous	1.09 (0.89, 1.34)	1.24 (1.04, 1.47)*	1.25 (1.05, 1.48)*	
Anxiety/Depression (PHQ4) Score				0.093
continuous	1.03 (0.92, 1.15)	1.05 (0.96, 1.15)	1.09 (0.99, 1.19)	
Gender				0.056
Male	Ref	Ref	Ref	
Female	0.9 (0.41, 1.94)	0.58 (0.31, 1.09)	0.57 (0.3, 1.06)	
Education				0.411
Primary school	Ref	Ref	Ref	
Secondary or less	0.63 (0.21, 1.85)	0.72 (0.31, 1.69)	0.93 (0.39, 2.21)	
Tertiary qualifications	0.83 (0.27, 2.52)	0.6 (0.24, 1.51)	0.71 (0.28, 1.8)	
Marital Status				0.003*
Married/Defacto/Living with Partner	Ref	Ref	Ref	
Not living with a partner	0.88 (0.38, 2.07)	2.12 (0.98, 4.57)	2.23 (1.03, 4.81)*	
Housing				<0.001*
Own house	Ref	Ref	Ref	
Rental house	1.12 (0.31, 4.14)	0.88 (0.25, 3.08)	1.86 (0.44, 7.84)	
Supported accommodation/government housing	0.65 (0.17, 2.48)	1.38 (0.41, 4.68)	2.9 (0.7, 11.97)	
With family or friends/Hotel,Motel/No home, street living/Other	1.5 (0.27, 8.43)	3.38 (0.75, 15.3)	5.81 (1.08, 31.15)*	
Contact with Friends				0.015
Never/No friends	Ref	Ref	Ref	
1-2 days a week	0.83 (0.22, 3.05)	0.46 (0.17, 1.29)	0.69 (0.24, 1.93)	

Characteristic	Heavy drinker only vs. Low risk user OR (99% CI)	Smoker only vs. Low risk user OR (99% CI)	Concurrent user vs. Low risk user OR (99% CI)	p-value[a]
1-3 days a month/Less than once a month	0.47 (0.12, 1.87)	0.56 (0.21, 1.53)	0.44 (0.15, 1.25)	
Nearly every day/3-4 days a week	1.39 (0.42, 4.56)	0.67 (0.26, 1.71)	1.1 (0.43, 2.85)	
Contact with Family				0.012
Never/No family	Ref	Ref	Ref	
1-2 days a week	2.78 (0.73, 10.6)	2.2 (0.73, 6.64)	2.08 (0.7, 6.18)	
1-3 days a month/Less than once a month	2.23 (0.6, 8.3)	2.09 (0.73, 5.98)	2.57 (0.92, 7.23)	
Nearly every day/3-4 days a week	0.86 (0.26, 2.8)	1.16 (0.46, 2.89)	0.86 (0.35, 2.14)	
Friends or Family who Smoke				<0.001*
None	Ref	Ref	Ref	
A few/Less than half	2.67 (0.95, 7.54)	2.52 (1.08, 5.85)*	2.87 (1.17, 7)*	
About half	1.88 (0.54, 6.53)	3.12 (1.18, 8.22)*	5.06 (1.89, 13.53)*	
Most or all of them	6.4 (1.52, 27)*	12.9 (3.98, 41.83)*	19.44 (5.86, 64.48)*	

[a]Wald type 3 (overall) p value statistic   *significant at $\alpha=0.01$

8.5 DISCUSSION

To our knowledge, this is the first study to investigate factors associated with smoking, heavy drinking, and the concurrent use of both substances in comparison to participants who were low risk users within a socioeconomically disadvantaged group.

Measured separately, the prevalence of smoking and heavy drinking in this sample were considerably higher than estimates found within the general population in Australia (smoking 12.8%, lifetime risky alcohol use 18%) (33) and comparable to rates found in homeless populations (34, 35), people with a mental illness(36, 37) and in a sample of Australian welfare recipients (18). High levels of concurrent use were identified in the current study compared to national estimates from the USA (22%) (7) and Australia (24%) (38). Consistent with previous research, individuals who were concurrent users had higher odds of: being younger; reporting more family and friends as smokers (39, 40); being homeless (34, 35); living alone/without a partner (41-43); and having higher levels of financial stress (44). Most of the factors associated with concurrent smoking and heavy drinking were also associated with smoking alone. Individuals who were heavy drinkers had higher odds of reporting higher proportions of friends and family that were smokers.

While alcohol use status of family and friends was not assessed in the current study, estimates of the amount of family and friends who were smokers showed consistent relationships to concurrent use, smoking and drinking. Higher numbers of smokers and heavy drinkers within individuals' networks may reflect higher levels of acceptability and perceived norms surrounding the use of these substances.

This study did not find expected significant relationships between gender, social support, social contact, anxiety, depression, or resilience and concurrent use. While some studies report males being more likely to engage in heavy drinking and smoking

than females (45), gender was not statistically significantly associated with concurrent use compared to use of neither substance in this sample. Social support may be more important during attempts to stop smoking or reduce drinking or may be mediated by the smoking and alcohol use profile of those family and friends relied on for support (46). Symptoms of anxiety and depression (mean PHQ4 scores) were higher than those found in general population studies (26) and the levels of resilience were lower than those found in general population studies (28), regardless of participants' smoking and alcohol use status. PHQ4 score was retained in the final model as removal of this variable affected the fit of the model and estimates for other variables. This suggests that there may be an underlying relationship between depression and anxiety and smoking/alcohol use status in this study. This study was only adequately powered to detect moderate to large associations.

Implications for interventions and public health campaigns

The results of this study indicate that multiple approaches including public health campaigns and interventions targeted at socioeconomically disadvantaged individuals are needed in order to encourage smoking cessation. Given the interrelationships between smoking and heavy alcohol use, there is an opportunity to implement sustained social marketing campaigns that are targeted to disadvantaged groups that address both smoking and heavy alcohol use at the same time. Such campaigns may be effective at creating awareness of the synergistic health effects of concurrent smoking and heavy drinking and at enhancing motivation to change these behaviours. However, such campaigns must be implemented and evaluated in a methodologically rigorous way (47).

Evidence from smoking cessation literature suggests that while disadvantaged smokers make attempts to quit smoking at rates similar to those within the general

population, the success rates of these quit attempts are lower (29, 48). Therefore, there is a need for targeted, evidence based interventions that address both behaviours and promote sustained behaviour change. Interventions that treat smoking and heavy alcohol use together result in similar, if not improved outcomes for individuals (13, 49) compared to interventions that treat the behaviours separately. However, further research is required to determine the treatment preferences of concurrent users in socioeconomically disadvantaged groups; the timing of treatments (either simultaneous or sequential) and the effectiveness of either method in disadvantaged groups.

Considering the association between contact with family and number of friends and family who were smokers, such interventions may benefit from inclusion of peer support (50). A systematic review of peer support programs found that disadvantaged groups may benefit more from peer programs that provide support that would otherwise not be available (50). Family and community based approaches to reducing tobacco and heavy alcohol consumption may also be considered. Family based interventions involving intensive have shown potential to help prevent adolescents and young people initiating smoking (51) and to decrease exposure to secondhand smoke (52). Further research should examine how best to design interventions that address the social context of smoking and alcohol use within disadvantaged groups (53).

CSOs may be well placed to address smoking and heavy drinking with their clients in tandem with the other issues clients present with (including unemployment and financial stress) (54). Addressing smoking in CSOs has been identified as acceptable and feasible by both CSO staff and clients (55, 56). However, careful planning and involvement with CSO staff is necessary in order to ensure they have the capacity to address these behaviours, as evidence suggests CSOs are already struggling to meet demand for services (57).

Strengths and limitations

This study is one of the first to examine a wide range of factors associated with smoking, heavy drinking and concurrent use of both substances in a socioeconomically disadvantaged sample in Australia. It provides valuable data regarding the concurrent and separate rates of tobacco and alcohol use in a sample of disadvantaged individuals and prompts further research into multiple substance use within clients of community service organisations. However, the present study did not collect data on participants' other substance use or mental health functioning. Illicit drug use or psychopathology may have driven the association between the psychosocial correlates and thus may account for some of the group differences observed. Obtaining accurate numbers of client presentations to the service in which this study was carried out was not possible. This limited the ability to provide an estimate of eligibility rates in this convenience sample. However the prevalence of smoking and heavy alcohol use in this survey are very close to those found in studies conducted in similar settings where consent rates were between 69% and 96% (18, 58). Smoking and alcohol use were assessed using self-report. Self-reported smoking status within socioeconomically disadvantaged samples using a touchscreen survey has been shown to be reliable and valid (21) and under-reporting of alcohol consumption does not appear to vary with socioeconomic position. Therefore, estimates of the prevalence of use of these substances are unlikely to have been heavily biased by the use of self-report. Additionally, the measures used within this study were brief indices of the constructs measured (compared to other available measures for these constructs). Use of longer or more comprehensive measures of these constructs may have provided different results.

Conclusion

Even among socioeconomically disadvantaged individuals, there is a subset of people who are at greater risk of health issues due to concurrent smoking and heavy drinking. This subset also experiences multiple forms of disadvantage including being homeless, being single, having more smokers in their social networks, and having higher levels of financial stress. Interventions aimed at smoking cessation and reducing heavy drinking may be strengthened by addressing both behaviours together. Addressing factors associated with disadvantage including low income, and housing status should also be a focus of research aimed at increasing the health profile of disadvantaged individuals.

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9. Paper Five: The association between cannabis use and motivation and intentions to quit tobacco within a sample of Australian socioeconomically disadvantaged smokers

Associated appendices:

Nil

Twyman L, Bonevski B, Paul C, Kay-Lambkin F, Bryant J, Oldmeadow C, Palazzi K, Guillaumier A. A mediation analysis of cannabis use, motivation to quit tobacco and length of previous tobacco quit attempts within an Australian sample of socioeconomically disadvantaged smokers. *Addictive Behaviors.* Under Editorial Review.

9.1 ABSTRACT

Introduction: This study aimed to a) describe concurrent and simultaneous tobacco and cannabis use and b) investigate the association between cannabis use and motivation and intentions to quit tobacco in a sample of socioeconomically disadvantaged smokers.

Method: A cross-sectional survey was conducted in 2013 and 2014 with current tobacco smokers receiving aid from two community service organisations in New South Wales, Australia. At least weekly cannabis use for the month prior to survey, motivation to quit tobacco and intentions to quit tobacco were measured in 369 participants (77% consent rate). Regressions were carried out to investigate associations between weekly cannabis use and motivation and intentions to quit tobacco.

Results: Concurrent tobacco and cannabis use was reported by 19% (n = 71) of the sample and of these users, 100% reported simultaneous use. While regular cannabis use was significantly associated with lower motivation to quit tobacco, it was not significantly associated with intentions to quit tobacco in the next 30 days.

Conclusions: Concurrent cannabis use is common in disadvantaged smokers, and may play a role in decreased motivation to quit tobacco, however it does not appear to be associated with intentions to quit in a sample of disadvantaged smokers.

9.2 INTRODUCTION

Tobacco smoking is the leading cause of avoidable morbidity and mortality globally and is associated with increased likelihood of cancer, cardiovascular and respiratory disease [1]. Cannabis users are four to nine times more likely to be regular tobacco users, compared with non-cannabis users [2]. The potential for cannabis to act as a 'gateway' to tobacco use [3], as well as the role of cannabis in supporting and reinforcing ongoing tobacco smoking [4], have been identified as issues of concern. Cannabis and tobacco use can occur either concurrently (use of cannabis and tobacco but not necessarily in the same instance) or simultaneously (use at the same time in the same instance) [5]. Rates of concurrent use in the general population have been estimated between 25% to 58%, with younger people more likely to report concurrent use [6-8]. Simultaneous use is an increasingly common occurrence [9, 10]. Cannabis and tobacco can be used simultaneously through spliffs (adding tobacco to cannabis wrapped in cigarette paper), blunts (removal of majority of tobacco from cigar, then filling with cannabis) or through chasing (smoking tobacco immediately after smoking cannabis) [5].

Increased levels of socioeconomic disadvantage are associated with increased likelihood of cannabis or tobacco use [11-14] and concurrent use of both substances [15]. Socioeconomically disadvantaged tobacco smokers who use cannabis tend to be at higher risk of poorer health outcomes [16, 17], find it harder to quit compared to those who do not use cannabis [18], and represent a group who are more likely to be underrepresented in research studies [19].

Studies linking cannabis use to tobacco cessation have found mixed results with some studies suggesting cannabis use inhibits tobacco cessation [18, 20-23] and others finding no association [24, 25]. In one qualitative study conducted with

socioeconomically disadvantaged tobacco smokers, simultaneous use of cannabis and tobacco was identified as a barrier to quitting tobacco smoking [10]. These results suggest that the effect of cannabis on tobacco cessation may be complex and depend on a number of variables such as context [22], age and type of tobacco dependence treatment [25].

The mechanisms that underlie any association between cannabis use and poorer tobacco cessation outcomes are unclear. Some researchers have suggested that weekly or daily cannabis use may result in diminished motivation to make attempts to quit tobacco smoking as well as maintain long term abstinence [25, 26]. Cannabis use may reduce a tobacco smoker's motivation to quit tobacco through simultaneous use, the shared route of administration (inhalation) [6], increased strength or frequency of nicotine withdrawal symptoms [27], increased urges to use tobacco [28], and environmental factors including increased acceptability and availability of the use of both substances [5, 6]. Furthermore, preliminary neuropsychological evidence suggests regular cannabis users may also experience decreased motivation through lower levels of dopamine synthesis capacity [29], which may affect motivation to change current behaviours generally, and tobacco use in particular. Current cannabis use coupled with lowered motivation to quit tobacco may also influence a smokers' intention to quit tobacco. While there remain questions around the impact of cannabis use on motivation [30], it is plausible that recent, frequent cannabis use has detrimental impacts on motivation to quit tobacco smoking and intention to quit which compromises the ability to remain abstinent from tobacco.

Therefore, amongst a sample of socioeconomically disadvantaged tobacco smokers, this study aimed to a) describe concurrent and simultaneous tobacco and

cannabis use and b) investigate the association between cannabis use and motivation and intentions to quit tobacco in a sample of socioeconomically disadvantaged smokers.

9.3 METHODS

Study design

A cross sectional survey was conducted at two non-government community service organisations (CSO) in New South Wales, Australia, from October 2013 to July 2014.

Setting

In Australia, clients of CSOs represent a social group who are more likely to experience multiple forms of disadvantage including unemployment, homelessness and financial stress [31]. Rates of tobacco and heavy alcohol use (including concurrent use of both substances) are high in clients of CSOs [32].

Participants

Eligible participants were 1) clients of the CSO, 2) aged 18 years or older, 3) not under the influence of alcohol or other drugs at time of recruitment, 4) not too distressed to complete the survey and 5) current daily or occasional tobacco smokers. Self-reported tobacco status was assessed using the following two items: 1) "Do you currently smoke tobacco products?" (categorised into: (a) Yes, daily; b) Yes, at least once a week; c) Yes, but less often than once a week; and d) No, not at all) and 2) "Have you smoked at least 100 cigarettes or a similar amount of smoking in your life?" (Yes/No/Not sure). Current tobacco smokers were defined as self-reported daily use, or occasional tobacco smokers who had smoked at least 100 cigarettes in their lifetime.

Procedure

CSO staff informed all clients about a health survey being conducted at the organisation and clients were asked to approach the Research Assistant (RA) for more information. RAs assessed client eligibility and provided clients with a written information statement. Survey completion was taken as consent. The survey was administered via a touchscreen computer. The RA provided assistance in completing the survey where necessary. Participants received a $10 grocery gift voucher as reimbursement for completing the survey. Ethics approval was granted by the University of Newcastle's Human Research Ethics Committee (Approval #: HREC2010-1002).

Measures

The survey included 40 questions and the mean completion time was 16.2 minutes (range = 9.2 – 21.3 minutes). All survey items were written assuming a fifth grade reading level.

Sociodemographic variables

Age, gender, highest level of education, marital status, housing status, income amount, income source and Aboriginal and/or Torres Strait Islander status were recorded.

Cannabis use

Self-reported cannabis use was assessed using a modified item from the Opiate Treatment Index-Cannabis scale [33]. Participants were first asked if they had ever used cannabis (marijuana, dope, grass, hash, pot). All participants who responded 'yes' were asked how *often* they had used cannabis within the past four weeks. Response options included: a) 6-7 days each week, b) 4-5 days each week, c) 2-3 days each week, d) 1 day each week, e) 1 day each fortnight, f) once in the last month and g) not at all in the last month. Participants who reported using cannabis at least once a week in the past

four weeks were distinguished from those who had not and defined as current cannabis users. Participants who reported ever using cannabis were also asked "Do you mix tobacco with cannabis (marijuana, dope, grass, hash, pot)?" (response: Yes/No). Participants who responded yes were classified as being simultaneous users.

Motivation to quit tobacco

Current motivation to quit smoking tobacco was assessed with the following item "On a scale of one to ten, where one is very low motivation and ten is very high motivation, please rate your current motivation to give up smoking" [34].

Intentions to quit tobacco

Intentions to quit were assessed using the following item "What are your intentions regarding quitting smoking. Do you plan to: a) quit in the next 30 days, b) quit in the next six months, c) quit, but not in the next six months, d) never quit, d) don't know. These categories were divided into two groups; respondents who reported intending to quit in the next 30 days and others.

Smoking related variables (tobacco)

Heaviness of Smoking Index (HSI) [35], age of tobacco smoking initiation and self-efficacy for quitting tobacco were assessed [36].

Data analysis

Descriptive statistics for socio-demographic and tobacco characteristics were calculated as counts and percentages for categorical variables and means (standard deviation) or median (interquartile range; IQR) for continuous variables, depending on distribution. The prevalence of current cannabis use (at least once per week during the last four weeks) was estimated with 95% confidence intervals. Characteristics were compared among cannabis use status groups using Chi^2 (categorical characteristics),

ANOVA or Kruskal-Wallis (continuous; parametric and non-parametric) tests for association.

Linear regression was used to examine whether frequency of cannabis use was associated with motivation to quit smoking. Logistic regression was used to examine whether frequency of cannabis use was associated with intentions to quit tobacco within the next 30 days. Covariates included in modelling were determined a priori based on review of current literature and included demographics (age, gender, education and Indigenous status), HSI, and mixing of cannabis and tobacco. For all regression modelling, collinearity of variables was checked using VIFs and linearity assumption for continuous variables and the (log or linear) outcome were examined. Adjusted regression coefficients or odds ratios are presented with 95% confidence intervals and Wald test p-values. SAS 9.4 was used for all analyses [37].

9.4 RESULTS

Response rate

Of the 606 clients attending the two centres during the study period, 478 (79%) clients were eligible to take part. Reasons for ineligibility included being a non-smoker (n=96), being under the influence of alcohol or other drugs (n = 5), distress (n =3), and being aged under 18 years (n = 5). Of eligible clients, 369 (77%) consented and gave complete survey data.

Demographic and smoking characteristics of the sample

Respondents reported considerable socioeconomic disadvantage. Individuals self-reporting as Aboriginal and/or Torres Strait Islander made up 21% (n = 60) of the sample, compared to 2.2% of the population in New South Wales [38] and the majority (71%) of participants reported income levels below the Australian single-person 'poverty line' [39]. Most participants received government benefits as their main source

of income (91%: see Table 1). Individuals had high levels of nicotine dependence (mean

HSI score was = 3, SD = 2) and low levels of self-efficacy for quitting tobacco smoking

(55% were slightly or not at all sure they would be successful at quitting if they tried).

Table 1. Demographic characteristics of the sample by cannabis use status

Characteristic	Never used (n=150; 41%)	Used < once per week in the past 4 weeks (n=148 40%)	Used ≥ once per week in the past 4 weeks (n=71, 19%)	Total (N=369)	p-value[b]
Age mean (SD)	42 (13)	39 (10)	38 (10)	40 (11)	0.01
Gender					
Male	36 (24%)	69 (46%)	45 (30%)	150 (41%)	<0.0001
Female	114 (52%)	79 (36%)	26 (12%)	219 (59%)	
Indigenous status					
Non-Indigenous	124 (43%)	122 (42%)	45 (15%)	291 (79%)	<0.001
Indigenous[a]	26 (33%)	26 (33%)	26 (33%)	78 (21%)	
Highest level of education					
Primary school	20 (33%)	23 (38%)	18 (30%)	61 (17%)	0.03
Secondary school	103 (44%)	88 (37%)	45 (19%)	236 (64%)	
Tertiary qualifications	27 (38%)	37 (51%)	8 (11%)	72 (20%)	
Weekly income amount (net)					
Less than $200 per week	35 (35%)	36 (36%)	29 (29%)	100 (29%)	0.12
Between $201-$400 per week	64 (40%)	71 (44%)	26 (16%)	161 (47%)	
More than $400 per week	37 (47%)	30 (38%)	11 (14%)	78 (23%)	
Prefer not to answer	14 (47%)	11 (37%)	5 (17%)	30 (8%)	
Source of income					
Paid employment (either full or part time)	11 (61%)	6 (33%)	1 (6%)	18 (5%)	0.33
Government pension or benefit	134 (40%)	135 (40%)	68 (20%)	337 (91%)	
Other	5 (36%)	7 (50%)	2 (14%)	14 (4%)	

[a]Due to low cell numbers participants who self-reported Aboriginal, Torres Strait Islander or both Aboriginal and Torres Strait Islander status were included together in the Indigenous category. It should be noted Aboriginal and Torres Strait Islander peoples make up two distinct cultural peoples.

[b] p-value from Chi^2, ANOVA or Kruskal-Wallis test for association.

Table 2. Smoking related characteristics of the sample by cannabis use status

Characteristic	Never used (n=150; 41%)	Used < once per week in the past 4 weeks (n=148 40%)	Used ≥ once per week in the past 4 weeks (n=71, 19%)	Total (N=369)	p-value[a]
Motivation to quit tobacco					
mean (SD)	6 (2)	6 (2)	5 (2)	5 (2)	0.035
Low motivation (1-3)	25 (34%)	28 (38%)	21 (28%)	74 (20%)	0.035
Moderate motivation (4-6)	77 (44%)	62 (36%)	35 (20%)	174 (48%)	
High motivation (7-10)	45 (38%)	57 (49%)	15 (13%)	117 (32%)	
Heaviness of Smoking Index					
mean (SD)	3 (2)	3 (2)	3 (1)	3 (2)	0.009
Number of cigarettes smoked					
median (IQR)	12 (7, 20)	15 (10, 20)	20 (10, 25)	15 (9, 20)	0.006
Age of tobacco smoking initiation					
mean (SD)	16 (4)	15 (4)	14 (4)	15 (4)	<0.001
Intentions regarding quitting tobacco					
Don't know	59 (45%)	46 (35%)	27 (20%)	132 (36%)	0.193
Never quit	2 (11%)	13 (68%)	4 (21%)	19 (5.1%)	
Quit but not in the next 6 months	21 (40%)	21 (40%)	10 (19%)	52 (14%)	
Quit in the next 6 months	45 (40%)	44 (39%)	23 (21%)	112 (30%)	
Quit in the next 30 days	23 (43%)	24 (44%)	7 (13%)	54 (15%)	
Self-efficacy levels for tobacco cessation					
Not at all sure	50 (39%)	49 (38%)	29 (23%)	128 (35%)	0.376
Slightly sure	26 (35%)	31 (42%)	17 (23%)	74 (20%)	
Moderately sure	40 (40%)	45 (45%)	15 (15%)	100 (27%)	
Very sure	29 (55%)	16 (30%)	8 (15%)	53 (14%)	
Extremely sure	5 (36%)	7 (50%)	2 (14%)	14 (3.8%)	

[a] p-value from Chi^2, ANOVA or Kruskal-Wallis test for association.

Motivation and intentions to quit tobacco in the sample

The mean motivation to quit tobacco score was 5.4 (SD = 2.36, range 1-10) and 15% of respondents had intentions to quit using tobacco in the next 30 days (n = 54) (see Table 2). Overall, almost a third of participants (32%, n = 117) had high motivation to quit tobacco scores.

Cannabis use in the sample

Almost one in five (19%, n = 71) participants were current cannabis users (using cannabis at least once per week during the past four weeks; see Table 3). Of those, 41% (n = 29) reported using cannabis on six to seven days per week in the last four weeks. The majority of participants (81%, n = 179) who reported ever using cannabis reported simultaneous cannabis and tobacco use and all (100%, n = 71) current cannabis users reported simultaneous tobacco use.

Table 3. Cannabis use in a sample of socioeconomically disadvantaged current smokers and percentage reporting simultaneous use of both substances

Characteristic			
Variable	**Levels**	**Frequency (%)**	**95% CI**
Cannabis use group	Never used	150 (40.7%)	132 - 168 (35.6% - 45.7%)
	Ever used	219 (59.3%)	201 – 237 (54.3% - 64.4%)
	Used < once per week in the past 4 weeks	148 (40.1%)	130 – 166 (35.1% - 45.1%)
	Used ≥ once per week in the past 4 weeks	71 (19.2%)	56 – 86 (15.2% - 23.3%)
Cannabis/tobacco mixed (simultaneous use)	NA	150 (40.7%)	132 - 168 (35.6% - 45.7%)
	No	40 (10.8%)	28 - 52 (7.7% - 14%)
	Yes	179 (48.5%)	160 – 198 (43.4% - 53.6%)

Association between current cannabis use and motivation and intentions to quit tobacco use

On average, cannabis use was associated with a 0.7 point lower motivation to quit score (LS-Mean and 95% CI: 4.6 (4, 5.2) for current cannabis users vs 5.3 (4.9, 5.7) for non-current cannabis users) (See Table 4). Mixing cannabis and tobacco was not significantly associated with motivation score. Current cannabis use resulted in a reduced odds of intention to quit tobacco smoking, but this was not statistically significant.

Table 4. Regular cannabis use, motivation and intention to quit

Parameter		Motivation to quit tobacco use		Intentions to quit tobacco use	
Parameter	Comparison	β (95% CI)[a]	p-value	OR (95% CI)[b]	p-value
Regular cannabis use	Yes vs No	-0.70 (-1.37, -0.03)	0.04	0.81 (0.3, 2.18)	0.67
Cannabis and tobacco mixed	Yes vs No	0.40 (-0.13, 0.94)	0.14	1.2 (0.61, 2.37)	0.59
Age	Per year	0.01 (-0.01, 0.03)	0.35	1.02 (0.99, 1.05)	0.08
Gender	Female vs Male	-0.16 (-0.63, 0.32)	0.52	1.22 (0.64, 2.31)	0.54
HSI	Per 1 score increase	-0.53 (-0.67, -0.38)	<0.001	0.79 (0.65, 0.96)	0.02
Indigenous status	Indigenous vs Non-Indigenous	-0.004 (-0.57, 0.56)	0.99	0.61 (0.26, 1.46)	0.27
Education	Secondary/Tertiary qualifications vs Primary school	0.78 (0.15, 1.41)	0.02	3.41 (0.98, 11.84)	0.05

[a]Adjusted β estimate (95%CI) and p-value from linear regression

[b]Adjusted OR (95%CI) and p-value from binary logistic regression

9.5 DISCUSSION

This study is the first to report both concurrent and simultaneous cannabis and tobacco use in a socioeconomically disadvantaged sample of Australians. Of the tobacco smokers who used cannabis in their lifetime, 19% reported using cannabis and tobacco concurrently. This rate of concurrent use is comparable to studies conducted with smokers from other disadvantaged groups [18]. The high rate of simultaneous cannabis and tobacco use in our sample highlights the imperative to consider cannabis use in tobacco smokers who are considering a cessation attempt, and to ensure support programs are tailored to this simultaneous use. The high rates of concurrent and simultaneous use of cannabis and tobacco have a number of other important implications; as a barrier to quitting tobacco [10], in the development of nicotine

dependence and stronger withdrawal symptoms [40, 41], and the worsening of respiratory outcomes compared to those who use either substance alone [16, 17].

Current cannabis use was significantly associated with lower motivation to quit tobacco smoking while adjusting for factors including nicotine dependence. However the clinical significance of this difference must be considered. Overall, smokers in the current study reported high levels of ambivalence regarding quitting (mean motivation scores were five on a ten point scale) and around a third reported 'not knowing' what their intentions were regarding quitting tobacco. Current cannabis use was not significantly associated with intentions to quit.

Other factors are likely to play a role in the association between cannabis use and difficulty quitting tobacco: individuals who use cannabis and tobacco may be more likely to be nicotine dependent than those who only use tobacco [25, 42]. Nicotine dependence is a consistent predictor of ability to remain abstinent [43], therefore nicotine dependence levels in smokers who also use cannabis may also partly account for the association between cannabis use and difficulty quitting tobacco smoking. Additionally, users of both cannabis and tobacco may report intensified severity of some withdrawal symptoms than those that use only one substance [27], and more intense withdrawal symptoms may compromise maintenance of smoking cessation [44]. Hence, clinicians supporting disadvantaged tobacco smokers to make a cessation attempt need to consider whether cannabis use is also present, and offer specific interventions to ameliorate the increased withdrawal symptoms likely to be experienced during a tobacco quit attempt.

Aspects of mental health, including experiencing symptoms of depression and anxiety, may play an important role in both tobacco and cannabis use [45], especially in smokers from disadvantaged groups. In Australia, mental illness is more common in

people who smoke tobacco and in people with cannabis use disorder [46]. Use of

cannabis and tobacco as a coping mechanism and to strengthen ability to manage stress

is a commonly reported reason for use of both substances [47, 48]. Further research

examining the precise functions of mental health and stress on cannabis and tobacco use

and quitting is important to inform the development of interventions to better meet the

needs of smokers with complex needs.

Implications

The substantial proportion of current cannabis use at least once a week in the

past four weeks in our sample suggests smoking cessation interventions targeted at

socioeconomically disadvantaged smokers must consider cannabis and its role in

tobacco cessation. Disadvantaged smokers should be educated about the adverse health

effects of dual use of both substances and that they may need additional support in order

to achieve and maintain cessation from both substances [5, 18, 20-23].

Future research questions include whether treatments for concurrent cannabis

and tobacco use should occur simultaneously or sequentially, the effectiveness of these

treatments and the treatment preferences of disadvantaged individuals. Evidence on how

best to address concurrent tobacco and cannabis use is lacking [6]. The failure of

treatments for tobacco or cannabis to consider the other substance has impeded the

significant secondary prevention opportunities available to minimise the harms

associated with use of both of these substances. Use of both substances is associated

with socioeconomic disadvantage [14, 15]. Clearly, smoking cessation services need to

adapt to the social and psychological complexities of disadvantaged smokers.

Strengths and limitations

This study measured current cannabis use at a clinically significant level (at least

once per week) [5] and succeeded in reaching a group that demonstrated high and

multiple forms of socioeconomic disadvantage; a group that is typically hard to reach for research purposes. The study used the CSO setting to sample socioeconomically disadvantaged smokers, a setting which is representative of highly disadvantaged Australians as these services provide mental health, housing and financial crisis aid nationally (30). However the sample is not generalizable to the general Australian population.

The present study used a simplified measure of cannabis use. Different measures including structured clinical interviews may have identified those individuals who were cannabis dependent, which may have had associations with motivation and intentions to quit. Although it was stressed to participants that their responses to this survey would remain confidential, it is possible some participants may not have disclosed their cannabis use. Use reported in this study may therefore be an underrepresentation. Precise information about the mode of mixing tobacco and cannabis (blunts, spliffs, or chasing) was not assessed in this study, and should be considered in future research.

CONCLUSIONS

Weekly use of cannabis within the last four weeks is common within socioeconomically disadvantaged smokers. Additionally, current cannabis use was significantly associated with lower levels of motivation to quit tobacco smoking. However, current cannabis use was not associated with intentions to quit tobacco. Smoking cessation interventions targeted at disadvantaged smokers should assess and address cannabis use in order to improve intervention effectiveness.

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10. INTRODUCTION TO PAPER SIX

Many factors work together to make quitting smoking difficult for disadvantaged smokers (as demonstrated by the results in papers One, Two and Three). Quitting smoking is also complicated when other substances are being used (see Papers Four and Five). Use of cessation aids including Nicotine Replacement Therapy (NRT) (1), other stop smoking medications (2, 3) and behavioural counselling (4, 5) have been shown to be effective at increasing cessation rates over quitting without any such aids.

However, as shown in Papers One, Two and Three, there is overall low uptake of these cessation aids by disadvantaged smokers (Paper One). This is possibly due to low perceived access to smoking cessation aids due to cost, perceptions of safety and negative side effects associated with stop smoking medications and uncertainty about whether current programs and services including Quitline are appropriate for disadvantaged smokers (Papers Two and Three).

The need for new cessation aids that are safe and effective has been identified (6). Electronic nicotine delivery systems (ENDS), also known as electronic cigarettes (e-cigarettes) are a commonly used alternative nicotine delivery product and are rapidly gaining popularity (7). E-cigarettes are the subject of continued debate in research and policy-making. On one hand, e-cigarettes, (especially those containing nicotine (8)) may represent an effective smoking cessation tool that may significantly reduce the harms from tobacco smoking (9). On the other hand, e-cigarettes may act as a gateway to tobacco use for non-smokers and ex-smokers, be associated with unknown adverse health effects or may compromise current tobacco control denormalisation strategies (10).

Further, while e-cigarettes may have potential as a harm reduction strategy to help smokers lower the negative health effects from traditional tobacco cigarettes (6, 9, 11,

12), it is unclear how smokers of low SEP may be affected (13). Smokers of low SEP may be less likely to use e-cigarettes (14-16) and therefore less likely to experience any associated reductions in harm. Therefore, e-cigarettes may contribute to a further widening in the socioeconomic differences in smoking prevalence and tobacco-related health disparities (17).

As evidence on the safety and effectiveness of e-cigarettes continues to emerge, it is vital that the awareness, perceptions and usage patterns of e-cigarettes by socioeconomically disadvantaged smokers is monitored. Therefore, Paper Six aimed to assess the awareness, use and perceptions of e-cigarettes in a sample of disadvantaged smokers.

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11. Paper Six: Electronic cigarettes: awareness, recent use, and attitudes within a sample of socioeconomically disadvantaged Australian smokers

17. Associated appendices:

17.1 E-cigarette image

17.2 Published manuscript (copy-edited version)

The definitive version is available at:

http://ntr.oxfordjournals.org/content/early/2015/09/16/ntr.ntv183.full

Twyman L, Bonevski B, Paul C et al. Electronic Cigarettes: Awareness, Recent Use, and Attitudes Within a Sample of Socioeconomically Disadvantaged Australian Smokers Nicotine & Tobacco Research 2015. 10.1093/ntr/ntv183. Copyright ©2015, The Society for Research on Nicotine and Tobacco, (Oxford Journals).

Twyman L, Bonevski B, Paul C, Bryant J, Gartner C, Guillaumier A. Electronic cigarettes: awareness, recent use, and attitudes within a sample of socioeconomically disadvantaged Australian smokers. *Nicotine & Tobacco Research*. In Press.

11.1 ABSTRACT

Introduction: Electronic cigarette (e-cigarette) awareness, trial of e-cigarettes in the past 12 months, source and perceptions of safety and effectiveness was assessed within a disadvantaged sample of adult Australian smokers receiving welfare aid.

Methods: A cross-sectional survey was administered to clients who smoke at two community service organisations in New South Wales, Australia from October 2013 to July 2014. E-cigarette awareness, trial in past 12 months, sources of e-cigarettes and perceptions of the safety and effectiveness of e-cigarettes to help people quit were assessed along with sociodemographic and smoking-related variables.

Results: In total, 369 participants completed the survey (77% response rate). Awareness and trial of e-cigarettes were reported by 77% (n = 283) and 35% (n = 103) of the sample respectively. E-cigarettes were most commonly obtained from friends/strangers followed by tobacco shops (tobacconists). Trying e-cigarettes in the past 12 months was significantly associated with positive perceptions of their safety (OR = 1.8, CI = 1, 3.1) and effectiveness (OR = 1.9, CI = 1.1, 3.2). Motivation to quit tobacco smoking was also significantly positively associated with positive perceptions of e-cigarette safety (OR = 1.2, CI = 1.1, 1.4) and effectiveness (OR = 1.2, CI = 1.0, 1.3).

Conclusions: Rates of awareness and trial of e-cigarettes within a disadvantaged sample of Australian smokers are comparable to rates found within representative samples of the general Australian population. Previously trying e-cigarettes and higher levels of motivation to quit were associated with more positive perceptions of e-cigarette safety and effectiveness.

11.2 INTRODUCTION

In high income countries, the highest prevalence of smoking is concentrated in the most disadvantaged groups in society. Rates of smoking are highest amongst people with the lowest level of income (25% - 30%) (1); people with a mental illness (32%) (2); people with alcohol and other substance use disorders (3); people who are homeless (73%) (4); Indigenous people (31% - 52%)(5-7); and prisoners (78% - 84%) (8, 9). Individuals within these groups often experience multiple forms of disadvantage, for example, people who are homeless are more likely to experience mental illness (10). These groups have been identified as priority targets for smoking cessation research (11), recognising the need for novel approaches.

Electronic cigarettes (also known as electronic nicotine delivery systems or e-cigarettes) have recently emerged as potential smoking cessation aids for smokers. E-cigarettes deliver an aerosol usually consisting of a carrier solution (typically propylene glycol and/or vegetable glycerol), flavourings and often, but not always, nicotine. In Australia, possession and/or use of an e-cigarette containing nicotine without a prescription from a medical practitioner is illegal in all states(12). It is legal to possess and use e-cigarettes that do not contain nicotine, however sale may be unlawful in some Australian states(12). This is in contrast with the USA and many parts of Europe where there are relatively few restrictions placed on marketing and purchase of e-cigarettes with or without nicotine (13).

The two strongest arguments for the use and regulated promotion of e-cigarettes within the tobacco control research field are that e-cigarettes represent a safer alternative to tobacco cigarettes and can be used to aid current smokers to quit smoking. Two trials have demonstrated that using an e-cigarette containing nicotine is associated with increased likelihood of cessation at six months follow up compared to using e-

cigarettes without nicotine (14). However the safety and effectiveness of e-cigarettes have not yet been established (14, 15). Another argument is to promote the long-term use of e-cigarettes as a method of harm reduction for smokers unable to quit, such as those from disadvantaged groups who are heavily nicotine dependent and have made numerous unsuccessful quit attempts (16, 17).

Awareness and use of e-cigarettes appears to be increasing over time in both the international literature (18) and in Australia (13). Surveys assessing smokers and ex-smokers awareness of e-cigarettes in the UK, US, Australia and Canada found an overall awareness of 46% in 2013(19). In Australia and the UK, awareness of e-cigarettes had increased to 91% in 2014(13). Estimates of ever use ranged from 8% in 2013 across smokers and smokers in the UK, US, Australia and Canada to 35% in Australia and the UK in 2014. In 2014, estimates of current e-cigarette use in the general population range from 1% to 6% (18). Levels of awareness and ever use in current and former smokers are generally lower in Australia compared to the UK (13) and USA (19). This may be due in part to the differences in regulations covering e-cigarettes between these countries and Australia.

To date, only two US-based studies exploring awareness and use of e-cigarettes within disadvantaged groups have been published. In a sample of opioid dependent smokers, levels of e-cigarette awareness (99%), ever use (73%) and use in the past 30 days (33%) were higher than levels found within the general US population (20). In a national probability sample of smokers and non-smokers, those reporting a mental health condition were significantly more likely to have tried e-cigarettes (15%) than those without (7%) (21). Levels of current use in this probability sample were higher for those with a mental health condition (9%) than those without (5%), however this difference was not significant.

Data concerning e-cigarette use in disadvantaged groups in Australia are lacking. Comparing awareness, use and attitudes across countries may provide insight on the impact of different regulatory environments. If e-cigarettes develop a stronger evidence base as a smoking cessation aid or harm reduction strategy, information about awareness, use and perceptions of e-cigarettes is needed to shape policy. A better understanding of the awareness, use and perceptions of e-cigarettes within a highly socioeconomically disadvantaged group of smokers will also help inform the current limited research agenda on smoking and disadvantaged groups.

Aims

Within a sample of socioeconomically disadvantaged smokers, this study aims to examine:

a) the percentage of participants who i) have ever heard about e-cigarettes and ii) have tried e-cigarettes in the past 12 months;

b) the most common ways e-cigarettes are obtained ;

c) perceptions of e-cigarette safety, cost, and effectiveness as an aid to quit;

d) whether perceptions of e-cigarettes are associated with use .

11.3 METHODS

Study design

A cross sectional survey was conducted at two non-government community service organisations (CSO) in New South Wales, Australia, from October 2013 to July 2014. The study aimed to sample priority groups with high smoking prevalence rates including people who are homeless, unemployed, with mental illness, and of Aboriginal and/or Torres Strait Islander background. Although these groups are hard to reach, recruitment via CSOs represents an effective mechanism for obtaining a representative

sample (11, 22). Both CSO sites provided financial and material assistance to clients experiencing financial hardship.

Participants

Eligible participants were 1) clients of the CSO, 2) aged 18 years or older, 3) not under the influence of alcohol or other drugs at time of recruitment, 4) not too distressed to complete the survey and 5) current daily or occasional smokers. Self-reported smoking status was assessed using the following two items 1) "Do you currently smoke tobacco products? " with the following response options a) Yes daily b) Yes at least once a week c) Yes but less often than once a week and d) No, not at all and 2) "Have you smoked at least 100 cigarettes or a similar amount of smoking in your life?" a) Yes b) No or c) Not sure. Current smokers were defined as self-reported daily or occasional smokers who had smoked at least 100 cigarettes in their lifetime.

Procedure

CSO staff informed all clients about a health survey being conducted at the organisation and clients were asked to approach the Research Assistant (RA) for more information. RAs provided an Information Statement and assessed client eligibility. Survey completion was taken as consent. The survey was administered via a touchscreen computer. The RA provided assistance in completing the survey where necessary. The survey included 40 items in total and the mean completion time was 16.2 minutes (ranged from 9.2 – 21.3 minutes).Only those data relating to e-cigarettes are presented in this paper. Participants received a $10 grocery card gift voucher as reimbursement for completing the survey. Ethics approval was granted by the University of Newcastle's Human Research Ethics committee.

Measures

Sociodemographic variables:

Age, gender, Aboriginal and/or Torres Strait Islander (Indigenous) status, education, housing status, weekly net income, and source of income were assessed.

E-cigarette awareness, ever use, source and perceptions:

Participants were presented with an image of an e-cigarette (Supplementary file 1) along with a brief description of e-cigarettes before they were presented with e-cigarette questions. The description read: "The following questions are about electronic cigarettes or e-cigarettes. An e-cigarette (like the one shown on the left here) uses a battery and may also light up or have smoke (vapour) coming from it like a real cigarette". To assess awareness, participants were asked "Before now, have you ever heard of electronic cigarettes or e-cigarettes?" and to assess use in the past 12 months they were asked "In the last 12 months, have you ever tried electronic cigarettes or e-cigarettes, even just one time?". Participants who reported trying e-cigarettes in the past 12 months were asked from where they had obtained e-cigarettes with response options : a) internet/online; b) tobacco shop (tobacconist); c) friend or stranger; d) while travelling overseas or e) other. Participants could select multiple responses. Perceptions of e-cigarettes were assessed on a Likert-type scale from one (strongly disagree) to five (strongly agree) with the following statements "E-cigarettes can help people quit smoking tobacco", "I would switch to e-cigarettes if they were cheaper than tobacco cigarettes", "E-cigarettes are safer to use than tobacco cigarettes" and "I would give e-cigarettes a go to help me quit smoking".

Additional covariates

Quit attempts in the past 12 months were assessed by asking all current smokers "Have you made a serious attempt to quit smoking in the last 12 months? By serious attempt I mean you decided that you would try to make sure you never smoked again (Yes/No)?" (23). Motivation to quit was assessed on a 10 point Likert scale where 1 =

very low, 10 = very high (24). Nicotine dependence was assessed using the two-item

Heaviness of Smoking Index (HSI) with higher scores indicating higher levels of

nicotine dependence (25). Self-efficacy was assessed using the following: "If you

decided to give up smoking completely in the next 6 months, how sure are you that you

would succeed?" 1) Not at all sure, 2) Slightly sure, 3) Moderately sure, 4) Very sure, or

5) Extremely sure (23).

Data analysis

Percentages and 95% confidence intervals were calculated for the number of

respondents indicating they were aware of electronic cigarettes and those who had

responded ever trying e-cigarettes. Chi square analysis was carried out to investigate

differences in the proportion of participants strongly agreeing or agreeing to the four

statements assessing perceptions of e-cigarettes. Binary logistic regression was used to

examine whether having tried e-cigarettes in the past 12 months was associated with

agreement that e-cigarettes can assist with quitting and that e-cigarettes are safer,

adjusting for demographic and smoking characteristics.

The variables included in logistic regression models were: e-cigarette use in past

12 months, age, gender, HSI, Indigenous status, highest level of education, motivation

to quit, quit attempt in the last 12 months and self-efficacy. As two sites were used as

recruitment centres for this survey, recruitment site was included as a covariate to

control for any differences by centre. Collinearity of variables was checked using

Variance Inflation Factors (VIFS) and linearity assumption for continuous variables and

the (log) outcome were examined. Crude and adjusted odds ratios, with 95% confidence

intervals and p-values were calculated for variables in the model. Consideration was

made at each step that the removal of each non-significant variable did not negatively

affect either the fit of the model (measured by significant change in likelihood ratio test

or more than four point increase in Akaike Information Criterion (AIC) or change the estimates for remaining variables by no more than 10%. SAS 9.4 (SAS Institute Inc., Cary, NC, USA) was used for all analyses.

11.4 RESULTS

Response rates

Of the 606 clients attending the two centres during the study period, 478 (78%) clients were eligible to take part and invited to see the RA for more information about the study. Reasons for ineligibility included being a non-smoker (n=96), being under the influence of alcohol or other drugs (n = 5), distress (n =3), and being aged under 18 years (n = 5). Of eligible clients, 369 (77%) individuals consented and gave complete survey data.

Sociodemographic characteristics of the sample

The sample of participants was highly socioeconomically disadvantaged (see Table 1). Individuals self-reporting as Aboriginal and/or Torres Strait Islander made up 21% (n = 60) of the sample, compared to 2.2% of the population in New South Wales (26). The sample displayed exceptionally low income with 71% (n = 261) reporting income well below the Australian single-person 'poverty line' of $500 per week (27) and 91% (n = 337) dependent on government benefits as their main source of income.

Awareness, past 12 month use and source of obtaining e-cigarettes:

Seventy-seven percent of the sample (n = 283) said they had heard of e-cigarettes and of those individuals, 36% (n = 103) had used e-cigarettes at least once in the past 12 months (see Table 2). The most common sources for obtaining e-cigarettes were from a friend or stranger (52%, n = 53) followed by from a tobacco shop (40%, n

= 41). The "other" response category included obtaining e-cigarettes from the internet and overseas (9%, n = 18).

Perceptions of e-cigarettes:

Participant perceptions of e-cigarettes are reported in Table 3. Significantly higher proportions of participants who had tried e-cigarettes at least once in the past 12 months either agreed or strongly agreed that e-cigarettes are safer to use than tobacco cigarettes (58% versus 44%, p = .03) and that e-cigarettes can help people quit smoking (51% versus 34%, p <.01) compared to those who had not tried e-cigarettes within the past 12 months. No significant difference was found between those who had tried e-cigarettes and those who had not tried e-cigarettes regarding whether they would use e-cigarettes if they were cheaper than tobacco cigarettes or the intention to use cigarettes in order to quit smoking.

After adjusting for demographic and smoking characteristics, the odds of agreeing that e-cigarettes can help people quit smoking tobacco were 1.9 times higher in participants who had tried e-cigarettes, compared to those who had not (CI = 1.1, 3.2). Odds of agreeing that e-cigarettes can help people quit smoking were also higher for those who had higher levels of motivation to quit smoking (OR = 1.2, CI = 1.0, 1.3). All other variables were non-significant (Table 4).

The odds of agreeing with the statement that e-cigarettes are safer to use than tobacco cigarettes were 1.8 times higher in participants who had tried e-cigarettes, compared to those who had not (CI = 1.0, 3.1). Females (OR= 2.0, CI = 1.2, 3.3) and participants with higher levels of motivation to quit (OR = 1.2, CI = 1.1, 1.4) also had higher odds of agreeing that e-cigarettes are safer to use than tobacco cigarettes. All other variables were non-significant.

Table 1. Demographics by awareness and use of e-cigarettes in the past 12 months.

Characteristic	Class/Statistic	Not aware of e-cigarettes (n=86)	No (n=180)	Yes (n=103)	Total (N=369)
Age	mean (SD)	39 (10)	41 (12)	38 (12)	40 (11)
Gender	Male	39 (26%)	70 (47%)	41 (27%)	150 (41%)
	Female	47 (21%)	110 (50%)	62 (28%)	219 (59%)
Indigenous status[a]	Aboriginal and/or TSI	18 (23%)	35 (45%)	25 (32%)	78 (21%)
	No	68 (23%)	145 (50%)	78 (27%)	291 (79%)
Highest level of education	Primary school	14 (23%)	28 (46%)	19 (31%)	61 (17%)
	Secondary or less	63 (27%)	110 (47%)	63 (27%)	236 (64%)
	Tertiary qualifications	9 (13%)	42 (58%)	21 (29%)	72 (20%)
Housing status	Own house	1 (9.1%)	6 (55%)	4 (36%)	11 (3.0%)
	Rental house	34 (24%)	69 (49%)	39 (27%)	142 (38%)
	With family or friends/Hotel, Motel/No home, street living	15 (28%)	17 (32%)	21 (40%)	53 (14%)
	Supported accommodation/government housing	34 (22%)	85 (56%)	33 (22%)	152 (41%)
	Other	2 (18%)	3 (27%)	6 (55%)	11 (3.0%)
Marital status	Separated/Divorced/Never married or single/Widowed	64 (22%)	144 (48%)	89 (30%)	297 (80%)
	Married/Defacto/Living with Partner	22 (31%)	36 (50%)	14 (19%)	72 (20%)
Weekly income amount (net)	Less than $200 per week	33 (33%)	44 (44%)	23 (23%)	100 (29%)
	Between $201-$400 per week	34 (21%)	78 (48%)	49 (30%)	161 (47%)
	More than $400 per week	10 (13%)	43 (55%)	25 (32%)	78 (23%)
Source of income	Paid employment (either full or part time)	6 (33%)	6 (33%)	6 (33%)	18 (4.9%)
	Government pension or benefit	77 (23%)	167 (50%)	93 (28%)	337 (91%)
	Other	3 (21%)	7 (50%)	4 (29%)	14 (3.8%)
Do you currently smoke tobacco products?	Daily smoker	76 (22%)	163 (48%)	99 (29%)	338 (92%)
	Occasional smoker	10 (32%)	17 (55%)	4 (13%)	31 (8.4%)
Heaviness of Smoking Index (HSI)	mean (SD)	3 (2)	3 (2)	3 (2)	3 (2)

Characteristic	Class/Statistic	Not aware of e-cigarettes (n=86)	No (n=180)	Yes (n=103)	Total (N=369)
Number of cigarettes smoked per day	mean (SD)	14.4 (8.6)	15.6 (9.8)	17.7 (11.0)	15.9 (10.0)
Quit attempt in last 12 months	Yes	66 (22%)	150 (50%)	87 (29%)	303 (82%)
Motivation to quit	mean (SD)	5.4 (2.2)	5.4 (2.4)	5.4 (2.4)	5.4 (2.4)
Self-efficacy levels	Low	46 (23%)	97 (48%)	59 (29%)	202 (55%)
	Moderate	23 (23%)	50 (50%)	27 (27%)	100 (27%)
	High	17 (25%)	33 (49%)	17 (25%)	67 (18%)
Site of recruitment	Site A	10 (15%)	29 (45%)	26 (40%)	65 (18%)
	Site B	76 (25%)	151 (50%)	77 (25%)	304 (82%)

[a]Aboriginal and/or Torres Strait Islander status was collapsed into Indigenous versus

non-Indigenous for all analyses due to low cell numbers

Table 2: Awareness, past 12 months use of e-cigarettes and source of e-cigarettes

Characteristic	Frequency (%)
Awareness	
Yes	283 (76.7%)
No	86 (23.3%)
Of those who are aware of e-cigarettes (n=283)	
Tried e-cigarettes in the past 12 months	
Yes	103 (36.4%)
No	180 (63.6%)
Source of e-cigarettes[a]	
Tobacco shop	41 (18.6%)
Friend	53 (22.7%)
Other[b]	18 (9.1%)

[a]Participants could select more than option

[b]NB "Other" category includes internet, travelling overseas, and 'other'

Table 3. Perceptions of e-cigarettes

Perception	Strongly disagree	Disagree	Don't know	Agree	Strongly agree
E-cigarettes can help people quit smoking tobacco.	38 (13.4%)	22 (7.8%)	109 (38.5%)	64 (22.6%)	50 (17.7%)
Would switch if cheaper than tobacco cigarettes	58 (20.5%)	42 (14.8%)	69 (24.4%)	58 (20.5%)	56 (19.8%)
Safer to use than tobacco cigarettes.	32 (11.3%)	23 (8.1%)	88 (31.1%)	75 (26.5%)	65 (23%)
I would give e-cigarettes a go to help me quit smoking	52 (18.4%)	32 (11.3%)	63 (22.3%)	69 (24.4%)	67 (23.7%)

Table 4. Multivariate analysis examining characteristics associated with ever use in the current sample

Parameter	Agreeing that e-cigarettes can help people quit smoking tobacco		Agreeing that e-cigarettes are safer to use than tobacco cigarettes	
	Adjusted		**Adjusted**	
	OR (95% CI)	p-value	OR (95% CI)	p-value
Tried E-cigarette (Yes)	1.9 (1.1, 3.2)	0.03	1.8 (1.0, 3.1)	0.04
Age	1.0 (0.98, 1.0)	0.98	1.0 (0.99, 1.0)	0.15
Gender (Female vs Male)	1.3 (0.74, 2.1)	0.39	2.0 (1.2, 3.3)	0.01
Heaviness of Smoking Index (HSI)	1.1 (0.89, 1.3)	0.50	1.1 (0.9, 1.3)	0.36
Indigenous versus non-Indigenous	1.4 (0.74, 2.5)	0.32	0.78 (0.42, 1.5)	0.44
Highest level of education	.	0.07	.	0.85
Secondary or less vs Primary School	1.7 (0.8, 3.7)	0.17	0.86 (0.42, 1.8)	0.69
Tertiary qualifications vs Primary school	2.7 (1.1, 6.5)	0.02	1.0 (0.44, 2.3)	0.99
Motivation	1.2 (1.0, 1.3)	0.02	1.2 (1.1, 1.4)	<0.01
Quit attempt in last 12 months (Yes)	1.1 (0.55, 2.1)	0.82	0.95 (0.49, 1.8)	0.88
Self-efficacy	.	0.83	.	0.70
Slightly sure vs Not at all Sure	1.2 (0.58, 2.5)	0.63	1.3 (0.63, 2.7)	0.48
Moderately sure vs Not at all Sure	0.91 (0.45, 1.8)	0.80	1.3 (0.65, 2.6)	0.47
Very sure vs Not at all sure	0.88 (0.36, 2.1)	0.77	1.4 (0.57, 3.3)	0.47
Extremely sure vs Not at all Sure	1.7 (0.47, 6.0)	0.42	0.59 (0.16, 2.2)	0.43
Site (Site A versus Site B)	0.62 (0.32, 1.2)	0.16	1.4 (0.73, 2.8)	0.30

11.5 DISCUSSION

In this sample of adult welfare recipient smokers, 77% of participants were aware of e-cigarettes and of those, 37% reported trying an e-cigarette within the past 12 months. To our knowledge this is one of the first studies to examine e-cigarette awareness, use and perceptions within a disadvantaged sample in Australia. Most participants reported obtaining e-cigarettes from friends or strangers or from a tobacco shop (tobacconist). Trying e-cigarettes within the past 12 months was associated with positive perceptions of the safety of e-cigarettes and e-cigarettes as an aid to quit smoking. Additionally, higher motivation to quit smoking was also associated with positive perceptions of the safety and effectiveness of e-cigarettes to help smokers quit. Levels of awareness reported in the current study are comparable to levels reported in a study conducted with a representative sample of the Australian population in 2014(13) and slightly lower than estimates within the UK (2014), USA and Canada (2013) (13, 19). Estimates of e-cigarette trial in the current sample were slightly lower (36%) than estimates of ever use in a national sample of current smokers with a mental health condition in the USA (40%) (21).

Obtaining e-cigarettes from a friend or stranger reflects research that shows that people first try e-cigarettes on their friends' or family's recommendation (28). Both initiation and cessation of tobacco use is known to be influenced by social networks (29), and this may be occurring fore-cigarette use. Consistent with previous literature, e-cigarettes were perceived as safer to use than tobacco cigarettes (30, 31) and as aids to help individuals quit smoking tobacco cigarettes (31, 32) by a large proportion of the sample. However, around half of the sample appears misinformed or unsure about whether e-cigarettes are less risky than cigarettes. This reflects data from the UK suggesting that while usage rates have increased, individuals still report uncertainty

regarding the safety of e-cigarettes compared to tobacco cigarettes(33). Also consistent with the previous literature, ever trying e-cigarettes was associated with positive perceptions of the safety and effectiveness of e-cigarettes to help smokers quit (31).

Motivation to quit tobacco smoking was significantly associated with ever trying e-cigarettes. This reflects research that suggests smokers experiencing forms of disadvantage including substance use disorders and mental health conditions may be more likely to ever use e-cigarettes than smokers in the general population (21, 34).

Implications

These results highlight the need for high quality evidence from randomised controlled trials about the safety and effectiveness, or otherwise, of e-cigarettes given current rates of ever use. As awareness of e-cigarettes continues to grow, use may also increase (28). If research confirms the effectiveness of e-cigarettes for cessation or harm reduction, they may become a useful intervention for smokers from socioeconomically disadvantaged groups who have not been able to quit smoking with existing methods. It is important to educate the public regarding what is and what is not known about the safety of e-cigarettes based on current scientific knowledge. Similarly, the public should be kept up to date as evidence grows regarding the effectiveness of e-cigarettes as a cessation aid or harm reduction tool. If the eventual evidence supports these potential benefits of e-cigarettes, they may be an important intervention to target to smokers from socioeconomically disadvantaged groups (19, 35).

Concerns have been raised about the potential for e-cigarettes to increase (and not reduce) the disparities in harms from smoking as new technologies and innovations have historically contributed to increasing disparities in health between disadvantaged and more advantaged individuals who have more capacity to access and benefit from these technologies(36). However, our study demonstrates that highly disadvantaged

smokers *are* accessing this technology, even within a country with highly restrictive laws covering their sale and use. Discussions about how to regulate e-cigarettes should consider the potential impact of such regulations on disadvantaged smokers, who may benefit most from access to less harmful alternatives.

The cost of e-cigarettes may be an important factor to consider. Research to date on the cost of e-cigarettes has shown mixed evidence, with some studies reporting that smokers perceive e-cigarettes to cost less than tobacco cigarettes and other studies reporting the opposite (37, 38). Within this study, a high proportion of smokers agreed they would switch to e-cigarettes if they were cheaper than tobacco cigarettes. As e-cigarette technology increases and cheaper e-cigarette models emerge on the market, it is important to examine the perceptions of the cost of e-cigarettes(39) and how this effects uptake and stopping use of e-cigarettes within disadvantaged groups, for whom cost may be especially important. Nicotine-containing e-cigarettes are likely to be more effective as a cessation aid than non-nicotine e-cigarettes, however should one gain registration as a therapeutic good, it is likely to only be available on private prescription which may make this option unaffordable for disadvantaged smokers.

Strengths and limitations

The main strength of this cross-sectional survey is its large sample of highly disadvantaged smokers with high rates of homelessness, poverty and indigenous status, often referred to as hard-to-reach (40). This was achieved by approaching smokers through a CSO. While this means that the conclusions are limited to similar populations of disadvantaged Australian smokers seeking assistance from CSO, they may also be generalizable to disadvantaged smokers in other high-income countries where e-cigarettes that contain nicotine are not legal.

As this was a cross-sectional survey, we are unable to determine whether positive experiences with e-cigarettes lead to positive perceptions, or if positive perceptions of e-cigarettes meant participants were more likely to try e-cigarettes. It is plausible that both perceptions and experience affect one another simultaneously.

Another limitation includes the assessment of ever use of e-cigarettes (and not current use). Longitudinal information on the uptake, current use and cessation of e-cigarettes is needed in disadvantaged groups. Additionally, the items used to assess e-cigarette use did not distinguish between nicotine and non-nicotine e-cigarette models, and the image depicting e-cigarettes was only an early generation "ciga-like" model. Participants may have been more able to recognise newer generation e-cigarette models and thus answered "no" when indicating ever use. Therefore, estimates of ever use in this study may underestimate the true rates of ever use in this sample. This study provides a preliminary investigation into use of e-cigarettes among a highly disadvantaged population of smokers. Future studies should seek to increase the knowledge around current use of e-cigarettes (as definitions of current use are refined(41)) and to distinguish between nicotine and non-nicotine models and the subsequent generations of e-cigarette models.

Factors including current use of e-cigarettes, frequency of use, patterns of use including dual use, reasons for use and stopping use of e-cigarettes were not assessed in this study. Future studies should assess these within disadvantaged groups as awareness and use of e-cigarettes increases. Reasons for use may be particularly important to assess as previous research suggests there may be different typologies of e-cigarette users based on the reasons they have for using e-cigarettes (28).

Conclusion

Awareness and use of e-cigarettes in this disadvantaged sample were similar to rates reported in a study conducted with a representative sample of the Australian population. Perceptions of e-cigarettes were positive and broadly reflected those reported in the international literature. There is a need for high quality evidence about the safety and effectiveness, or otherwise, of e-cigarettes, to guide appropriate policy-making concerning these products.

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12. DISCUSSION AND IMPLICATIONS

DISCUSSION

The aims of this thesis were to provide an exploratory investigation into the factors associated with smoking and smoking cessation amongst people experiencing multiple and severe forms of socioeconomic disadvantage. A series of studies using data from two large cross-sectional surveys were conducted with clients of community service organisations (CSOs). A systematic review of the literature concerning perceived barriers to smoking was also conducted. The participants in the studies within this thesis represented a subgroup of the population who were more likely to report multiple forms of social, material and financial disadvantage and who may have been less likely to be adequately represented in in epidemiological or population-wide studies. The six Papers in this thesis have provided novel information that extends the literature on smoking cessation in "hard to reach" socioeconomically disadvantaged groups. The findings from each of these papers, the implications of these findings for smoking cessation interventions and considerations for future research are summarised below.

12.1 Summary of key findings

Figure 1 provides a model of the summarised findings from the research studies within this thesis. This Figure is similar to the Figure shown in Paper Two (Systematic review of the perceived barriers to cessation). However, this figure depicts the factors found within all six of the Papers included in this thesis and provides an overall picture of the factors that may be contributing to the high rates of smoking in socioeconomically disadvantaged subgroups. Overall, the findings within this thesis suggest that the factors that contribute to continued smoking and inhibit cessation in socioeconomically disadvantaged smokers are complex and varied. Using the Social Determinants of Health Framework (SDHF), factors that inhibit cessation include

individual, lifestyle, social and community networks, and living conditions against a broader context of socioeconomic disadvantage.

Addressing the individual, lifestyle and social and community factors is likely to be possible through intensive and integrated cessation programs. The inclusion of these factors in future smoking cessation programs designed for socioeconomically disadvantaged smokers should be empirically evaluated. At the same time, the contribution of the living and working conditions of disadvantaged smokers to their continuing tobacco use should also be addressed through committed and sustainable social policies that aim to improve the social determinants of health for some of the most vulnerable people in society.
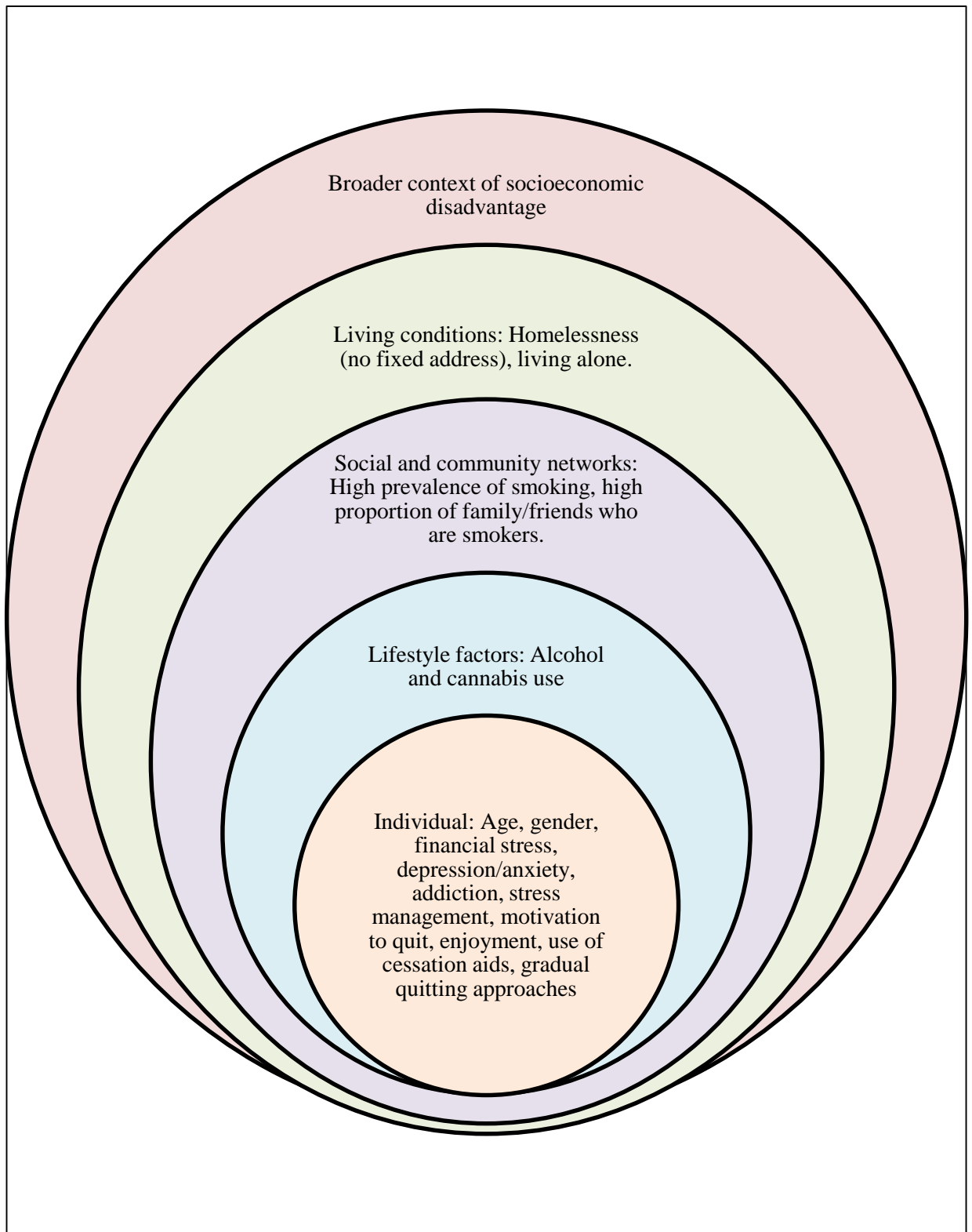
Figure 1. Model of the factors impeding smoking cessation for socioeconomically disadvantaged smokers

Differences in characteristics of ex-smokers and current smokers

Key differences in the sociodemographic profile and use of cessation aids and approaches to quitting between disadvantaged ex-smokers and current smokers were identified. Paper One demonstrated that increased levels of financial stress, anxiety and depression were associated with being a current smoker rather than an ex-smoker. There were key demographic differences too, with current smokers more likely to be male, younger and to report having more friends and family who were smokers.

Paper One also found significant differences in the cessation aids and quit methods used between smokers and ex-smokers. Where there were significant differences between smokers and ex-smokers, ex-smokers tended to be *less* likely to report use of cessation aids than current smokers and were *more* likely to report using gradual versus abrupt quitting methods.

Barriers to quitting are numerous and vary by disadvantaged group

Numerous barriers to cessation were identified by studies within this thesis (Papers Two and Three). The results from Paper Two indicated barriers were identified at all levels of the SDHF including the individual, their lifestyle factors, their social and community networks, living conditions and broader cultural, environmental and socioeconomic contexts. As identified in Paper Two, many of the barriers to cessation were modifiable through short term public health strategies. While Paper Two treated the six selected disadvantaged groups singularly, it should be noted that these groups experience significant overlap e.g. people who are homeless are more likely to have mental health issues (1).

Paper Two identified three barriers that were commonly reported across all groups included in the review. These were smoking in order to manage stress, lack of support to quit from health and other professionals, and the high prevalence and

acceptability of smoking in disadvantaged communities. Paper Two also identified unique factors associated with specific types of disadvantage for example use of tobacco for cultural and ceremonial reasons in some Indigenous cultures or prioritising immediate needs including shelter and food over smoking cessation for people who were experiencing homelessness.

Paper Three extended the existing literature on barriers to smoking cessation by asking socioeconomically disadvantaged smokers to prioritise their barriers to smoking cessation. The top three barriers ranked first in order of importance to address for smoking cessation were addiction, use of smoking for stress management and enjoyment of smoking. It appears that there are a core set of barriers reported by disadvantaged smokers which cluster around addiction, lack of resources to manage withdrawal symptoms, stress management, enjoyment and the high prevalence and perceived acceptability of smoking in disadvantaged communities. It is pivotal that these barriers are understood and addressed in smoking cessation interventions whenever disadvantaged groups are involved.

High rates of alcohol and cannabis use amongst disadvantaged smokers

High rates of heavy alcohol use and regular cannabis use by socioeconomically disadvantaged smokers were identified in Papers Four and Five. The rates identified were higher than those reported in the general population in Australia (2, 3), and in the US (4). Paper Four examined the factors associated with concurrent tobacco and heavy alcohol use; tobacco use alone, or heavy alcohol use alone compared to neither heavy alcohol use nor tobacco use. The comparison to disadvantaged people who were neither heavy alcohol suers nor tobacco users was a novel feature of the study that allowed the identification of potential factors that promote heavy drinking and tobacco use within disadvantaged groups. Concurrent tobacco and heavy alcohol users and those who used

tobacco only tended to experience more isolated living conditions and higher financial stress.

Paper Five examined whether regular cannabis use was associated with shorter length of previous quit attempts, and whether motivation to quit smoking explained part of this association. The results supported this hypothesis, although only a small part of the association between cannabis use and quit attempt length was explained by lower levels of motivation to quit tobacco. This Paper also provided new information on the high proportion of smokers in disadvantaged groups who reported simultaneous use of tobacco and cannabis (also referred to as "mulling"). Both regular cannabis and heavy alcohol use have been implicated in lowering likelihood of successful tobacco cessation (5-9).

Socioeconomically disadvantaged smokers are using electronic cigarettes

Paper Six provided novel information on the awareness, use and perceptions of e-cigarettes by socioeconomically disadvantaged smokers. Disadvantaged smokers reported similar rates of awareness and use compared to those reported in the general population in Australia. Comparable proportions of smokers rated e-cigarettes as safe and effective to those who rated them as unsafe and ineffective, suggesting there is wide variation in how e-cigarettes are currently perceived by disadvantaged smokers. Participants who had used e-cigarettes in the past 12 months and participants who were more motivated to quit were more likely to perceive e-cigarettes as safe and effective products to aid in quitting.

12.2 How does this body of research advance existing knowledge?

Throughout high income countries, the association between smoking and multiple forms of social and economic disadvantage is evident (10, 11). The high smoking rates found in the two samples included in this thesis supports the view that

smoking is becoming increasingly concentrated in lower SEP groups. Therefore, smoking cessation strategies which are successful with these groups are needed in order to reduce the disproportionate burden of tobacco-related disease experienced in these groups. A greater understanding of the factors that inhibit smoking cessation in disadvantaged groups is required in order to reduce the prevalence of smoking.

This thesis focussed on smokers experiencing severe and multiple forms of disadvantage, rather than low socioeconomic position alone. The focus on participants who experienced multiple types of disadvantage is a strength of the research within this thesis because there is very little data on these groups (12). Exploring the differences between the characteristics of participants within this thesis and the overall Australian population provides insight into the level of disadvantage experienced by the participants. Distributions of gender and average age were similar between participants included in this thesis and those reported in the Australian general population (50% female; median age = 37 years) (13). However, the proportion of participants who identified as Aboriginal and/or Torres Strait Islander people were overrepresented in both study samples (16% - 21%) compared to the proportion of the general Australian population (2.4%) (13). Similarly, people with lower levels of education were overrepresented in the two socioeconomically disadvantaged samples, with $20\% - 26\%$ of participants reporting post-school qualifications compared to 57% of the Australian population (14). As income amount was measured categorically in this study, direct comparisons are made difficult, however the average weekly net income in Australia for the May quarter in 2015 was $1545.60, a figure considerably higher than the incomes reported by participants (15). An overwhelming proportion of participants reported government pensions or benefits as their *main* source of income (91- 93%). This is

contrasted against approximately 20% of the Australian population *living in households* where government benefits are the main source of income (16).

The participants within this thesis represented groups who experience multiple and severe levels of disadvantage, who are hard to reach and retain for research purposes and for whom less evidence is available regarding the successful ways to encourage smoking cessation. The results of this thesis represent an attempt to further our knowledge about these groups, in order to inform the development of more successful interventions and future research questions for the tobacco control field. The findings within this thesis also represent initial steps in the attempt to address the gap in the literature regarding socioeconomically disadvantaged smokers. The following sections aim to provide recommendations for the key intervention components that are likely to be important in successful smoking cessation programs for socioeconomically disadvantaged smokers and to make suggestions for future research concerning smoking and disadvantaged groups.

12.3 What should be the key components of cessation interventions for disadvantaged smokers?

Core barriers that are experienced by a number of disadvantaged groups and that were prioritised as most important to address before smoking cessation could occur were identified. These barriers focussed on addiction and withdrawal symptoms, the emotional, mood and stress regulation properties associated with smoking, high prevalence and acceptability of smoking and low levels of support in order to quit. It is argued that in order to enhance their effectiveness, smoking cessation interventions targeted at disadvantaged smokers should consider the following.

Does the use of evidence based aids to cessation need to be increased?

Addiction and difficulty managing withdrawal symptoms were identified as the most important and frequently cited barriers to quitting. High levels of addiction to cigarette smoking, most commonly measured by nicotine dependence, are associated with stronger cravings (17). Stronger cravings (or urges) to smoke are associated with lower likelihood of maintaining smoking cessation (18). One of the most effective ways to combat addiction and withdrawal symptoms is through nicotine replacement therapy (NRT). There is strong evidence that supports NRT as an effective way to increase the likelihood of quitting smoking in the general population (19, 20) although effectiveness specifically with disadvantaged populations has not been well-established. Generally, NRT is most effective when used in conjunction with other cessation aids, for example behavioural interventions (21).

Overall use of any evidence based cessation aid by disadvantaged smokers in the studies included in this thesis was low. The systematic review (Paper Two) identified a range of potential reasons for the lower use of evidence based aids to cessation including: the cost of NRT and other pharmacological interventions; poor knowledge and uptake of existing smoking cessation programs including face to face counselling, telephone support and physician advice; belief that tobacco dependence treatments were largely ineffective; and concerns about the possible side effects of medication. Negative beliefs about accessing existing treatment services included lack of continuity of care; capacity to treat smoking in the context of mental illness, lack of cultural appropriateness and smokers' desire to quit unassisted without support.

Therefore it is important that interventions employ strategies to increase uptake of evidence-based strategies. Most quit smoking trials involve provision of NRT or another type of pharmacotherapy. However, few trials exist that directly test strategies to enhance use of NRT and other evidence based cessation aids for disadvantaged

smokers. In a study in the US, (n = 245) a brief intervention for clients of a Salvation Army service resulted in participants being less likely to perceive quitting smoking medications (including NRT) as dangerous, and more likely to endorse the belief that smoking medications aid in managing cravings (22). It also resulted in a higher proportion of smokers reporting calling the Quitline and higher levels of knowledge about the services offered through the Quitline (22). However, no significant differences were observed in the proportion of participants who met point prevalence abstinence or who had made quit attempts at one month follow up. Further research is required to determine how best to maximise use of NRT in current disadvantaged smokers, including studies that examine changes in perceptions of cessation aids over a longer period of time and that use objective rather than subjective measures of use.

Further examination of the differences in disadvantaged smokers and ex-smokers use of cessation aids is also required, as research within this thesis suggests ex-smokers were less likely to report use of any type of evidence based cessation method. Examinations of use of cessation aids in disadvantaged groups should involve measures of nicotine dependence and assess ever use of smoking cessation aids. Future research may also benefit from focussing on long term ex-smokers use of cessation aids to identify the factors associated with effective use of cessation aids.

How can the social networks of disadvantaged smokers be addressed to increase cessation?

The findings within this thesis suggest that the smoking behaviours within disadvantaged smokers' social networks play a key role in continuing smoking, with higher estimates of family and friends who were smokers associated with lower likelihood of being an ex-smoker (Paper One), higher likelihood of being a smoker who concurrently consumes heavy levels of alcohol (Paper Four) and a perceived barrier to

quitting reported by all disadvantaged groups included in the systematic review (Paper Two).

Evidence from studies conducted with adolescents show that the smoking behaviours of parents and family have strong impacts on tobacco smoking initiation, progression to regular smoking and ability to quit (23, 24). A study conducted in a large social network of adults over three decades, people who continued to smoke remained connected to people who also smoked, while connections between smokers and non-smokers diminished as people quit (25). The high prevalence of smoking in disadvantaged subgroups means that smoking in social networks may be even more important to address in these groups. Higher numbers of smokers in social networks means potentially more frequent cues to smoke (26), higher levels of acceptability and accessibility of smoking (smoking perceived as the norm; sharing cigarettes), and potentially lower motivation to quit (27).

Social support interventions for smoking cessation may be effective in addressing the effects of social networks for disadvantaged smokers. There are many different types of social support interventions, including group based smoking cessation programs (either face to face or online), peer-run or operated services, and peer volunteers or employees based in healthcare or other service based settings (28). Reviews of social support interventions for smoking cessation for general population smokers have often concluded that there are low levels of rigorous evidence for the effectiveness of social support interventions (29-31). However, these reviews did not focus on smokers from disadvantaged subgroups.

Disadvantaged smokers may stand to gain the most out of social support interventions due to the high prevalence of smoking within disadvantaged subgroups, where social support to quit smoking may be less readily available and where social

networks may promote continued use rather than cessation. A systematic review of social support programs for smoking cessation in disadvantaged groups found that social support programs that utilised peer counsellors who were ex-smokers were most effective at increasing smoking cessation in disadvantaged groups (28). However, the authors called for more rigorous study designs, in particular studies that allow testing whether or not the social support component in and of itself provided benefits.

Components of interventions that could address smoking in social networks include 1) educating smokers about how peer and family smoking influences cessation and relapse; 2) teaching strategies to smokers that help to minimise contact with smoking friends and family early in the quit attempt (although this is not an easy task and may have other mediating implications); 3) engaging direct support from smoking family and friends, and 4) involving disadvantaged ex-smokers as "peer counsellors" in smoking cessation interventions.

Evidence from studies conducted with people who are homeless suggests that knowing other homeless people who have successfully quit may play an important role in smoking cessation. In a sample of people who were currently experiencing homeless knowing more ex-smokers was associated with successful quitting (32). A considerable proportion of former smokers who were experiencing homelessness (59%) were interested in helping current smokers quit (33). Potential successful interventions for smoking cessation could aim to link up current disadvantaged smokers with ex-smokers who have experienced similar socioeconomic disadvantage, while providing strategies for minimising contact with smoking friends and family in the short term.

Unfortunately, limited information on the most effective way to address the social context of smoking in disadvantaged smokers is available (26). More research examining how those who successfully quit within these social environments is needed.

In addition, further evidence of the effectiveness of strategies including education, engaging friends and family support during the quit attempt and utilising disadvantaged peer ex-smokers is needed. It is likely that combinations of these strategies (rather than any one approach) will be most effective, given the complexities of attempting to change behaviours through social networks.

Does stress management need to be included in interventions targeted at disadvantaged smokers?

Smoking in order to manage stress and negative mood/emotions is a core barrier for disadvantaged smokers. The relationship between tobacco use and stress is complex and potentially bi-directional. As demonstrated in this thesis smoking is regularly reported as a coping mechanism to manage stress, and help modulate mood and emotions (by both disadvantaged smokers and smokers from the general population). In the UK, smokers from lower social grades were more likely to report stress management as a reason for continuing to smoke (34). While smoking is perceived as an effective stress management tool by current smokers, people who have quit smoking are more likely to report lower levels of stress and low mood compared those who continue to smoke. A longitudinal study of 469 smokers who were hospitalized after myocardial infarction or coronary artery bypass surgery found that at one year follow up, those who remained abstinent reported significantly lower rates of perceived stress than those who remained smoking (35). The deprivation reversal model (36) posits that smoking (or rather, periods of nicotine withdrawal between cigarettes) actively contributes to increased stress levels. These brief periods of nicotine withdrawal between cigarettes cumulatively add to stress levels experienced on an everyday basis. Once smokers maintain smoking cessation they stop experiencing the nicotine withdrawal, which lowers their perceived stress levels.

Some studies report that people of lower SEP report a higher number of stressful life events and experience higher levels of stress due to these life events (37). On the other hand, other evidence suggests that the number of stressful life events is similar across SEP, but that the nature of the stressful life events is more severe for low SEP people (38). It may be important for smoking cessation interventions to acknowledge the socioeconomic related stressors experienced including discrimination, poverty, low levels of social capital and high levels of hopelessness (39).

Existing quit smoking programs often involve suggestions or components related to managing stress while quitting smoking. However, research concerning the increased effectiveness (or add-on value) of addressing stress as part of smoking cessation interventions is lacking, in particular for socioeconomically disadvantaged groups. A study conducted in Turkey compared an enhanced quit program that included cognitive behaviour oriented anger and stress management with a control group that was offered a standard quit program (n = 350) (40). Participants in the anger/stress management condition were significantly more likely to report biochemically confirmed continuous abstinence at six month follow up. However, a study in Canada (n = 332) found that the addition of a stress management program with physician advice and NRT did not result in additional benefits for those allocated to the stress management arm (41). The authors did note that participants' adherence to the stress management condition was significantly lower than adherence in the control (48% to 75% attended >50% of sessions respectively). When data were analysed with only those who attended >50% sessions, outcomes were more favourable for the stress management condition at two month follow up, but significant differences were not present at 12 months. Therefore it is possible that smoking cessation programs that incorporate stress management techniques may be more effective than programs that do not address stress

management. However, this hypothesis would need to be tested rigorously with socioeconomically disadvantaged smokers.

What is the potential impact of other substance use on smoking and quit attempts in disadvantaged smokers?

Smoking cessation interventions targeted at disadvantaged smokers should also consider the role that other substance use (namely heavy alcohol consumption and regular cannabis use) has on successful tobacco cessation. This thesis identified rates of concurrent tobacco and heavy alcohol use and concurrent tobacco and cannabis use that were far higher than those reported in the general population. Current smokers who regularly used cannabis were also less likely to be motivated to quit smoking and more likely to report shorter previous quit attempts. Motivation to quit tobacco partially mediated the association between regular cannabis use and length of previous quit attempt. Alcohol, tobacco and cannabis are the three most commonly used substances in Australia (NDSHS, 2014). Concurrent use of these substances with tobacco often results in worse health outcomes than use of either substance alone. Therefore addressing alcohol and cannabis use in the context of smoking cessation may enhance cessation rates and thereby reduce the burden of illness experienced in disadvantaged smokers.

Feasibility studies provide some evidence that addressing tobacco smoking and cannabis can lead to positive outcomes. A pilot study conducted in Switzerland demonstrated high levels of acceptability of a group based cessation program for users of both cannabis and tobacco (n = 77) (42). Program content included motivational enhancement therapy, cognitive behavioural therapy (CBT) and relapse prevention. A pilot study in the US tested the effectiveness of CBT and NRT patches for tobacco and cannabis users (n = 12) (43). The program that combined CBT and NRT resulted in significant differences for tobacco use but not cannabis use.

There is also some evidence to suggest that programs may not need to address all behaviours explicitly in order for significant changes to be made. In the pilot study conducted in Switzerland, participants who reduced their cannabis and tobacco use also improved their alcohol use and mental health during the study period, even though these were not directly addressed (42). In a sample of 236 heavy drinkers enrolled in a smoking cessation trial in the US, heavy drinkers reduced their marijuana use alongside their tobacco use even though the intervention did not explicitly address marijuana (44). Although the number of marijuana users in the sample was low (n = 57), this result provides a promising indication that addressing one behaviour may result in changes in other behaviours independently. This has implications for intervention research in disadvantaged groups. Other behaviours, including levels of alcohol use and cannabis use, should be measured at baseline and follow up, regardless of the content of the intervention.

The high rates of simultaneous use of cannabis and tobacco also have implications for tobacco smoking cessation interventions. Assessing simultaneous cannabis and tobacco use at follow up is important in order to properly reflect smoking cessation outcomes. CSO drug and alcohol services may represent acceptable settings to address these behaviours in tandem. Future research should examine the capacity of CSOs to either be the setting for addressing alcohol and cannabis use in the context of smoking cessation or coordinate strong referral systems to other services for help with these issues.

Do we need to explore alternative quit aids or approaches to cessation for highly disadvantaged groups?

It appears that socioeconomically disadvantaged smokers are aware of and trying electronic cigarettes at the same rate as smokers from the general Australian

population. Trying e-cigarettes was also associated with more positive perceptions of the safety and effectiveness of e-cigarettes, as well as higher levels of motivation to quit smoking. E-cigarettes may represent a new tool for harm minimisation in socioeconomically disadvantaged groups that are unable to quit. However, the safety and effectiveness of e-cigarettes remains in question. The relative safety of e-cigarettes compared to traditional cigarettes has been acknowledged, however the absolute safety of e-cigarettes remains in question (45). The large number of different e-cigarette models and the lack of universal mandatory safety standards in e-cigarette manufacturing (46, 47) means that assessing the safety of e-cigarettes is complex (48).

The evidence regarding the effectiveness of e-cigarettes as a method of quitting or reducing harm is yet to be established. A Cochrane review published in 2014 concluded e-cigarettes containing nicotine are more effective than placebo e-cigarettes at increasing cessation, but that more research was needed to increase confidence in this conclusion (49). Conversely, a meta-analysis published in 2014 found e-cigarette users were no more likely than non-users to report quitting smoking (47). Additionally, e-cigarettes may act as a gateway to tobacco use (50), as adolescents in California who used e-cigarettes at baseline were more likely than non-users to report use of tobacco cigarettes one year later. This is of concern as the number of non-smokers using e-cigarettes is also increasing (51-53).

However, even if e-cigarettes do emerge as evidence based harm reduction or cessation tools, there are still concerns about how their use may affect current disparities in smoking between disadvantaged smokers and smokers who are more advantaged. Following patterns of new technology consumption, e-cigarettes are more likely to be taken up by people of higher SEP (54). Thus, there remains the opportunity for e-cigarettes to widen tobacco related health disparities rather than contribute to their

narrowing. Research must continue to be conducted with socioeconomically disadvantaged individuals in order to monitor the impact of e-cigarettes on smoking and cessation (55).

12.4 Do smoking cessation interventions need to be more intensive or integrated?

The research on what works for disadvantaged smokers in quitting smoking is limited. This thesis sought to increase the level of knowledge about factors that may play a role in smoking and cessation. The research within this thesis has made several recommendations for the content of smoking cessation interventions aimed at disadvantaged smokers. It would not be feasible for a single intervention program to address all of these factors at the same time. However, the research within this thesis does suggest that there is a need for smoking cessation programs aimed at disadvantaged smokers to be comprehensive, encompassing the individual smoker, their levels of nicotine dependence, alcohol and cannabis use, social networks, sources of stress and preferences for use of NRT/other cessation aids. As interventions become more comprehensive, they may also become more intensive, needing to be administered for a longer amount of time and more time within each contact point. For example, gradual quitting approaches, which may be the preferred quit approach for disadvantaged current smokers, may require longer interventions, in order to allow for reductions in smoking over time.

Research suggests that the more intensive an intervention is, the more likely it is to be successful (19). However, increases in the intensity of smoking cessation programs should be considered in the context of participant preferences and likelihood of maintaining program adherence. The longer and more involved an intervention is, the higher the potential for participants to disengage, drop out or not adhere to the intervention. This is an important point to consider because socioeconomically

disadvantaged people are already "hard to reach and retain" for research purposes. Thus the comprehensiveness of smoking cessation programs should be balanced against the likelihood of participants adhering to the program so that programs are designed to maximise adherence.

The evidence for increasing integration of interventions for socioeconomically disadvantaged smokers is significant. The success of smoking cessation interventions cannot be separated from the settings in which they are provided (19). Socioeconomically disadvantaged people may be less likely to be reached through traditional health based settings (like hospitals or GP clinics) (56) and in some contexts, may be less likely to be offered help to quit smoking (57). Thus, along with providing more intensive smoking cessation interventions, there may also be a need to ensure that intervention are integrated into the services already used and accessed by disadvantaged smokers.

Integrating smoking cessation programs into services requires change at the organisational level (58, 59). Capacity building and consultation with both staff and clients of existing services is required in order to effectively enable integration of smoking cessation services. Partnerships between services and researchers are required in order to rigorously evaluate the factors that facilitate and hinder integration as well as the impact of integrating services.

Community service organisations are well placed to address smoking cessation for disadvantaged smokers because they represent a trusted source of support for some of the most disadvantaged people in society (60, 61), and a large portion of the clients of CSOs report smoking (62, 63). CSOs have the opportunity to provide smoking cessation support in tandem with addressing other issues in a holistic manner; as well as providing referral to other services. Integrating smoking cessation into other services

including mental health and substance use treatment settings (58) and homelessness services (59) is also necessary.

12.5 Addressing the broader social determinants of health: where to start?

Recommendations regarding smoking cessation interventions for smokers from disadvantaged groups need to be located within consideration of the broader social context of smoking. The sociodemographic characteristics of the two samples that were recruited in the studies within this thesis demonstrated that clients of CSOs are some of the most disadvantaged in Australia, experiencing multiple forms of social and economic disadvantage. This is concerning given indications that in general, the gap between lower and higher SEP in Australia appears to be widening (64, 65).

Factors including financial stress and living conditions (homelessness and living alone) emerged from this thesis as being important factors to explore further in smoking and disadvantage. Efforts must be concentrated on improving the social determinants of health experienced by socioeconomically disadvantaged smokers including (but not limited to) low levels of education, low levels of income, high levels of unemployment, homelessness, and financial stress.

Existing evidence suggests that negative changes in the social determinants of health result in more or continued smoking including financial stress (66), unemployment (67, 68), increase in neighbourhood deprivation and personal deprivation (a measure similar to financial stress) (69). Less is known about how positive changes in the social determinants of health are related to changes in behaviour, especially over the long term. Short term gains in employment/income may be associated with increased negative behaviours (69). Panel or repeated measures studies are examples of study designs that are able to explore the associations between changes

in social determinants (like employment or housing) and changes in smoking behaviours.

Summary

Key components of successful smoking cessation interventions for disadvantaged smokers include a) effective management of nicotine dependence and withdrawal (addiction) through use of cessation aids; b) addressing social networks associated with smoking, c) incorporating stress management techniques, d) considering the impact of other substance use including alcohol and cannabis and e) exploring the potential harm minimisation/cessation promoting qualities of e-cigarettes. The suggested components require interventions to be more intensive and more integrated into the current services and settings that are accessed by disadvantaged smokers. Addressing smoking within socioeconomically disadvantaged groups cannot be separated from efforts that aim to improve the social determinants of health.

Numerous recommendations have been made throughout this thesis. Considering most of the evidence is in its infancy or has not been assessed in disadvantaged groups, it is vital that the recommendations made are evaluated rigorously. Longitudinal studies are required in order to examine changes and attempt to make conclusions regarding causality. Randomised controlled trial designs are required in order to test the effectiveness of key intervention components.

12.6 Strengths and Limitations

This body of work was successful in reaching a subgroup of the population that have traditionally been excluded from much of the tobacco use literature. Both samples are characterised by multiple and severe forms of socioeconomic disadvantage including low income, poor housing, low levels of education, high levels of anxiety and depression symptoms and high levels of financial stress.

Each of the studies included in this thesis provided novel findings regarding smoking and quitting behaviours by socioeconomically disadvantaged smokers. This thesis and the chapters within it did not aim to provide direct comparisons between socioeconomically disadvantaged smokers behaviours and general population smokers. However, consideration of data from large population level surveys in Australia and internationally allows general contextual comparisons to be made. The methodological strengths and limitations for each individual study have been outlined in each Paper's discussion; however the findings of this thesis should be considered with the following limitations in mind. The results from this thesis are gathered from two cross-sectional studies. Cross-sectional surveys confer some limitations, including being unable to make conclusions regarding causality or changes over time.

All behaviours and cognitions in this thesis were assessed via self-report. The validity of self-report measures of smoking and alcohol use has been found to be acceptable. However, there is the potential for social desirability and other biases when assessing self-report measures of behaviours and cognitions. The results of this thesis pertain to the experiences and characteristics of two samples of CSO clients. Therefore, this sample has limited generalizability to smokers who are not clients of CSOs and potentially to disadvantaged smokers from countries other than Australia. However, these samples may be more generalizable to other samples of disadvantaged people accessing CSO support.

12.7 Conclusions

Socioeconomically disadvantaged smokers demonstrate a poorer sociodemographic profile than socioeconomically disadvantaged ex-smokers and are also more likely use cessation aids and to have quit gradually during their most recent quit attempt. Disadvantaged smokers face a considerable number of factors that inhibit

and constrain smoking cessation. These factors are not limited to the individual, and instead include their wider social and community networks, living and working conditions, as well as cultural, environmental and socioeconomic contexts. Disadvantaged smokers also experience higher levels of co-occurring cannabis and heavy alcohol use, both behaviours that are known to be detrimental to tobacco cessation attempts. Both smoking alone and concurrent smoking and heavy alcohol use are associated with increased levels of socioeconomic disadvantage. Motivation to quit tobacco has a small but significant role in mediating the relationship between regular cannabis use and length of previous quit attempt. Awareness and use of e-cigarettes appeared to be comparable to the general population and disadvantaged smokers who had used e-cigarettes in the past 12 months or who were more motivated to quit were more likely to perceive e-cigarettes as safe and effective cessation products.

The research within this thesis suggests that interventions that address smoking in socioeconomically disadvantaged subgroups of smokers must address addiction, stress management, enhanced use of cessation aids, mental health, other substance use (namely alcohol and cannabis), the smoking behaviours in social networks, as well as the broader social determinants of health. Effective interventions that address the perceived barriers to smoking cessation for disadvantaged smokers are likely to be more intensive and integrated within existing services accessed by these smokers. The findings within this thesis suggest that while challenging, there are promising avenues of new research to follow that will further enhance the effectiveness of smoking cessation programs for disadvantaged smokers

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Paper One Appendices

13.1 Ethics approval

13.2 Baseline survey

Appendix 13.1. Ethics approval for RCT

HUMAN RESEARCH ETHICS COMMITTEE

THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

Notification of Expedited Approval

To Chief Investigator or Project Supervisor:	**Doctor Biljana Bonevski**
Cc Co-investigators / Research Students:	**Doctor Christine Paul** **Conjoint Professor Afaf Girgis** **Professor Catherine d'Este**
Re Protocol:	**RCT of a client-centred, caseworker-delivered smoking cessation intervention for a socially disadvantaged population**
Date:	**18-May-2010**
Reference No:	**H-2010-1002**
Date of Initial Approval:	**18-May-2010**

Thank you for your **Response to Conditional Approval** submission to the Human Research Ethics Committee (HREC) seeking approval in relation to the above protocol.

Your submission was considered under **Expedited** review by the Chair/Deputy Chair.

I am pleased to advise that the decision on your submission is **Approved** effective **18-May-2010**.

In approving this protocol, the Human Research Ethics Committee (HREC) is of the opinion that the project complies with the provisions contained in the National Statement on Ethical Conduct in Human Research, 2007, and the requirements within this University relating to human research.

Approval will remain valid subject to the submission, and satisfactory assessment, of annual progress reports. *If the approval of an External HREC has been "noted" the approval period is as determined by that HREC.*

The full Committee will be asked to ratify this decision at its next scheduled meeting. A formal *Certificate of Approval* will be available upon request. Your approval number is **H-2010-1002**.

If the research requires the use of an Information Statement, ensure this number is inserted at the relevant point in the Complaints paragraph prior to distribution to

potential participants You may then proceed with the research.

Conditions of Approval

This approval has been granted subject to you complying with the requirements for *Monitoring of Progress*, *Reporting of Adverse Events*, and *Variations to the Approved Protocol* as <u>detailed below</u>.

PLEASE NOTE:
In the case where the HREC has "noted" the approval of an External HREC, progress reports and reports of adverse events are to be submitted to the External HREC only. In the case of Variations to the approved protocol, or a Renewal of approval, you will apply to the External HREC for approval in the first instance and then Register that approval with the University's HREC.

- *Monitoring of Progress*

Other than above, the University is obliged to monitor the progress of research projects involving human participants to ensure that they are conducted according to the protocol as approved by the HREC. A progress report is required on an annual basis. Continuation of your HREC approval for this project is conditional upon receipt, and satisfactory assessment, of annual progress reports. You will be advised when a report is due.

- *Reporting of Adverse Events*

1. It is the responsibility of the person **first named on this Approval Advice** to report adverse events.
2. Adverse events, however minor, must be recorded by the investigator as observed by the investigator or as volunteered by a participant in the research. Full details are to be documented, whether or not the investigator, or his/her deputies, consider the event to be related to the research substance or procedure.
3. Serious or unforeseen adverse events that occur during the research or within six (6) months of completion of the research, must be reported by the person first named on the Approval Advice to the (HREC) by way of the Adverse Event Report form within 72 hours of the occurrence of the event or the investigator receiving advice of the event.
4. Serious adverse events are defined as:
   - Causing death, life threatening or serious disability.
   - Causing or prolonging hospitalisation.
   - Overdoses, cancers, congenital abnormalities, tissue damage, whether or not they are judged to be caused by the investigational agent or procedure.
   - Causing psycho-social and/or financial harm. This covers everything from perceived invasion of privacy, breach of confidentiality, or the diminution of social reputation, to the creation of psychological fears and trauma.
   - Any other event which might affect the continued ethical acceptability of the project.

5. Reports of adverse events must include:
    - Participant's study identification number;
    - date of birth;
    - date of entry into the study;
    - treatment arm (if applicable);
    - date of event;
    - details of event;
    - the investigator's opinion as to whether the event is related to the research procedures; and
    - action taken in response to the event.

6. Adverse events which do not fall within the definition of serious or unexpected, including those reported from other sites involved in the research, are to be reported in detail at the time of the annual progress report to the HREC.

- ***Variations to approved protocol***

If you wish to change, or deviate from, the approved protocol, you will need to submit an *Application for Variation to Approved Human Research*. Variations may include, but are not limited to, changes or additions to investigators, study design, study population, number of participants, methods of recruitment, or participant information/consent documentation. **Variations must be approved by the (HREC) before they are implemented** except when Registering an approval of a variation from an external HREC which has been designated the lead HREC, in which case you may proceed as soon as you receive an acknowledgement of your Registration.

Linkage of ethics approval to a new Grant

HREC approvals cannot be assigned to a new grant or award (ie those that were not identified on the application for ethics approval) without confirmation of the approval from the Human Research Ethics Officer on behalf of the HREC.

Best wishes for a successful project.

Associate Professor Alison Ferguson
Chair, Human Research Ethics Committee

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Linked University of Newcastle administered funding:

Funding body	Funding project title	First named investigator	Grant Ref
Project Grant	RCT of a client-centred, caseworker-delivered smoking cessation intervention for a socially disadvantaged population0	Bonevski Biljana,	G0190197

Appendix 13.2 Baseline survey

A – QUESTIONS EVERYONE IS ASKED:
DEMOGRAPHICS

First, we would like to know a little bit about you.

1. Are you

Male	1
Female	2

2. In what year were you born?

1	9		

3. What is the postcode of the suburb where you live? If you don't know the postcode, please type '0000'. (Press CLR if you make a mistake)

4. Counting yourself, how many adults (people aged 18 years and over) live in your household?

adults

5. How many children (people aged under 18 years old) live in your household?

children

6. What type of housing do you live in?

Own house	1
Rental house	2
With family or friends	3
Supported accommodation/government housing	4
Hotel/motel	5
No home/street living	6
Other	7

7. Are you of Aboriginal or Torres Strait Islander origin?

Yes, Aboriginal	1
Yes, Torres Strait Islander	2
Yes, both	3
No	4

8. What best describes your marital status?

Married	1
De facto or living with a partner	2
Separated or divorced	3
Never married or single	4
Widowed	5

9. What is the highest level of education that you have completed?

Primary school	1
Completed year 10 (School Certificate)	2
Completed year 12 (Higher School Certificate)	3
TAFE or other trade qualification	4
University Degree	5

10. What is your take-home household income each week (that is, after tax has been taken out)?

Less than $100 per week	1
Between $101 -$200 per week	2
Between $201-$300 per week	3
Between $301-$400 per week	4
Between $401-500 per week	5
More than $500 per week	6
Prefer not to answer	7

11. What is your main source of income?

Paid employment (either full time or part time)	1
Government pension or benefit	2
Family member	3
Personal savings	4
Other	5

12. In the past 6 months did any of the following happen to you because of a shortage of money:

	Yes	No
could not pay electricity, gas, or telephone bills on time;		
could not pay the mortgage or rent on time;		
pawned or sold something;		
went without meals;		
was unable to heat home;		
asked for financial help from friends or family;		
asked for help from a welfare/community organization		

13. Suppose you had only one week to raise $2,000 for an emergency. Which of the following best describes how hard it would be for you to get that money?

I could easily raise the money	1
I could raise the money, but it would involve some sacrifices (e.g. reduced spending, selling a possession)	2
I would have to do something drastic to raise the money (e.g. selling an important possession)	3
I don't think I could raise the money	4

14. Before this visit, how many times have you come to this service in the last 12 months?

None, this is first time	0
1-2 times	1
3-4 times	2
More than 4 times	3

ACCESS TO HEALTHCARE

15. Was there any time in the past year that you needed health care but could not get it (like visits to the GP or hospital)?

Yes	1
No, did not need health care	2
No, got all health care I needed	3

LINK: IF Q14 = 2 or 3 GO TO Q17

16. Which of the following types of health care did you need but could not get <u>in the last year?</u>

GP	1
Medical Specialist	2
Hospital	3
Dentist	4
Allied health (physiotherapist, podiatrist, dietician etc)	5
Other type of care	6

17. What was the <u>main reason</u> you were unable to get the care needed most recently?

No service available in the area at the time I most needed it	1
Waiting time too long / no appointments	2
Cost	3
Decided not to seek care / didn't bother	4
Personal or family responsibilities / too busy	5
Transportation problems	6
Other	7

18. Did you delay or not use the following health services because of the cost in the last 12 months?

A) GP	Yes	No
B) Specialist	Yes	No
C) Medicines	Yes	No
D) Pathology test	Yes	No
E) Imaging test	Yes	No

19. Please read through the following list of events below and tick any that have happened to you in the past 6 months. Please also rate how positive or negative this event was on a scale from very positive to very negative.

Event	Did this occur in the past 6 months?	Very negative	Somewhat negative	Neutral	Somewhat positive	Very positive
Got married or other long term commitment to your partner						
You or your partner became pregnant or had a baby						
You or a member of your family became seriously ill or injured						
Your home environment changed (you moved house or renovated, the neighbourhood improved or got worse)						
You and your partner separated or divorced						
Lost your job						
Started a new job						
Someone close to you died						
Had problems with the police/law/government						
You were a victim of crime						
You lost a home through fire, flood or other disaster						
You were released from jail						
Other major life event (please type in)						

SMOKING STATUS

20. Do you currently smoke tobacco products?

Yes, Daily	1
Yes, At least once a week	2
Yes, but less often than once a week	3
No, Not at all	4

LINK: IF Q20 = 1 GO TO Q22

LINK: IF Q20 = 2, 3 or 4 GO TO Q21

21. Have you smoked at least 100 cigarettes or a similar amount of tobacco in your life?

Yes	1
No	2
Not sure	3

LINK: IF Q20 = 2 or 3 AND Q21 = 1 GO TO Q22
LINK: IF Q20 = 4 AND Q21 = 1 GO TO Q43
LINK: IF Q20 = 4 AND Q21 = 2 or 3 GO TO Q48

SMOKER PROFILE

[CURRENT SMOKERS ONLY] (Q20 = 1 or Q20=2-3 AND Q21=1)

22. How long ago was the last time you smoked a cigarette, cigar or pipe?

Less than 4 hours ago	1
Between 4 and 8 hours ago	2
Between 8 and 12 hours ago	3
Longer than 12 hours ago	4

23. What type of tobacco do you NORMALLY use (CHOOSE ONE ONLY)?

Cigarettes (Pre-rolled)	1
Cigarettes (Roll your own)	2
Chop chop (cheaper loose leaf tobacco)	3
Cigars or Pipe	4
Chewing tobacco	5
Snuff (powder tobacco)	6

If 4-6 on Q23, then go to (finishing up the survey)

If 1-3 on Q23, then go to Q24

24. On an average day, how many cigarettes do you smoke? Press CLR if you make a mistake

25. At what age did you first start smoking daily?

years

26. How soon after waking up do you smoke?

Within 5 minutes	1
6-30 minutes	2
31-60 minutes	3
After 60 minutes	4

27. How much do you spend on average on tobacco each week? Enter your answer in dollars ($)

$

28. From where did you last buy your cigarettes?

Supermarket	1
Service Station	2
Smoke shop / Tobacconist	3
Corner shop / Convenience store	4
Internet	5
Over-the-counter in a pub/bar/club	6
Vending machine	7
Newsagency	8
Liquor store	9
Video shop	10
Other	11

29. In the last six months have you spent money on cigarettes that you knew would be better spent on household essentials like food?

Yes	1
No	2

QUITTING

[CURRENT SMOKERS ONLY] (Q20=1 or Q20=2-3 AND Q21=1)

30. Have you ever tried to quit smoking before?

Yes	1
No	2

LINK: IF Q30=2 GO TO Q34

31. How many serious attempts to stop smoking have you made in the last 12 months? By serious attempt I mean you decided that you would try to make sure you never smoked again. Please include any attempt that you are currently making and please include any successful attempt made in the last year. Press CLR if you make a mistake

LINK: IF Q31= 0 GO TO Q32

32. During your most recent attempt to quit smoking, did you stop smoking suddenly or did you gradually cut down on the number of cigarettes smoked?

A) Stopped smoking suddenly	1
B) Gradually cut down number of cigarettes smoked	2
C) Can't remember	3

33. What methods did you use during your last quit attempt?

A) A stop smoking medication prescribed by your doctor called zyban or bupropion	1
B) A stop smoking medication prescribed by your doctor called varenicline or champix	2
C) Nicotine replacement therapy (gum, patches, inhaler, lozenge) prescribed by your doctor	3
D) Nicotine replacement therapy (gum, patches, inhaler, lozenge) you bought without a doctor's prescription (e.g., from the supermarket or chemist)	4
E) Self-help book or brochure	5
F) Herbal or natural remedies	6
D) Relaxation or meditation	7
E) Group counselling	8
F) Internet support	9
G) Telephone support (like Quitline)	10
H) Own will-power, no help	11
I) Distractions	12
J) Exercise	13
K) Going to see a GP	14
L) Acupuncture or hypnosis	15
M) Other	16

34. How often have the following people advised you to quit in the last 12 months? (Choose as many answers as apply).

	Never	Sometimes	Often
A) Doctor	1	2	3
B) Nurse	1	2	3
C) Other health worker (e.g. dentist, dietician, physio)	1	2	3
D) Family member	1	2	3
E) Friend	1	2	3
F) Caseworker/support person/social worker/ counsellor	1	2	3
G) Teacher	1	2	3
H) Boss at work	1	2	3
I) Other person	1	2	3

35. Which statement best describes how interested you are in quitting smoking?

I am not interested in quitting smoking	1
I am a bit interested in quitting smoking	2
I am very interested in quitting smoking	3

36. What are your intentions regarding quitting? Do you plan to:

Quit in the next 30 days	1
Quit in the next 6 months	2
Quit, but not in the next 6 months	3
Never quit	4
Don't know	5

37. On a scale of **one to ten** rate your current motivation to give up smoking.

(Very low)   **(Very high)**

1----2----3----4----5----6----7----8----9----10

38. If you were thinking of quitting smoking, would you prefer to stop suddenly or gradually cut down on the number of cigarettes you smoke?

A) Stop smoking suddenly	1
B) Gradually cut down number of cigarettes smoked	2
C) No preference	3

39. Listed below are situations that lead some people to smoke. We would like to know HOW TEMPTED you may be to smoke in each situation. Please answer the following questions on a scale of 1 = 'Not at all tempted' to 5 = 'Extremely tempted' following five point scale.

Statements	Not at all tempted	Not very tempted	Moderately tempted	Very tempted	Extremely tempted
With friends at a party					
When I first get up in the morning					
When I am very anxious and stressed					
Over coffee while talking and relaxing					
When I feel I need a lift					
When I am very angry about something or someone					
With my spouse or close friend who is smoking					
When I realize I haven't smoked for a while					
When things are not going my way and I am frustrated					

SELF-EFFICACY
[CURRENT SMOKERS ONLY] (Q20=1 or Q20=2-3 AND Q21=1)

40. If you decided to give up smoking completely in the next 6 months, how sure are you that you would succeed?

Not at all sure	1
Slightly sure	2
Moderately sure	3
Very sure	4
Extremely sure	5

ENJOYMENT

[CURRENT SMOKERS ONLY] (Q20=1 or Q20=2-3 AND Q21=1)

41. Which of these statements most applies to you? (Choose **one** response)

I hate being a smoker	1
I am unhappy about being a smoker	2
I am happy about being a smoker	3
Don't know	4

42. How much do you enjoy smoking?

Very much	1
Quite a bit	2
Not particularly	3
Not at all	4
Don't know	5

EX-SMOKER PROFILE

[EX-SMOKERS ONLY] (Q20 = 4 AND Q21 = 1)

43. How long has it been since you quit smoking?

Less than 3 months	1
3-6 months	2
Between 6 and 12 months	3
Between 1 and 2 years	4
Between 2 and 5 years	5
More than 5 years	6

44. When you quit smoking, did you stop smoking suddenly or did you gradually cut down on the number of cigarettes smoked?

Stopped smoking suddenly	1
Gradually cut down number of cigarettes smoked	2
Can't remember	3

45. What type of tobacco did you normally use when you were smoking?

Cigarettes (Pre-rolled)	1
Cigarettes (Roll your own)	2
Cigars or Pipe	3
Chewing tobacco	4
Chop chop (loose leaf tobacco)	5
Snuff (tobacco in powder form)	6

46. Which of the following methods did you use when you quit smoking?

A) A stop smoking medication prescribed by your doctor such as zyban or bupropion	1
B) A stop-smoking medication prescribed your doctor called varenicline or champix	2
C) Nicotine replacement therapy (gum, patches, inhaler, lozenge) prescribed by your doctor	3
D) Nicotine replacement therapy (gum, patches, inhaler, lozenge) you bought without a doctor's prescription (e.g., from the supermarket or chemist)	4
E) Self-help book or brochure	5
F) Herbal or natural remedies	6
G) Relaxation or meditation	7
H) Group counselling	8
I) Internet support	9
J) Telephone support (like Quitline)	10
K) Own will-power, no help	11
L) Distractions	12
M) Exercise	13
N) Going to see a GP	14
O) Acupuncture or hypnosis	15
P) Other	16

47. This set of questions asks about reasons for quitting smoking. Please read each of the following reasons that smokers may have for quitting and decide how true each was for you when you quit.

I quit…	Not at all true	A little true	Moderately true	Quite true	Extremely true
A) Because I was afraid that I would get very sick if I didn't quit smoking	0	1	2	3	4
B) To prove that I could quit if I really wanted to	0	1	2	3	4
C) Because I felt like smoking was hurting my health	0	1	2	3	4
D) To feel in control of my life	0	1	2	3	4
E) To show that I could do other things that are important to me	0	1	2	3	4
F) Because I was afraid that smoking would shorten my life	0	1	2	3	4
G) So other people would stop nagging me	0	1	2	3	4
H) To save the money that I spent on cigarettes	0	1	2	3	4
I) Because someone was making me quit	0	1	2	3	4
J) So I wouldn't burn holes in clothes or furniture	0	1	2	3	4
K) Because people I am close to would have been mad at me if I didn't quit	0	1	2	3	4
L) So my house or car wouldn't smell	0	1	2	3	4
M) Because I wanted to be a good example to my kids	0	1	2	3	4
N) To get rid of bad cigarette breath or taste in my mouth	0	1	2	3	4
O) Because it was getting harder to	0	1	2	3	4

smoke in public places					
P) Because I was concerned about exposing others to my cigarette smoke	0	1	2	3	4
Q) Because of the death of a family member or friend	0	1	2	3	4
R) Other reason	0	1	2	3	4

EXPOSURE TO SECOND HAND SMOKE

48. In the last 24 hours have you been near other people who were smoking?

Yes	1
No	2

49. Counting yourself, how many people in your household smoke cigarettes at least once a week?

[ ] people

NOTE: IF Q20 = 1 – 3 AND Q21 = 1 THEN -1 FROM TOTAL OF Q49 TO DETERMINE NUMBER OF SMOKERS OTHER THAN PARTICIPANT IN HOUSEHOLD

RESILIENCE

50. Please indicate the extent to which you agree with each of the following statements:

	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I tend to bounce back quickly after hard times	1	2	3	4	5
I have a hard time making it through stressful events	1	2	3	4	5
It does not take me long to recover from a stressful event	1	2	3	4	5
It is hard for me to snap back when something bad happens	1	2	3	4	5
I usually come through difficult times with little trouble	1	2	3	4	5
I tend to take a long time to get over set-backs in my life	1	2	3	4	5

ALCOHOL USE (AUDIT-C)

51. Have you had an alcoholic drink of any kind in the last 12 months?

Yes	1
No	2

LINK: IF Q51 = 2 GO TO Q55

52. How often did you have a drink containing alcohol in the past year?

Never	1
Monthly or less	2
2 to 4 times a month	3
2 to 3 times a week	4
4 to 5 times a week	5
6 or more times a week	6

53. How many standard drinks containing alcohol did you have on a typical day when you were drinking in the past year? This picture shows you standard drinks.

0 drinks	1
1 to 2 drinks	2
3 to 4 drinks	3
5 to 6 drinks	4
7 to 9 drinks	5
10 or more drinks	6

=1
Spirit Shot/Nip (30ml)
Port/Sherry (60ml)
Full Strength Beer (Middy)

=1.5
Full Strength Beer (375ml)

=1.5
Pre-Mix Drinks (375ml)
Champagne (170ml)
Wine (150ml)

=0.8
Light Beer (375ml)

=7.5
Botle of Wine (750ml)

=22
Bottle of Spirits (700ml)

54. How OFTEN do you have four or more Standard Drinks on one occasion in the past year?

Never	1
Less than monthly	2
Monthly	3
Weekly	4
Daily or almost daily	5

DEPRESSION

55. Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Little interest or pleasure in doing things.	0	1	2	3
Feeling down, depressed, or hopeless.	0	1	2	3
Trouble falling/staying asleep, sleeping too much.	0	1	2	3
Feeling tired or having little energy.	0	1	2	3
Poor appetite or overeating.	0	1	2	3
Feeling bad about yourself, or that you are a failure, or have let yourself or your family down.	0	1	2	3
Trouble concentrating on things, such as reading the newspaper or watching TV.	0	1	2	3
Moving or speaking so slowly that other people could have noticed. Or the opposite; being so fidgety or restless that you have been moving around more than usual.	0	1	2	3
Thoughts that you would be better off dead or of hurting yourself in some way.	0	1	2	3

56. If you checked off any problems on the last page, how difficult have these problems made it for you to do your work, take care of things at home, or get along with other people?

Not difficult at all	1
Somewhat difficult	2
Very difficult	3
Extremely difficult	4

ANXIETY

57. Over the last 2 weeks, how often have you been bothered by any of the following problems?

	Not at all	Several days	More than half the days	Nearly every day
Feeling nervous, anxious, or on edge	0	1	2	3
Not being able to stop or control worrying	0	1	2	3

SOCIAL SUPPORT (NETWORKS)

58. How often are you in contact with any members of your family- including visits, phone calls, letters, or emails?

Nearly every day	1
3-4 days a week	2
1-2 days a week	3
1-3 days a month	4
Less than once a month	5
Never	6
No Family	7

59. How often are you in contact with any of your <u>friends</u>- including visits, phone calls, letters, or emails?

Nearly every day	1
3-4 days a week	2
1-2 days a week	3
1-3 days a month	4
Less than once a month	5
Never	6
No Friends	7

60. How many <u>family members</u> can you rely on if you have a serious problem?

No family I can rely on	1
1-2 Family Members	2
3-4 Family Members	3
5 or more Family Members	4

61. How many <u>friends</u> can you rely on if you have a serious problem?

No family I can rely on	1
1-2 Family Members	2
3-4 Family Members	3
5 or more Family Members	4

62. How many of your friends and family smoke?

None	1
A few/less than half	2
About half	3
Most or all of them	4

Paper Two Appendices:

14.1 References of full text articles that were excluded

14.2 Summary of included quantitative studies

14.3 Summary of included qualitative studies

14.4 Summary of included mixed methods studies

14.5 Overview of study characteristics

14.6 Quality assessment of qualitative studies

14.7 Quality assessment of quantitative studies

14.8 Detailed results

14.9 Copy of qualitative quality assessment tool

14.10 Copy of quantitative quality assessment tool

14.11 Published manuscript

Appendix 14.1 Supplementary file 1: References of full text articles that were retrieved, reviewed and excluded for not meeting inclusion criteria. Articles could meet multiple criteria for exclusion (total n = 377).

<u>Low socioeconomic status studies excluded (n = 111)</u>

Intervention studies

1.   Maher JE, Rohde K, Dent CW, Stark MJ, Pizacani B, Boysun MJ, et al. Is a statewide tobacco quitline an appropriate service for specific populations? Tobacco Control. 2007;16 Suppl 1:i65-70.
2.   Miller CL, Sedivy V. Using a quitline plus low-cost nicotine replacement therapy to help disadvantaged smokers to quit. Tobacco Control. 2009;18(2):144-9.
3.   Moffatt J, Stanton WR. Smoking and parenting among males in low socio-economic occupations. International Journal of Health Promotion and Education. 2005;43(3):81-6.
4.   O'Brien J, Salmon A, Geikie A, Jardine A, Oakes W. Integrating smoking care in community welfare agencies to reach disadvantaged people: Findings from the Smoking Matters Project. Health Promotion Journal of Australia. 2010;21(3):176-82.
5.   O'Loughlin J, Paradis G, Renaud L, Meshefedjian G, Barnett T. The "Yes, I Quit" smoking cessation course: does it help women in a low income community quit? Journal of community health. 1997;22(6):451-68.
6.   Sias JJ, Urquidi UJ, Bristow ZM, Rodriguez JC, Ortiz M. Evaluation of smoking cessation behaviors and interventions among Latino smokers at low-income clinics in a US-Mexico border county. Addictive behaviors. 2008;33(2):373-80. Epub 2007/11/17.

No discussion of barriers

1.   Ackerson LK, Viswanath K. Communication inequalities, social determinants, and intermittent smoking in the 2003 Health Information National Trends Survey. Preventing chronic disease. 2009;6(2):A40.
2.   Amos A, Wiltshire S, Bostock Y, Haw S, McNeill A. 'You can't go without a fag...you need it for your hash'--a qualitative exploration of smoking, cannabis and young people. Addiction (Abingdon, England). 2004;99(1):77-81. Epub 2003/12/18.
3.   Arnold CL, Davis TC, Berkel HJ, Jackson RH, Nandy I, London S. Smoking status, reading level, and knowledge of tobacco effects among low-income pregnant women. Preventive medicine. 2001;32(4):313-20. Epub 2001/04/17.
4.   Bonevski B, Bryant J, Paul C. Encouraging smoking cessation among disadvantaged groups: a qualitative study of the financial aspects of cessation. Drug and alcohol review. 2011;30(4):411-8. Epub 2011/03/02.
5.   Donaghy E, Bauld L, Eadie D, McKell J, Pringle B, Amos A. A qualitative study of how young Scottish smokers living in disadvantaged communities get their cigarettes. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2013;15(12):2053-9. Epub 2013/08/06.
6.   Eadie D, MacAskill S, McKell J, Baybutt M. Barriers and facilitators to a criminal justice tobacco control coordinator: an innovative approach to supporting smoking cessation among offenders. Addiction (Abingdon, England). 2012;107 Suppl 2:26-38. Epub 2012/11/21.
7.   Gillies V, Willig C. 'You get the nicotine and that in your blood'—constructions of addiction and control in women's accounts of cigarette smoking. Journal of Community & Applied Social Psychology. 1997;7(4):285-301.
8.   Macleod J, Smith GD, Metcalfe C, Hart C. Is subjective social status a more important determinant of health than objective social status? Evidence from a prospective observational study of Scottish men. Social Science & Medicine. 2005;61(9):1916-29.

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No discussion of barriers to smoking cessation (e.g. might be barriers to accessing health care in general)

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Not carried out in high income country/not published in English

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Not reporting the perceived self-reported barriers to smoking cessation (e.g. might report results of logistic regressions showing nicotine dependence associated with cessation success)

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Population level study

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Reviews (reviews conducted on smoking within the defined disadvantaged group but not reporting on perceived barriers to smoking cessation)

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Studies not meeting the subgroup definition

1. Abdullah ASM, Ho LM, Kwan YH, Cheung WL, McGhee SM, Chan WH. Promoting smoking cessation among the elderly: What are the predictors of intention to quit and successful quitting? Journal of aging and health 2006;**18**(4):552-64
2. Adams E, Melvin CL, Raskind-Hood CL. Sociodemographic, insurance, and risk profiles of maternal smokers post the 1990s: How can we reach them? Nicotine & Tobacco Research 2008;**10**(7):1121-29
3. Aitken PP, Davies JK, Leathar DS. Smoking prevalence and beliefs among adult Scots: implications for health education. International journal of health education 1982;**24**(3):164-75
4. Blackburn C, Bonas S, Spencer N, Dolan A, Coe C, Moy R. Smoking behaviour change among fathers of new infants. Social Science & Medicine 2005;**61**(3):517-26
5. Denham SA, Meyer MG, Toborg MA. Tobacco cessation in adolescent females in Appalachian communities. Family & community health 2004;**27**(2):170-81
6. Ko M, Schulken ED. Factors related to smoking cessation and relapse among pregnant smokers. American journal of health behavior 1998;**22**(2):83-89
7. Kruger TM, Howell BM, Haney A, Davis RE, Fields N, Schoenberg NE. Perceptions of smoking cessation programs in rural Appalachia. American journal of health behavior 2012;**36**(3):373-84 doi: 10.5993/ajhb.36.3.8[published Online First: Epub Date]|.

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Indigenous studies (n = 68)

Intervention studies

1.   Choi WS, Faseru B, Beebe LA, Greiner AK, Yeh HW, Shireman TI, et al. Culturally-tailored smoking cessation for American Indians: study protocol for a randomized controlled trial. Trials. 2011;12:126. Epub 2011/05/20.

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3.   Glover M, Bosman A, Wagemakers A, Kira A, Paton C, Cowie N. An innovative team-based stop smoking competition among Maori and Pacific Island smokers: rationale and method for the study and its evaluation. BMC public health. 2013;13:1228. Epub 2013/12/25.

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No discussion of barriers

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5.   Horn K, Noerachmanto N, Dino G, Manzo K, Brayboy M. Who wants to quit? Characteristics of American Indian youth who seek smoking cessation intervention. Journal of community health. 2009;34(2):153-63.

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No discussion of barriers to smoking cessation (e.g. might be barriers to accessing health care in general)

1.   Beals J, Novins DK, Spicer P, Whitesell NR, Mitchell CM, Manson SM, et al. Help seeking for substance use problems in two American Indian reservation populations. Psychiatric services (Washington, DC). 2006;57(4):512-20. Epub 2006/04/11.

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16.   Thomas DP, Briggs V, Anderson IP, Cunningham J. The social determinants of being an Indigenous non-smoker. Australian and New Zealand journal of public health. 2008;32(2):110-6. Epub 2008/04/17.

17.   Thomas DP, Ferguson M, Johnston V, Brimblecombe J. Impact and perceptions of tobacco tax increase in remote Australian aboriginal communities. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2013;15(6):1099-106. Epub 2012/11/21.

18.   Unger JB, Rohrbach LA, Cruz TB, Baezconde-Garbanati L, Howard KA, Palmer PH, et al. Ethnic variation in peer influences on adolescent smoking. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2001;3(2):167-76. Epub 2001/06/14.

19.   Unger JB, Shakib S, Cruz TB, Hoffman BR, Pitney BH, Rohrbach LA. Smoking behavior among urban and rural Native American adolescents in California. American journal of preventive medicine. 2003;25(3):251-4. Epub 2003/09/26.

20.   Unger JB, Soto C, Baezconde-Garbanati L. Perceptions of ceremonial and nonceremonial uses of tobacco by American-Indian adolescents in California. The Journal of adolescent health : official publication of the Society for Adolescent Medicine. 2006;38(4):443 e9-16. Epub 2006/03/22.

21.   van Esdonk T, Glover M, Kira A, Wagemakers A. Reducing Smoking in Pregnancy Among Maori Women: "Aunties" Perceptions and Willingness to Help. Maternal and child health journal. 2013. Epub 2013/11/12.

Not reporting the perceived self-reported barriers to smoking cessation (e.g. might report results of logistic regressions showing nicotine dependence associated with cessation success)

1.   Baezconde-Garbanati L, Beebe LA, Perez-Stable EJ. Building capacity to address tobacco-related disparities among American Indian and Hispanic/Latino communities: conceptual and systemic considerations. Addiction (Abingdon, England). 2007;102 Suppl 2:112-22. Epub 2007/10/06.

2.   Beebe LA, Vesely SK, Oman RF, Tolma E, Aspy CB, Rodine S. Protective assets for non-use of alcohol, tobacco and other drugs among urban American Indian youth in Oklahoma. Maternal & Child Health Journal. 2008;12:S82-90.

3.   Butler S, Williams M, Paterson J, Tukuitonga C. Smoking among mothers of a Pacific Island birth cohort in New Zealand: associated factors. The New Zealand medical journal. 2004;117(1206):U1171.

4.   Cosh S, Maksimovic L, Ettridge K, Copley D, Bowden JA. Aboriginal and Torres Strait Islander utilisation of the Quitline service for smoking cessation in South Australia. Australian journal of primary health. 2013;19(2):113-8. Epub 2012/09/07.

5.   Daley CM, Faseru B, Nazir N, Solomon C, Greiner KA, Ahluwalia JS, et al. Influence of traditional tobacco use on smoking cessation among American Indians. Addiction (Abingdon, England). 2011;106(5):1003-9. Epub 2011/02/11.

6.   Daley CM, Greiner KA, Nazir N, Daley SM, Solomon CL, Braiuca SL, et al. All Nations Breath of Life: using community-based participatory research to address health disparities in cigarette smoking among American Indians. Ethnicity & disease. 2010;20(4):334-8. Epub 2011/02/11.

7.   Faseru B, Daley CM, Gajewski B, Pacheco CM, Choi WS. A longitudinal study of tobacco use among American Indian and Alaska Native tribal college students. BMC public health. 2010;10:617. Epub 2010/10/20.

8.   Gilligan C, Sanson-Fisher RW, D'Este C, Eades S, Wenitong M. Knowledge and attitudes regarding smoking during pregnancy among Aboriginal and Torres Strait Islander women. The Medical journal of Australia. 2009;190(10):557-61.

9.   Gould GS, McEwen A, Munn J. Jumping the hurdles for smoking cessation in pregnant Aboriginal and Torres Strait Islander women in Australia. Journal of Smoking Cessation. 2011;6(1):33-6.

10.   Henderson PN, Rhoades D, Henderson JA, Welty TK, Buchwald D. Smoking cessation and its determinants among older American Indians: the Strong Heart Study. Ethnicity & disease. 2004;14(2):274-9.

11.   Hodge F, Nandy K. Factors associated with American Indian cigarette smoking in rural settings. International journal of environmental research and public health. 2011;8(4):944-54.

12.   Hutchinson PJ, Richardson CG, Bottorff JL. Emergent cigarette smoking, correlations with depression and interest in cessation among Aboriginal adolescents in British Columbia. Canadian Journal of Public Health. 2008;99(5):418-22.

13.   Johnston V, Thomas DP, McDonnell J, Andrews RM. Maternal smoking and smoking in the household during pregnancy and postpartum: findings from an Indigenous cohort in the Northern Territory. The Medical journal of Australia. 2011;194(10):556-9. Epub 2011/06/08.

14.   Kendzor DE, Businelle MS, Reitzel LR, Rios DM, Scheuermann TS, Pulvers K, et al. Everyday discrimination is associated with nicotine dependence among African American, Latino, and White smokers. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2014;16(6):633-40. Epub 2013/12/05.

15.   Nez Henderson P, Jacobsen C, Beals J, Team A-S. Correlates of cigarette smoking among selected Southwest and Northern plains tribal groups: the AI-SUPERPFP Study. American journal of public health. 2005;95(5):867-72. Epub 2005/04/28.

16.   Okamoto SK, Helm S, Pel S, McClain LL, Hill AP, Hayashida JK. Developing empirically based, culturally grounded drug prevention interventions for indigenous youth populations. The journal of behavioral health services & research. 2014;41(1):8-19. Epub 2012/11/29.

17.   Yu M, Stiffman AR, Freedenthal S. Factors affecting American Indian adolescent tobacco use. Addictive Behaviors. 2005;30(5):889-904.

Population level study

1.   Reed MB, Burns DM. A population-based examination of racial and ethnic differences in receiving physicians' advice to quit smoking. Nicotine and Tobacco Research. 2008;10(9):1487-94.

Reviews (reviews conducted on smoking within the defined disadvantaged group but not reporting on perceived barriers to smoking cessation)

1.   Conigrave KM, Lee KS. Smoking or alcohol dependence among Indigenous Australians: treatment may be needed, not just education. Heart, lung & circulation. 2012;21(10):626-31. Epub 2012/07/24.
2.   Cox LS, Okuyemi K, Choi WS, Ahluwalia JS. A review of tobacco use treatments in U.S. ethnic minority populations. American journal of health promotion : AJHP. 2011;25(5 Suppl):S11-30. Epub 2011/04/29.
3.   DiGiacomo M, Davidson PM, Abbott PA, Davison J, Moore L, Thompson SC. Smoking cessation in indigenous populations of Australia, New Zealand, Canada, and the United States: elements of effective interventions. International journal of environmental research and public health. 2011;8(2):388-410. Epub 2011/05/11.
4.   Ivers RG. A review of tobacco interventions for Indigenous Australians. Australian and New Zealand journal of public health. 2003;27(3):294-9. Epub 2004/01/07.
5.   Johnston V, Westphal DW, Glover M, Thomas DP, Segan C, Walker N. Reducing smoking among indigenous populations: new evidence from a review of trials. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2013;15(8):1329-38. Epub 2013/03/23.
6.   King TK, Borrelli B, Black C, Pinto BM, Marcus BH. Minority women and tobacco: implications for smoking cessation interventions. Annals of behavioral medicine : a publication of the Society of Behavioral Medicine. 1997;19(3):301-13. Epub 1997/07/01.
7.   Kong G, Singh N, Krishnan-Sarin S. A review of culturally targeted/tailored tobacco prevention and cessation interventions for minority adolescents. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2012;14(12):1394-406. Epub 2012/05/23.
8.   Stolberg VB. A cross-cultural and historical survey of tobacco use among various ethnic groups. Journal of ethnicity in substance abuse. 2007;6(3-4):9-80. Epub 2007/01/01.

Studies not meeting the subgroup definition

1.   Bond C, Brough M, Spurling G, Hayman N. 'It had to be my choice' Indigenous smoking cessation and negotiations of risk, resistance and resilience. Health, Risk & Society. 2012;14(6):565-81.
2.   Haines RJ, Oliffe JL, Bottorff JL, Poland BD. 'The missing picture': tobacco use through the eyes of smokers. Tobacco control. 2010;19(3):206-12. Epub 2010/05/27.
3.   Johnston V, Thomas DP. What works in Indigenous tobacco control? The perceptions of remote Indigenous community members and health staff. Health promotion journal of Australia : official journal of Australian Association of Health Promotion Professionals. 2010;21(1):45-50. Epub 2010/04/22.
4.   Kraemer KM, McLeish AC, Jeffries ER, Avallone KM, Luberto CM. Distress tolerance and perceived barriers to smoking cessation. Substance abuse : official publication of the Association for Medical Education and Research in Substance Abuse. 2013;34(3):277-82. Epub 2013/07/13.

5.   Lubetkin EI, Lu WH, Krebs P, Yeung H, Ostroff JS. Exploring primary care providers' interest in using patient navigators to assist in the delivery of tobacco cessation treatment to low income, ethnic/racial minority patients. Journal of community health. 2010;35(6):618-24. Epub 2010/03/26.

6.   Renner CC, Enoch C, Patten CA, Ebbert JO, Hurt RD, Moyer TP, et al. Iqmik: a form of smokeless tobacco used among Alaska natives. American journal of health behavior. 2005;29(6):588-94. Epub 2005/12/13.

7.   Wise M, Massi L, Rose M, Nancarrow H, Conigrave K, Bauman A, et al. Developing and implementing a state-wide Aboriginal health promotion program: the process and factors influencing successful delivery. Health promotion journal of Australia : official journal of Australian Association of Health Promotion Professionals. 2012;23(1):25-9. Epub 2012/06/27.

Mental illness studies (n = 90)

Intervention studies

1.   Ames SC, Croghan IT, Clark MM, Patten CA, Stevens SR, Schroeder DR, et al. Change in perceived stress, partner support, decisional balance, and self-efficacy following residential nicotine dependence treatment. Journal of Addictive Diseases. 2008;27(1):73-82.

2.   Van Dongen CJ, Kriz P, Fox KA, Haque I. A quit smoking group pilot study. Journal of Psychosocial Nursing & Mental Health Services. 1999;37(12):31.

3.   Weinberger AH, Hitsman B, Papandonatos GD, Sacco KA, Vessicchio JC, George TP. Predictors of abstinence and changes in psychiatric symptoms in a pooled sample of smokers with schizophrenia receiving combination pharmacotherapy and behavioral therapy for smoking cessation. Journal of Clinical Psychopharmacology. 2009;29(6):601-3.

4.   Williams JM, Ziedonis DM, Vreeland B, Speelman-Edwards N, Zechner MR, Williams MT, et al. A wellness approach to addressing tobacco in mental health settings: learning about healthy living. American Journal of Psychiatric Rehabilitation. 2009;12(4):352-69.

No discussion of barriers

1.   Acton GS, Kunz JD, Wilson M, Hall SM. The construct of internalization: conceptualization, measurement, and prediction of smoking treatment outcome. Psychological Medicine. 2005;35(3):395-408.

2.   Carr S, Lhussier M, Forster N, Geddes L, Deane K, Pennington M, et al. An evidence synthesis of qualitative and quantitative research on component intervention techniques, effectiveness, cost-effectiveness, equity and acceptability of different versions of health-related lifestyle advisor role in improving health. Health Technology Assessment. 2011;15(9):1-284.

3.   Cooper J, Mancuso SG, Borland R, Slade T, Galletly C, Castle D. Tobacco smoking among people living with a psychotic illness: the second Australian Survey of Psychosis. The Australian and New Zealand journal of psychiatry. 2012;46(9):851-63. Epub 2012/05/31.

4.   Hapke U, Schumann A, Rumpf HJ, John U, Konerding U, Meyer C. Association of smoking and nicotine dependence with trauma and posttraumatic stress disorder in a general population sample. The Journal of nervous and mental disease. 2005;193(12):843-6. Epub 2005/12/02.

5.   Kalman D, Morissette SB, George TP. Co-morbidity of smoking in patients with psychiatric and substance use disorders. The American journal on addictions / American Academy of Psychiatrists in Alcoholism and Addictions. 2005;14(2):106-23. Epub 2005/07/16.

6.   Kelly PJ, Baker AL, Deane FP, Kay-Lambkin FJ, Bonevski B, Tregarthen J. Prevalence of smoking and other health risk factors in people attending residential substance abuse treatment. Drug and alcohol review. 2012;31(5):638-44. Epub 2012/05/31.

7.   Moeller-Saxone K. Cigarette smoking and interest in quitting among consumers at a psychiatric disability rehabilitation and support service in Victoria. Australian & New Zealand Journal of Public Health. 2008;32(5):479-81.

8.   Prochaska JJ. Failure to treat tobacco use in mental health and addiction treatment settings: a form of harm reduction? Drug and alcohol dependence. 2010;110(3):177-82. Epub 2010/04/10.

9.   Prochaska JJ. Integrating tobacco treatment into mental health settings. JAMA: Journal of the American Medical Association. 2010;304(22):2534-5.

10.   Reichler H, Baker A, Lewin T, Carr V. Smoking among in-patients with drug-related problems in an Australian psychiatric hospital. Drug and alcohol review. 2001;20(2):231-7.

11.   Suplee PD. The importance of providing smoking relapse counseling during the postpartum hospitalization. JOGNN: Journal of Obstetric, Gynecologic & Neonatal Nursing. 2005;34(6):703-12.

12.   Wye PM, Bowman JA, Wiggers JH, Baker A, Knight J, Carr VJ, et al. Smoking restrictions and treatment for smoking: policies and procedures in psychiatric inpatient units in Australia. Psychiatric services (Washington, DC). 2009;60(1):100-7. Epub 2008/12/31.

No discussion of barriers to smoking cessation (e.g. might be barriers to accessing health care in general)

1.   Carmody TP, McFall M, Saxon AJ, Malte CA, Chow B, Joseph AM, et al. Smoking outcome expectancies in military veteran smokers with posttraumatic stress disorder. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2012;14(8):919-26. Epub 2012/01/25.

2.   Carton S, Jouvent R, Widlocher D. Nicotine dependence and motives for smoking in depression. Journal of substance abuse. 1994;6(1):67-76.

3.   Kelly DL, Raley HG, Lo S, Wright K, Liu F, McMahon RP, et al. Perception of smoking risks and motivation to quit among nontreatment-seeking smokers with and without schizophrenia. Schizophrenia bulletin. 2012;38(3):543-51. Epub 2010/11/03.

4.   Thornton LK, Baker AL, Lewin TJ, Kay-Lambkin FJ, Kavanagh D, Richmond R, et al. Reasons for substance use among people with mental disorders. Addictive behaviors. 2012;37(4):427-34. Epub 2011/12/27.

5.   Torchalla I, Okoli CT, Malchy L, Johnson JL. Nicotine dependence and gender differences in smokers accessing community mental health services. Journal of psychiatric and mental health nursing. 2011;18(4):349-58. Epub 2011/03/23.

Not reporting the perceived self-reported barriers to smoking cessation (e.g. might report results of logistic regressions showing nicotine dependence associated with cessation success)

1.   Alvarado GF, Breslau N. Smoking and young people's mental health. Current Opinion in Psychiatry. 2005;18(4):397-400.

2.   Anderson AE, Bowman JA, Knight J, Wye PM, Terry M, Grimshaw S, et al. Smoking cessation care provision and support procedures in Australian community mental health centers. Psychiatric services (Washington, DC). 2013;64(7):707-10. Epub 2013/07/04.

3.   Apodaca TR, Abrantes AM, Strong DR, Ramsey SE, Brown RA. Readiness to change smoking behavior in adolescents with psychiatric disorders. Addictive behaviors. 2007;32(6):1119-30. Epub 2006/09/05.

4.   Ashton M, Miller CL, Bowden JA, Bertossa S. People with mental illness can tackle tobacco. Australian & New Zealand Journal of Psychiatry. 2010;44(11):1021-8.

5.   Blalock J, Robinson J, Wetter D, Cinciripini P. Relationship of DSM-IV-based depressive disorders to smoking cessation and smoking reduction in pregnant smokers. American Journal on Addictions. 2006;15(4):268-77.

6.   Bonevski B, Bowman J, Richmond R, Bryant J, Wye P, Stockings E, et al. Turning of the tide: changing systems to address smoking for people with a mental illness. Mental Health and Substance Use. 2011;4(2):116-29.

7.   Burgess ES, Brown RA, Kahler CW, Niaura R, Abrams DB, Goldstein MG, et al. Patterns of change in depressive symptoms during smoking cessation: who's at risk for relapse? Journal of consulting and clinical psychology. 2002;70(2):356-61. Epub 2002/04/16.

8.   Compton MT, Daumit GL, Druss BG. Cigarette smoking and overweight/obesity among individuals with serious mental illnesses: a preventive perspective. Harvard review of psychiatry. 2006;14(4):212-22. Epub 2006/08/17.

9.   Cook JW, McFall MM, Calhoun PS, Beckham JC. Posttraumatic stress disorder and smoking relapse: A theoretical model. Journal of traumatic stress. 2007;20(6):989-98. Epub 2007/12/25.

10.   Cosci F, Corlando A, Fornai E, Pistelli F, Paoletti P, Carrozzi L. Nicotine dependence, psychological distress and personality traits as possible predictors of smoking cessation. Results of a double-blind study with nicotine patch. Addictive behaviors. 2009;34(1):28-35.

11.   Culhane MA, Schoenfeld DA, Barr RS, Cather C, Deckersbach T, Freudenreich O, et al. Predictors of early abstinence in smokers with schizophrenia. Journal of Clinical Psychiatry. 2008;69(11):1743-50.

12.   Hall SM, Prochaska JJ. Treatment of smokers with co-occurring disorders: emphasis on integration in mental health and addiction treatment settings. Annual review of clinical psychology. 2009;5:409-31. Epub 2009/03/31.

13.   Japuntich SJ, Smith SS, Jorenby DE, Piper ME, Fiore MC, Baker TB. Depression predicts smoking early but not late in a quit attempt. Nicotine & Tobacco Research. 2007;9(6):677-86.

14.   Killen JD, Fortmann SP, Kraemer HC, Varady AN, Davis L, Newman B. Interactive effects of depression symptoms, nicotine dependence, and weight change on late smoking relapse. Journal of Consulting & Clinical Psychology. 1996;64(5):1060-7.

15.   Lan T-H, Chiu H-J, Wu B-J, Hung T-H, Hu T-M. Readiness to quit and smoking reduction outcomes. American Journal of Psychiatry. 2007;164(5):827-8; author reply 8.

16.   Levine MD, Marcus MD, Kalarchian MA, Houck PR, Cheng Y. Weight concerns, mood, and postpartum smoking relapse. American Journal of Preventive Medicine. 2010;39(4):345-51.

17.   Levine MD, Marcus MD, Kalarchian MA, Weissfeld L, Qin L. Weight concerns affect motivation to remain abstinent from smoking postpartum. Annals of Behavioral Medicine. 2006;32(2):147-53.

18.   McGee R, Williams S, Stanton W. Is mental health in childhood a major predictor of smoking in adolescence? Addiction (Abingdon, England). 1998;93(12):1869-74. Epub 1999/02/02.

19.   Mezuk B, Rafferty JA, Kershaw KN, Hudson D, Abdou CM, Lee H, et al. Reconsidering the role of social disadvantage in physical and mental health: stressful life events, health behaviors, race, and depression. American journal of epidemiology. 2010;172(11):1238-49. Epub 2010/10/05.

20.   Minami H, McCarthy DE, Jorenby DE, Baker TB. An ecological momentary assessment analysis of relations among coping, affect and smoking during a quit attempt. Addiction (Abingdon, England). 2011;106(3):641-50.

21.   Morris CD, May MG, Devine K, Smith S, DeHay T, Mahalik J. Multiple perspectives on tobacco use among youth with mental health disorders and addictions. American journal of health promotion : AJHP. 2011;25(5 Suppl):S31-7. Epub 2011/04/29.

22.   Mullane JC, Stewart SH, Rhyno E, Steeves D, Watt M, Eisner A. Anxiety, sensitivity and difficulties with smoking cessation. Columbus, Alexandra M [Ed]. 2008;54:141-55.

23.   Olivier D, Lubman DI, Fraser R. Tobacco smoking within psychiatric inpatient settings: biopsychosocial perspective. Australian & New Zealand Journal of Psychiatry. 2007;41(7):572-80.

24.   Palm KM, Abrantes AM, Strong DR, Ramsey SE, Brown RA. Smoking Characteristics of Adolescent Smokers With Post-traumatic Stress Disorder in a Psychiatric Inpatient Setting. Journal of Dual Diagnosis. 2009;5(1):14-29.

25.   Piper ME, Cook JW, Schlam TR, Jorenby DE, Baker TB. Anxiety diagnoses in smokers seeking cessation treatment: relations with tobacco dependence, withdrawal, outcome and response to treatment. Addiction (Abingdon, England). 2011;106(2):418-27.

26.   Prochaska JJ, Rossi JS, Redding CA, Rosen AB, Tsoh JY, Humfleet GL, et al. Depressed smokers and stage of change: implications for treatment interventions. Drug & Alcohol Dependence. 2004;76(2):143-51.

27.   Reid MS, Jiang H, Fallon B, Sonne S, Rinaldi P, Turrigiano E, et al. Smoking cessation treatment among patients in community-based substance abuse rehabilitation programs: exploring predictors of outcome as clues toward treatment improvement. The American journal of drug and alcohol abuse. 2011;37(5):472-8. Epub 2011/08/23.

28.   Reilly P, Murphy L, Alderton D. Challenging the smoking culture within a mental health service supportively. International Journal of Mental Health Nursing. 2006;15(4):272-8.

29.   Richards CS, Cohen LM, Morrell HE, Watson NL, Low BE. Treating depressed and anxious smokers in smoking cessation programs. Journal of consulting and clinical psychology. 2013;81(2):263-73. Epub 2012/03/21.

30.   Selby P, Voci SC, Zawertailo LA, George TP, Brands B. Individualized smoking cessation treatment in an outpatient setting: Predictors of outcome in a sample with psychiatric and addictions co-morbidity. Addictive behaviors. 2010;35(9):811-7.

31.   Stein MD, Anderson BJ, Niaura R. Smoking cessation patterns in methadone-maintained smokers. Nicotine and Tobacco Research. 2007;9(3):421-8.

32.   Swan GE, Jack LM, Curry S, Chorost M, Javitz H, McAfee T, et al. Bupropion SR and counseling for smoking cessation in actual practice: Predictors of outcome. Nicotine and Tobacco Research. 2003;5(6):911-21.

Population level study

1.   John U, Meyer C, Rumpf HJ, Hapke U. Smoking, nicotine dependence and psychiatric comorbidity--a population-based study including smoking cessation after three years. Drug and alcohol dependence. 2004;76(3):287-95. Epub 2004/11/25.

Reviews (reviews conducted on smoking within the defined disadvantaged group but not reporting on perceived barriers to smoking cessation)

1.   Ameringer KJ, Leventhal AM. Applying the tripartite model of anxiety and depression to cigarette smoking: an integrative review. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2010;12(12):1183-94. Epub 2010/11/03.

2.   Arfken CL. E. A review: Depression and smoking. Ethnicity and Disease. 2007;17(SUPPL. 3):S3-16-S3-8.

3.   Aubin HJ, Rollema H, Svensson TH, Winterer G. Smoking, quitting, and psychiatric disease: a review. Neuroscience and biobehavioral reviews. 2012;36(1):271-84. Epub 2011/07/05.

4.   Banham L, Gilbody S. Smoking cessation in severe mental illness: what works? Addiction (Abingdon, England). 2010;105(7):1176-89.

5.   el-Guebaly N, Cathcart J, Currie S, Brown D, Gloster S. Smoking cessation approaches for persons with mental illness or addictive disorders. Psychiatric Services. 2002;53(9):1166-70.

6.   Fagerström K, Aubin H. Management of smoking cessation in patients with psychiatric disorders. Current Medical Research & Opinion. 2009;25(2):511-8.

7.	Fu SS, McFall M, Saxon AJ, Beckham JC, Carmody TP, Baker DG, et al. Post-traumatic stress disorder and smoking: A systematic review. Nicotine and Tobacco Research. 2007;9(11):1071-84.

8.	Goldberg JO. Successful change in tobacco use in schizophrenia. Journal of the American Psychiatric Nurses Association. 2010;16(1):30-5. Epub 2010/01/01.

9.	Guydish J, Passalacqua E, Tajima B, Manser ST. Staff smoking and other barriers to nicotine dependence intervention in addiction treatment settings: a review. Journal of psychoactive drugs. 2007;39(4):423-33. Epub 2008/02/29.

10.	Hitsman B, Borrelli B, McChargue DE, Spring B, Niaura R. History of depression and smoking cessation outcome: a meta-analysis. Journal of consulting and clinical psychology. 2003;71(4):657-63. Epub 2003/08/20.

11.	Ischaki E, Gratziou C. Smoking and depression: Is smoking cessation effective? Therapeutic advances in respiratory disease. 2009;3(1):31-8.

12.	Mathers M, Toumbourou JW, Catalano RF, Williams J, Patton GC. Consequences of youth tobacco use: a review of prospective behavioural studies. Addiction (Abingdon, England). 2006;101(7):948-58.

13.	Mills EJ, Wu P, Lockhart I, Wilson K, Ebbert JO. Adverse events associated with nicotine replacement therapy (NRT) for smoking cessation. A systematic review and meta-analysis of one hundred and twenty studies involving 177,390 individuals. Tobacco Induced Diseases. 2010;8:15p.

14.	Mookadam F, Arthur HM. Social support and its relationship to morbidity and mortality after acute myocardial infarction: Systematic overview. Archives of Internal Medicine. 2004;164(14):1514-8.

15.	Rasmusson AM, Picciotto MR, Krishnan-Sarin S. Smoking as a complex but critical covariate in neurobiological studies of posttraumatic stress disorders: A review. Journal of Psychopharmacology. 2006;20(5):693-707.

16.	Schroeder SA, Morris CD. Confronting a neglected epidemic: tobacco cessation for persons with mental illnesses and substance abuse problems. Annual review of public health. 2010;31:297-314 1p following Epub 2009/12/17.

17.	Sharp DL, Blaakman SW. A review of research by nurses regarding tobacco dependence and mental health. Annual review of nursing research. 2009;27:297-318.

18.	Shirani A, Tremlett H. The effect of smoking on the symptoms and progression of multiple sclerosis: A review. Journal of Inflammation Research. 2010;3(1):115-26.

19.	Silvani P, Camporesi A. Drug-induced pulmonary hypertension in newborns: A review. Current Vascular Pharmacology. 2007;5(2):129-33.

20.	Siru R, Hulse GK, Tait RJ. Assessing motivation to quit smoking in people with mental illness: a review. Addiction (Abingdon, England). 2009;104(5):719-33. Epub 2009/05/06.

21.	Small G, Dubois B. A review of compliance to treatment in Alzheimer's disease: Potential benefits of a transdermal patch. Current medical research and opinion. 2007;23(11):2705-13.

22.	Torchalla I, Nosen L, Rostam H, Allen P. Integrated treatment programs for individuals with concurrent substance use disorders and trauma experiences: a systematic review and meta-analysis. Journal of substance abuse treatment. 2012;42(1):65-77. Epub 2011/11/01.

23.	Ziedonis D, Montoya ID. Tobacco Dependence Amongst Individuals with Schizophrenia: A Public Health Crisis and an Opportunity for Bidirectional Translational Research. Journal of Dual Diagnosis. 2007;3(3-4):3-7.

Studies not meeting the subgroup definition

1.	Allen SS, Hatsukami DK, Christianson D. Nicotine withdrawal and depressive symptomatology during short-term smoking abstinence: A comparison of postmenopausal women using and not using hormone replacement therapy. Nicotine and Tobacco Research. 2003;5(1):49-59.

2.   Baker A, Ivers RG, Bowman J, Butler T, Kay-Lambkin FJ, Wye P, et al. Where there's smoke, there's fire: high prevalence of smoking among some sub-populations and recommendations for intervention. Drug and alcohol review. 2006;25(1):85-96. Epub 2006/02/24.

3.   Gehricke JG, Loughlin SE, Whalen CK, Potkin SG, Fallon JH, Jamner LD, et al. Smoking to self-medicate attentional and emotional dysfunctions. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2007;9 Suppl 4:S523-36. Epub 2008/08/30.

4.   Gierisch JM, Straits-Troster K, Calhoun PS, Beckham JC, Acheson S, Hamlett-Berry K. Tobacco use among Iraq- and Afghanistan-era veterans: a qualitative study of barriers, facilitators, and treatment preferences. Preventing chronic disease. 2012;9:E58. Epub 2012/02/18.

5.   Gonzalez A, Zvolensky MJ, Vujanovic AA, Leyro TM, Marshall EC. An evaluation of anxiety sensitivity, emotional dysregulation, and negative affectivity among daily cigarette smokers: relation to smoking motives and barriers to quitting. Journal of psychiatric research. 2008;43(2):138-47. Epub 2008/04/18.

6.   Kraemer KM, McLeish AC, Jeffries ER, Avallone KM, Luberto CM. Distress tolerance and perceived barriers to smoking cessation. Substance abuse : official publication of the Association for Medical Education and Research in Substance Abuse. 2013;34(3):277-82. Epub 2013/07/13.

7.   Lawn S. Australians with mental illness who smoke. The British journal of psychiatry : the journal of mental science. 2001;178(1):85. Epub 2001/01/03.

8.   McNeill A, Amos A, McEwen A, Ferguson J, Croghan E. Developing the evidence base for addressing inequalities and smoking in the United Kingdom. Addiction (Abingdon, England). 2012;107 Suppl 2:1-7. Epub 2012/11/21.

9.   Moss TG, Weinberger AH, Vessicchio JC, Mancuso V, Cushing SJ, Pett M, et al. A tobacco reconceptualization in psychiatry: toward the development of tobacco-free psychiatric facilities. American Journal on Addictions. 2010;19(4):293-311.

10.   Nichols L, Martindale-Adams J, Burns R, Coon D, Ory M, Mahoney D, et al. Social marketing as a framework for recruitment: illustrations from the REACH study. Journal of aging and health. 2004;16(5 Suppl):157S-76S. Epub 2004/09/28.

11.   Prochaska JJ, Sorensen JL, Hall SM, Rossi JS, Redding CA, Rosen AB, et al. Predictors of health functioning in two high-risk groups of smokers. Drug & Alcohol Dependence. 2005;78(2):169-75.

12.   Shirley DK, Kesari RK, Glesby MJ. Factors associated with smoking in HIV-infected patients and potential barriers to cessation. AIDS patient care and STDs. 2013;27(11):604-12. Epub 2013/10/22.

13.   Wye P, Bowman J, Wiggers J, Baker A, Knight J, Carr V, et al. Total smoking bans in psychiatric inpatient services: a survey of perceived benefits, barriers and support among staff. BMC public health. 2010;10:372. Epub 2010/06/26.

Homeless studies (n = 38)

Intervention studies

1.   Businelle MS, Kendzor DE, Kesh A, Cuate EL, Poonawalla IB, Reitzel LR, et al. Small financial incentives increase smoking cessation in homeless smokers: a pilot study. Addict Behav. 2014;39(3):717-20. Epub 2013/12/11.

2.   Goldade K, Whembolua GL, Thomas J, Eischen S, Guo H, Connett J, et al. Designing a smoking cessation intervention for the unique needs of homeless persons: a community-based randomized clinical trial. Clinical trials (London, England). 2011;8(6):744-54. Epub 2011/12/15.

3.   Monso E, Campbell J, Tonnesen P, Gustavsson G, Morera J. Sociodemographic predictors of success in smoking intervention. Tobacco control. 2001;10(2):165-9.

4.   Okuyemi KS, Goldade K, Whembolua GL, Thomas JL, Eischen S, Guo H, et al. Smoking characteristics and comorbidities in the power to quit randomized clinical trial for homeless smokers. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2013;15(1):22-8. Epub 2012/05/17.

5.	Okuyemi KS, Thomas JL, Hall S, Nollen NL, Richter KP, Jeffries SK, et al. Smoking cessation in homeless populations: a pilot clinical trial. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2006;8(5):689-99. Epub 2006/09/30.
6.	Shelley D, Cantrell J, Wong S, Warn D. Smoking cessation among sheltered homeless: a pilot. American journal of health behavior. 2010;34(5):544-52. Epub 2010/06/09.

No discussion of barriers

1.	Torchalla I, Strehlau V, Okoli CT, Li K, Schuetz C, Krausz M. Smoking and predictors of nicotine dependence in a homeless population. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2011;13(10):934-42. Epub 2011/05/31.

No discussion of barriers to smoking cessation (e.g. might be barriers to accessing health care in general)

1.	Aloot CB, Vredevoe DL, Brecht ML. Evaluation of high-risk smoking practices used by the homeless. Cancer nursing. 1993;16(2):123-30. Epub 1993/04/01.
2.	Baggett TP, O'Connell JJ, Singer DE, Rigotti NA. The unmet health care needs of homeless adults: a national study. American journal of public health. 2010;100(7):1326-33. Epub 2010/05/15.
3.	Baggett TP, Rigotti NA. Cigarette smoking and advice to quit in a national sample of homeless adults. American journal of preventive medicine. 2010;39(2):164-72. Epub 2010/07/14.
4.	Butler J, Okuyemi KS, Jean S, Nazir N, Ahluwalia JS, Resnicow K. Smoking characteristics of a homeless population. Substance abuse : official publication of the Association for Medical Education and Research in Substance Abuse. 2002;23(4):223-31. Epub 2002/11/20.
5.	Gelberg L, Andersen RM, Leake BD. The Behavioral Model for Vulnerable Populations: application to medical care use and outcomes for homeless people. Health services research. 2000;34(6):1273-302. Epub 2000/02/02.
6.	Gelberg L, Gallagher TC, Andersen RM, Koegel P. Competing priorities as a barrier to medical care among homeless adults in Los Angeles. American journal of public health. 1997;87(2):217-20. Epub 1997/02/01.
7.	Heffron WA, Skipper BJ, Lambert L. Health and lifestyle issues as risk factors for homelessness. The Journal of the American Board of Family Practice / American Board of Family Practice. 1997;10(1):6-12.
8.	Kushel MB, Vittinghoff E, Haas JS. Factors associated with the health care utilization of homeless persons. JAMA : the journal of the American Medical Association. 2001;285(2):200-6. Epub 2001/02/15.
9.	Malloy C, Christ MA, Hohloch FJ. The homeless: social isolates. Journal of community health nursing. 1990;7(1):25-36. Epub 1990/01/01.
10.	McGuire J, Rosenheck R. The quality of preventive medical care for homeless veterans with mental illness. Journal for Healthcare Quality: Promoting Excellence in Healthcare. 2005;27(6):26-32.
11.	Ober K, Carlson L, Anderson P. Cardiovascular risk factors in homeless adults. The Journal of cardiovascular nursing. 1997;11(4):50-9. Epub 1997/07/01.
12.	O'Toole TP, Gibbon JL, Hanusa BH, Fine MJ. Utilization of health care services among subgroups of urban homeless and housed poor. Journal of health politics, policy and law. 1999;24(1):91-114. Epub 1999/05/26.
13.	Padgett D, Struening EL, Andrews H. Factors affecting the use of medical, mental health, alcohol, and drug treatment services by homeless adults. Medical care. 1990;28(9):805-21. Epub 1990/09/01.
14.	Robertson MJ, Cousineau MR. Health status and access to health services among the urban homeless. American journal of public health. 1986;76(5):561-3. Epub 1986/05/01.

15.   Thompson SJ. Risk/protective factors associated with substance use among runaway/homeless youth utilizing emergency shelter services nationwide. Substance Abuse. 2004;25(3):13-26.

16.   Thompson SJ, Zittell-Palamara KM, Forehand G. Risk factors for cigarette, alcohol, and marijuana use among runaway youth utilizing two services sectors. Journal of Child & Adolescent Substance Abuse. 2005;15(1):17-36.

17.   Wojtusik L, White MC. Health status, needs, and health care barriers among the homeless. Journal of health care for the poor and underserved. 1998;9(2):140-52. Epub 1999/03/12.

Not reporting the perceived self-reported barriers to smoking cessation (e.g. might report results of logistic regressions showing nicotine dependence associated with cessation success)

1.   Baggett TP, Anderson R, Freyder PJ, Jarvie JA, Maryman K, Porter J, et al. Addressing tobacco use in homeless populations: a survey of health care professionals. Journal of health care for the poor and underserved. 2012;23(4):1650-9. Epub 2012/01/01.

2.   Baggett TP, Lebrun-Harris LA, Rigotti NA. Homelessness, cigarette smoking and desire to quit: results from a US national study. Addiction (Abingdon, England). 2013;108(11):2009-18. Epub 2013/07/10.

3.   Bassuk EL, Buckner JC, Perloff JN, Bassuk SS. Prevalence of mental health and substance use disorders among homeless and low-income housed mothers. The American journal of psychiatry. 1998;155(11):1561-4. Epub 1998/11/13.

4.   Diaz T, Dusenbury L, Botvin GJ, Farmer-Huselid R. Factors associated with drug use among youth living in homeless shelters. Journal of Child & Adolescent Substance Abuse. 1997;6(1):91-110.

5.   Greene JM, Ennett ST, Ringwalt CL. Substance use among runaway and homeless youth in three national samples. American journal of public health. 1997;87(2):229-35.

6.   Kim DH, Daskalakis C, Plumb JD, Adams S, Brawer R, Orr N, et al. Modifiable cardiovascular risk factors among individuals in low socioeconomic communities and homeless shelters. Family & community health. 2008;31(4):269-80. Epub 2008/09/17.

7.   Lee TC, Hanlon JG, Ben-David J, Booth GL, Cantor WJ, Connelly PW, et al. Risk factors for cardiovascular disease in homeless adults. Circulation. 2005;111(20):2629-35.

8.   Thompson RG, Hasin DS. Cigarette, marijuana, and alcohol use and prior drug treatment among newly homeless young adults in New York City: Relationship to a history of foster care. Drug and alcohol dependence. 2011;117(1):66-9. Epub 2011/02/04.

Reviews (reviews conducted on smoking within the defined disadvantaged group but not reporting on perceived barriers to smoking cessation)

1.   Baggett TP, Tobey ML, Rigotti NA. Tobacco use among homeless people--addressing the neglected addiction. The New England journal of medicine. 2013;369(3):201-4. Epub 2013/07/19.

2.   Fazel S, Khosla V, Doll H, Geddes J. The prevalence of mental disorders among the homeless in western countries: systematic review and meta-regression analysis. PLoS medicine. 2008;5(12):e225. Epub 2008/12/05.

3.   Hwang SW, Tolomiczenko G, Kouyoumdjian FG, Garner RE. Interventions to improve the health of the homeless: a systematic review. American journal of preventive medicine. 2005;29(4):311-9. Epub 2005/10/26.

Studies not meeting the subgroup definition

1.   Cousineau MR. Health status of and access to health services by residents of urban encampments in Los Angeles. Journal of health care for the poor and underserved. 1997;8(1):70-82. Epub 1997/02/01.
2.   Epstein JA, Williams C, Botvin GJ, Diaz T, Ifill-Williams M. Psychosocial predictors of cigarette smoking among adolescents living in public housing developments. Tobacco control. 1999;8(1):45-52.
3.   Kruger TM, Howell BM, Haney A, Davis RE, Fields N, Schoenberg NE. Perceptions of smoking cessation programs in rural Appalachia. American journal of health behavior. 2012;36(3):373-84. Epub 2012/03/01.

Prisoner studies (n = 22)

Intervention studies

1.   Berg CJ, Ahluwalia JS, Cropsey K. Predictors of adherence to behavioral counseling and medication among female prisoners enrolled in a smoking cessation trial. Journal of correctional health care : the official journal of the National Commission on Correctional Health Care. 2013;19(4):236-47. Epub 2013/08/21.
2.   Cropsey K, Eldridge G, Weaver M, Villalobos G, Stitzer M, Best A. Smoking cessation intervention for female prisoners: addressing an urgent public health need. American journal of public health. 2008;98(10):1894-901.
3.   Cropsey KL, Jackson DO, Hale GJ, Carpenter MJ, Stitzer ML. Impact of self-initiated pre-quit smoking reduction on cessation rates: results of a clinical trial of smoking cessation among female prisoners. Addictive behaviors. 2011;36(1-2):73-8. Epub 2010/10/05.
4.   Cropsey KL, McClure LA, Jackson DO, Villalobos GC, Weaver MF, Stitzer ML. The impact of quitting smoking on weight among women prisoners participating in a smoking cessation intervention. American journal of public health. 2010;100(8):1442-8.
5.   Khavjou OA, Clarke J, Hofeldt RM, Lihs P, Loo RK, Prabhu M, et al. A Captive Audience. Bringing the WISEWOMAN Program to South Dakota Prisoners. Women's Health Issues. 2007;17(4):193-201.

No discussion of barriers

1.   Foley KL, Proescholdbell S, Herndon Malek S, Johnson J. Implementation and enforcement of tobacco bans in two prisons in North Carolina: a qualitative inquiry. Journal of correctional health care : the official journal of the National Commission on Correctional Health Care. 2010;16(2):98-105. Epub 2010/03/27.
2.   Kauffman RM, Ferketich AK, Murray DM, Bellair PE, Wewers ME. Measuring tobacco use in a prison population. Nicotine & Tobacco Research. 2010;12(6):582-8.
3.   Kauffman RM, Ferketich AK, Wewers ME. Tobacco policy in American prisons, 2007. Tobacco control. 2008;17(5):357-60.

Not reporting the perceived self-reported barriers to smoking cessation (e.g. might report results of logistic regressions showing nicotine dependence associated with cessation success)

1.   Belcher JM, Butler T, Richmond RL, Wodak AD, Wilhelm K. Smoking and its correlates in an Australian prisoner population. Drug and Alcohol Review. 2006;25(4):343-8.
2.   Cropsey K, Eldridge GD, Ladner T. Smoking among female prisoners: an ignored public health epidemic. Addictive behaviors. 2004;29(2):425-31. Epub 2004/01/21.
3.   Cropsey KL, Linker JA, Waite DE. An analysis of racial and sex differences for smoking among adolescents in a juvenile correctional center. Drug & Alcohol Dependence. 2008;92(1-3):156-63.
4.   Durrah TL. Correlates of daily smoking among female arrestees in New York City and Los Angeles, 1997. American journal of public health. 2005;95(10):1788-92.
5.   El-Guebaly N, Cathcart J, Currie S, Brown D, Gloster S. Public health and therapeutic aspects of smoking bans in mental health and addiction settings. Psychiatric services (Washington, DC). 2002;53(12):1617-22. Epub 2002/12/04.
6.   Lekka NP, Lee KH, Argyriou AA, Beratis S, Parks RW. Association of cigarette smoking and depressive symptoms in a forensic population. Depression and Anxiety. 2007;24(5):325-30.
7.   Lincoln T, Tuthill RW, Roberts CA, Kennedy S, Hammett TM, Langmore-Avila E, et al. Resumption of smoking after release from a tobacco-free correctional facility. Journal of Correctional Health Care. 2009;15(3):190-6.
8.   Makris E, Gourgoulianis KI, Hatzoglou C. Prisoners and cigarettes or 'imprisoned in cigarettes'? What helps prisoners quit smoking? BMC public health. 2012;12:508. Epub 2012/07/10.
9.   Nijhawan AE, Salloway R, Nunn AS, Poshkus M, Clarke JG. Preventive healthcare for underserved women: results of a prison survey. Journal of women's health (2002). 2010;19(1):17-22. Epub 2010/01/22.
10.   Ramaswamy M, Faseru B, Cropsey KL, Jones M, Deculus K, Freudenberg N. Factors associated with smoking among adolescent males prior to incarceration and after release from jail: a longitudinal study. Substance abuse treatment, prevention, and policy. 2013;8(1):37. Epub 2013/11/02.
11.   Richmond RL, Wilhelm KA, Indig D, Butler TG, Archer VA, Wodak AD. Cardiovascular risk among Aboriginal and non-Aboriginal smoking male prisoners: inequalities compared to the wider community. BMC public health. 2011;11:783. Epub 2011/10/12.
12.   Thibodeau L, Jorenby DE, Seal DW, Kim SY, Sosman JM. Prerelease intent predicts smoking behavior postrelease following a prison smoking ban. Nicotine and Tobacco Research. 2010;12(2):152-8.

Reviews (reviews conducted on smoking within the defined disadvantaged group but not reporting on perceived barriers to smoking cessation)

1.   Donahue JJ. Tobacco Smoking Among Incarcerated Individuals: A Review of the Nature of the Problem and What is Being Done in Response. Journal of Offender Rehabilitation. 2009;48(7):589-604.

Studies not meeting the subgroup definition

1.   Dickens GL, Stubbs JH, Haw CM. Smoking and mental health nurses: a survey of clinical staff in a psychiatric hospital. Journal of psychiatric and mental health nursing. 2004;11(4):445-51. Epub 2004/07/17.

At risk youth studies (n = 48)

Intervention studies

1.   Horn K, Dino G, Kalsekar I, Massey CJ, Manzo-Tennant K, McGloin T. Exploring the relationship between mental health and smoking cessation: a study of rural teens. Prevention science : the official journal of the Society for Prevention Research. 2004;5(2):113-26. Epub 2004/05/12.
2.   Kelly AB. Predictors of response to brief smoking cessation interventions for adolescents who have contravened school smoking policy. Journal of Substance Use. 2008;13(4):219-24.

No discussion of barriers

1.   Akers RL, Lee G. A longitudinal test of social learning theory: Adolescent smoking. Journal of Drug Issues. 1996;26(2):317-43.
2.   Hanson MJ. The theory of planned behavior applied to cigarette smoking in African-American, Puerto Rican, and non-Hispanic white teenage females. Nursing research. 1997;46(3):155-62.

No discussion of barriers to smoking cessation (e.g. might be barriers to accessing health care in general)

1.   Diaz T, Dusenbury L, Botvin GJ, Farmer-Huselid R. Factors associated with drug use among youth living in homeless shelters. Journal of Child & Adolescent Substance Abuse. 1997;6(1):91-110.
2.   Donaghy E, Bauld L, Eadie D, McKell J, Pringle B, Amos A. A qualitative study of how young Scottish smokers living in disadvantaged communities get their cigarettes. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2013;15(12):2053-9. Epub 2013/08/06.
3.   Hansen WB, Collins LM, Johnson CA, Graham JW. Self-initiated smoking cessation among high school students. Addictive Behaviors. 1985;10(3):265-71.
4.   Lipperman-Kreda S, Paschall MJ, Grube JW. Perceived enforcement of school tobacco policy and adolescents' cigarette smoking. Preventive Medicine. 2009;48(6):562-6.

Not carried out in high income country/not published in English

1.   Malhotra C, Sharma N, Saxena R, Ingle GK. Drug use among juveniles in conflict with the law. Indian Journal of Pediatrics. 2007;74(4):353-6.
2.   Manolova A. Adolescent smoking and social environment. Archives of the Balkan Medical Union. 2005;40(1):7-11.
3.   Ng N, Weinehall L, Ohman A. 'If I don't smoke, I'm not a real man' Indonesian teenage boys' views about smoking. Health education research. 2007;22(6):794-804.

Not reporting the perceived self-reported barriers to smoking cessation (e.g. might report results of logistic regressions showing nicotine dependence associated with cessation success)

1.   Bean MK, Mitchell KS, Speizer IS, Wilson DB, Smith BN, Fries EA. Rural adolescent attitudes toward smoking and weight loss: relationship to smoking status. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2008;10(2):279-86. Epub 2008/02/01.

2.   Beebe LA, Vesely SK, Oman RF, Tolma E, Aspy CB, Rodine S. Protective assets for non-use of alcohol, tobacco and other drugs among urban American Indian youth in Oklahoma. Maternal and child health journal. 2008;12(SUPPL. 1):S82-S90.

3.   Belgrave FZ, Johnson J, Nguyen A, Hood K, Tademy R, Clark T, et al. Stress and tobacco use among African-American adolescents: the buffering effect of cultural factors. Journal of Drug Education. 2010;40(2):173-88.

4.   Booker CL, Gallaher P, Unger JB, Ritt-Olson A, Johnson CA. Stressful life events, smoking behavior, and intentions to smoke among and multiethnic sample of sixth graders. Ethnicity & health. 2004;9(4):369-97.

5.   Colgan Y, Turnbull DA, Mikocka-Walus AA, Delfabbro P. Determinants of resilience to cigarette smoking among young Australians at risk: An exploratory study. Tobacco Induced Diseases. 2010;8(1).

6.   Conwell LS, O'Callaghan MJ, Andersen MJ, Bor W, Najman JM, Williams GM. Early adolescent smoking and a web of personal and social disadvantage. Journal of Paediatrics & Child Health. 2003;39(8):580-5.

7.   Dozois DN, Farrow JA, Miser A. Smoking patterns and cessation motivations during adolescence. The International journal of the addictions. 1995;30(11):1485-98. Epub 1995/09/01.

8.   Fettes DL, Aarons GA. Smoking behavior of US youths: a comparison between child welfare system and community populations. American journal of public health. 2011;101(12):2342-8.

9.   Flynn BS, Worden JK, Secker-Walker RH, Pirie PL, Badger GJ, Carpenter JH. Long-term responses of higher and lower risk youths to smoking prevention interventions. Preventive Medicine. 1997;26(3):389-94.

10.   Frohlich KL, Mykhalovskiy E, Poland BD, Haines-Saah R, Johnson J. Creating the socially marginalised youth smoker: the role of tobacco control. Sociology of health & illness. 2012;34(7):978-93. Epub 2012/03/06.

11.   Glanz K, Mau M, Steffen A, Maskarinec G, Arriola KJ. Tobacco use among Native Hawaiian middle school students: Its prevalence, correlates and implications. Ethnicity and Health. 2007;12(3):227-44.

12.   Hansen WB. Behavioral predictors of abstinence: early indicators of a dependence on tobacco among adolescents. International Journal of the Addictions. 1983;18(7):913-20.

13.   Hanson MJ. An examination of ethnic differences in cigarette smoking intention among female teenagers. Journal of the American Academy of Nurse Practitioners. 2005;17(4):149-55.

14.   Hanson MJS. African-American adolescents' intentions to smoke cigarettes: an application of the Theory of Planned Behavior. Journal of Gender, Culture, & Health. 1996;1(2):125-34.

15.   Indig D, Haysom L. Smoking behaviours among young people in custody in New South Wales, Australia. Drug and alcohol review. 2012;31(5):631-7. Epub 2012/03/08.

16.   Karcher MJ, Finn L. How connectedness contributes to experimental smoking among rural youth: developmental and ecological analyses. Journal of Primary Prevention. 2005;26(1):25-36.

17.   Kerby DS, Brand MW, John R. Anger types and the use of cigarettes and smokeless tobacco among Native American adolescents. Preventive Medicine. 2003;37(5):485-91.

18.   Leff MK, Moolchan ET, Cookus BA, Spurgeon L, Evans LA, London ED, et al. Predictors of smoking initiation among at risk youth: A controlled study. Journal of Child & Adolescent Substance Abuse. 2003;13(1):59-76.

19.   LeMaster PL, Connell CM, Mitchell CM, Manson SM. Tobacco use among American Indian adolescents: protective and risk factors. Journal of Adolescent Health. 2002;30(6):426-32.

20.   Ramsey SE, Brown RA, Strong DR, Sales SD. Cigarette smoking among adolescent psychiatric inpatients: Prevalence and correlates. Annals of Clinical Psychiatry. 2002;14(3):149-53.

21.   Yu M, Stiffman AR, Freedenthal S. Factors affecting American Indian adolescent tobacco use. Addictive Behaviors. 2005;30(5):889-904.

Reviews (reviews conducted on smoking within the defined disadvantaged group but not reporting on perceived barriers to smoking cessation)

1.   Cengelli S, O'Loughlin J, Lauzon B, Cornuz J. A systematic review of longitudinal population-based studies on the predictors of smoking cessation in adolescent and young adult smokers. Tobacco control. 2012;21(3):355-62. Epub 2011/08/19.

2.   Johnston V, Westphal DW, Glover M, Thomas DP, Segan C, Walker N. Reducing smoking among indigenous populations: new evidence from a review of trials. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2013;15(8):1329-38. Epub 2013/03/23.

Studies not meeting the subgroup definition

1.   Abernathy TJ, Bertrand LD. The prevalence of smokeless tobacco and cigarette use among sixth, seventh and eighth grade students: a longitudinal investigation. Canadian Journal of Public Health. 1992;83(1):15-8.

2.   Audrain-McGovern J, Rodriguez D, Epstein LH, Rodgers K, Cuevas J, Wileyto EP. Young adult smoking: What factors differentiate ex-smokers, smoking cessation treatment seekers and nontreatment seekers? Addictive Behaviors. 2009;34(12):1036-41.

3.   Barber P, Lopez-Valcarcel BG, Pinilla J, Santana Y, Calvo JR, Lopez A. Attitudes of teenagers towards cigarettes and smoking initiation. Substance use & misuse. 2005;40(5):625-43.

4.   Leatherdale ST, Ahmed R. Alcohol, marijuana, and tobacco use among Canadian youth: do we need more multi-substance prevention programming? Journal of Primary Prevention. 2010;31(3):99-108.

5.   Leatherdale ST, Ahmed R, Vu M. Factors associated with different cigarette access behaviours among underage smoking youth who usually smoke contraband (Native) cigarettes. Canadian Journal of Public Health. 2011;102(2):103-7.

6.   Leatherdale ST, McDonald PW. Youth smokers' beliefs about different cessation approaches: are we providing cessation interventions they never intend to use? Cancer Causes & Control. 2007;18(7):783-91.

7.   Leatherdale ST, McDonald PW, Cameron R, Jolin MA, Brown KS. A multi-level analysis examining how smoking friends, parents, and older students in the school environment are risk factors for susceptibility to smoking among non-smoking elementary school youth. Prevention Science. 2006;7(4):397-402.

8.   Leavy J, Wood L, Phillips F, Rosenberg M. Try and try again--qualitative insights into adolescent smoking experimentation and notions of addiction. Health Promotion Journal of Australia. 2010;21(3):208-14.

9.   Leeman RF, Schepis TS, Cavallo DA, McFetridge AK, Liss TB, Krishnan-Sarin S. Nicotine dependence severity as a cross-sectional predictor of alcohol-related problems in a sample of adolescent smokers. Nicotine & tobacco research : official journal of the Society for Research on Nicotine and Tobacco. 2010;12(5):521-4.

10.   Lowry R, Cohen LR, Modzeleski W, Kann L, Collins JL, Kolbe LJ. School violence, substance use, and availability of illegal drugs on school property among US high school students. Journal of School Health. 1999;69(9):347-55.

11.   Maes HH, Woodard CE, Murrelle L, Meyer JM, Silberg JL, Hewitt JK, et al. Tobacco, alcohol and drug use in eight- to sixteen-year-old twins: the Virginia Twin Study of Adolescent Behavioral Development. Journal of Studies on Alcohol. 1999;60(3):293-305.

12.   McGee R, Stanton WR. A longitudinal study of reasons for smoking in adolescence. Addiction (Abingdon, England). 1993;88(2):265-71.

13.   Milton B, Cook PA, Dugdill L, Porcellato L, Springett J, Woods SE. Why do primary school children smoke? A longitudinal analysis of predictors of smoking uptake during pre-adolescence. Public Health. 2004;118(4):247-55.

14.   Milton MH, Maule CO, Backinger CL, Gregory DM. Recommendations and guidance for practice in youth tobacco cessation. American journal of health behavior. 2003;27:S159-69.

Appendix 14.2 Supplementary file 2. Summaries of the included quantitative studies by disadvantaged group (n = 8).

Author, Year, Country	Study aims	Setting	Sample	Response rate	Type of survey (cross-sectional, etc)	Outcome measure (and info on survey instrument)	Barriers to quitting (type and prevalence)
Quantitative studies							
Low SES groups							
Price 1994(60) USA	Assess the perceptions of lung cancer and smoking in a socioeconomically disadvantaged sample.	Telephone interviews in Ohio, USA.	n = 500 49% female Age: mean = 58, SD = 18.2 Ethnicity: white (83%)	42%	Cross-sectional.	Predesigned survey instrument based on the Health Belief Model – 45 items. Barriers: 5 items. .79 reliability coefficient.	Habit: 82% Prevents boredom: 48% Helps to relax: 52% Addiction: 86% Many friends of smokers also smoke: 66%
Rosenthal et al 2013 (70) USA	Identify the most endorse barriers and motivations to quitting an sociodemographic differences in the barriers to quitting report.	Six low income neighbourhoods in new haven, Connecticut.	n = 350 Ethnicity: 61% Black 20% Latino 12% White Education: 56% High school diploma/ GED or less	73%	Cross-sectional	Gender, race/ethnicity, educational attainment, age, smoking status. Barriers measure based on pre-existing survey (7 items).	*Intrapersonal barriers* I don't want to quit: 37.4% It is too difficult: 57.7% I don't know how: 24.9% I am afraid of gaining weight :19.7% *Financial barrier* I can't afford the medication or nicotine replacement therapy products (such as the patch or gum): 30.9% *Support barrier* I don't have enough support: 25.7% *Social Influence barrier* Everyone I know uses tobacco: 33.1%

Author, Year, Country	Study aims	Setting	Sample	Response rate	Type of survey (cross-sectional, etc)	Outcome measure (and info on survey instrument)	Barriers to quitting (type and prevalence)
People with a mental illness							
Asher et al 2003 (101) USA	Report the relative frequency of endorsement of the various barriers as a source of guidance for clinicians wanting to motivate alcoholic patients to quit smoking.	Urban inpatient state-subsidized substance abuse facility.	96 alcohol dependent smokers	73%	Cross sectional survey	11 item True/False Barriers to Quitting Smoking in Substance Abuse Treatment (BQS-SAT) questionnaire.	If I quit smoking, I'll feel tense and irritable: 87% If I quit smoking, I would feel anxious: 78% When I don't smoke, I feel restless, and I can't concentrate: 56% If I quit smoking, my urges to smoke will be so strong, I won't be able to stand it: 48% I don't have the willpower to quit smoking: 47% I need smoking to lift me up when I'm feeling down: 42% Quitting smoking during substance abuse treatment would make it harder to stay sober: 41% If I quit smoking, I would gain weight: 40% Smoking gives me a lift when I'm feeling tired: 28% If I quit smoking, I won't be able to sleep: 23% If I quit smoking, my urges to drink or use drugs will be so strong I won't be able to stand it: 13% Negative affect: 32% Habit: 28% Seeing others smoke or peer pressure: 22%. Being addicted to more than one substance: 5% .

Author, Year, Country	Study aims	Setting	Sample	Response rate	Type of survey (cross-sectional, etc)	Outcome measure (and info on survey instrument)	Barriers to quitting (type and prevalence)
							Compulsion and mental urges: 3%
Carosella et al 1999 (88).\n\nUSA.	Assess the barriers to and facilitators of quitting smoking in long term care inpatients.	Long term psychiatric care units.	n = 92\n98% male\nAge: mean = 47.6\nDiagnoses: substance abuse (60.9%); schizophrenia (55.4%); affective disorders (38%).	77.7%	Interviews.	Smoking status and history, demographic information, reasons for not quitting smoking.	Enjoyment: 47.2%\nHabit : 36.1%\nBoredom: 12.5%\nAnxiety, nerves: 11.1%\nSmoking does me good (e.g., relaxing, stimulating, stifles pain): 9.7%\nAvailability of cigarettes: 6.9%\nNever had a reason/need to stop: 6.9%\nI have emotional problems: 6.9%\nOther stressors: 5.6%\nConcentrating on other addictions: 4.2%\nSmoking helps your appetite/digestion: 4.2%\nI need some help to stop: 4.2%\nSociability of smoking: 2.7%\nDon't know: 2.7%
Orleans et al 1993\n\nUSA	Aimed to inform the design of nicotine addiction treatments tailored for patients with chemical dependency	Inpatient substance use treatment centre	n = 78\n78% male\nmean age = 36.6 (SD = 10.1)\n78%: alcohol\n9% drug problems including cocaine, heroin, marijuana and prescription medication	Not reported	Cross-sectional	Sociodemographic, smoking related characteristics, 9 item barriers survey.	Missing or craving cigarettes: 68.4%\nBeing nervous, anxious or tense: 53.3%\nBeing around other smokers: 43.3%\nLosing a pleasure: 39.4%\nCoping with stress: 38.7%\nBeing afraid you'll fail: 27%\nGaining weight: 24.3%\nMaintaining sobriety: 9.9%\nIncreased alcohol/drug use: 2.9%

Author, Year, Country	Study aims	Setting	Sample	Response rate	Type of survey (cross-sectional, etc)	Outcome measure (and info on survey instrument)	Barriers to quitting (type and prevalence)
			13% alcohol and other drug problems				
Homeless groups							
Arnsten et al 2004 (106). USA.	Evaluate predictors of readiness to quit and interest in cessation counselling in a homeless sample	Homeless services at urban hospital	n = 98 Age: mean = 44 years. Median number of years homeless = 2.75 Predominantly white, unmarried, unemployed or disabled, males (proportions not provided).	Not reported.	Cross-sectional.	Smoking behaviour, reasons for quitting, readiness to quit, history of homelessness, alcohol and other drug history, psychiatric history, medical history, quit attempts, social support.	21% believe the people closest to them would be very helpful in quitting smoking. 29% endorsed the item "People closest to you want you to quit very much".
Connor et al. 2002 (107). USA.	Ascertain the prevalence of smoking, smoking cessation and how various factors associated with homelessness impact on readiness to	Emergency homeless services, residential drug treatment services, drop in centres for homeless in the city of Pittsburgh (9 homeless services).	n = 230 Male = 81% Age: mean = 41.8, SD = 10.7. Ethnicity: 54% African Americans; 40% white; 3% Hispanic; 3% other. Homelessness:	>97%	Cross-sectional.	Demographics, substance use history, housing status, Fagerstrom Test of Nicotine Dependence, Stage of Change, self-efficacy, barriers to cessation (as 5 potential barriers:	Cravings: 50% Stress or mood swings: 44% Being around others who smoke: 42% Not receiving any support during quit attempt: 26% Fear of weight gain: 20% No specific treatments (pharmacological) could help them quit smoking: 31.6%

Author, Year, Country	Study aims	Setting	Sample	Response rate	Type of survey (cross-sectional, etc)	Outcome measure (and info on survey instrument)	Barriers to quitting (type and prevalence)
	quit smoking.		46% living in transitional housing, 31% in shelter; street 20%; 3% living with family/friends.			cravings, other smokers, weight gain, habit, stress/mood), social support.	
Prisoner groups							
Dickens et al 2005 (109). UK.	To explore psychiatric inpatients views of smoking cessation options.	Forensic wards of large independent psychiatric hospital.	n = 34 57.8% male Age: mean = 36.0, SD = 9.7 Ethnicity: not reported. 88.9% legal status of detained.	44.1%	Cross-sectional.	Demographic details, mental health act status, smoking characteristics, views on smoking cessation and rules on smoking in the hospital.	Other patients smoking: 79.4% The "smoky atmosphere" would make it too difficult to stop smoking: 58.8% Seeing members of staff smoking: 55.9% Not enough encouragement from staff: 29.4% Not enough information about giving up smoking: 26.5% "It's just too difficult" to give up smoking: 73.5% Several smokers commented that boredom was a factor in continuing to smoke.

Author, Year, Country	Study aims	Setting	Sample	Response rate	Type of survey (cross-sectional, etc)	Outcome measure (and info on survey instrument)	Barriers to quitting (type and prevalence)

Appendix 14.3 Supplementary file 3: Summaries of the included qualitative studies by disadvantaged group (n = 54).

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
Low SES							
Ahijevych 2003(49). USA	Investigate the beliefs and attitudes towards tobacco of current and former Appalachian smokers.	Non metropolitan Appalachian county.	n = 14 64% female Age: mean = 33.7, SD = 8.7 Ethnicity: 100% white, non-Hispanic High school education or less: 40.5%	Focus groups	Roles of tobacco in life and community, factors helped or hindered previous quit attempts, community perceptions of tobacco use, and strategies for successful smoking cessation programs.	Content analysis.	Addiction to nicotine. Cravings. Smoking provides a rush. Alleviating boredom. Peers and family members who reinforced smoking. Routine/ritual of smoking. Social activities. Associated behaviours: alcohol, caffeine, Weight gain.
Bancroft et al 2003 (50). UK	Investigate barriers to quitting and accessing treatment in two disadvantaged areas of Scotland	Two disadvantaged geographical areas in Scotland	n = 100 50% female Age: not reported Ethnicity: not reported. Housing tenure: 76% council housing	Interviews	Smoking and quitting; future smoking, intentions to quit; habit and addiction.	Thematic analysis. NUDIST.	Addictive behaviour. Habit. Lack of alternatives. Smoking is the only pleasurable activity to do. Reward. Deal with stress. Alleviate boredom. Alleviate stress from financial pressures.
Beech et al 2003 (51). USA	Investigate the cultural and social factors associated with African American low income smokers.	High schools, colleges, housing developments and trade schools.	n = 118 45% female Age: between 18 and 35 years old. Ethnicity: 100% African American.	Focus groups.	Smoking initiation, smoking maintenance and cessation.	Content analysis.	Equal numbers of participants reporting smoking managed their stress compared to those who reported smoking contributed to their stress. Anxiety management. Daily hassles and life events. Energy and alertness. Taking a break. Boredom. Managing certain medical conditions. High levels of accessibility in communities. Willpower and prayer were more highly valued as cessation methods than use of pharmacology or counselling.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
							High prevalence of smoking within social networks and communities: family, peers and the wider community.
Bryant et al 2010 (52). AUS	Sought to describe the smoking behaviours and attitudes of disadvantaged Australian smokers attending SCSOs, including past experiences of quitting, preferences for quit support, and perceived barriers to quitting.	Five community welfare organisations located in New South Wales, Australia.	n = 32 69% female Age: all participants aged over 16 years.	Focus groups.	Current smoking behaviour, motivation to quit, past quit attempts, barriers to quitting and preferences for cessation support.	Thematic analysis. Nvivo version 8.	Stress relief. Calming, relaxing. Alleviating boredom. Coping mechanism. A best friend. Low self-efficacy – doubting ability to quit. Viewing quitting as impossible. Feeling ready and having willpower were integral to success. Low knowledge of quit support. Unsure how to correctly use NRT, belief NRT was ineffective, learning from others about the efficacy of NRT. Knowledge of other pharmacotherapies was low. Telephone quit lines usage also low. Weight gain. Limited perceived support from GPs and other health professionals. High cost of NRT. Repeated social and environmental exposure to smoking. Norm within the community. High prevalence of friends and family were smokers.
Copeland et al 2003 (53). UK	To further examine the roles that smoking plays in the lives of the study group	General practice in a deprived area of Edinburgh.	n = 51 100% female	Open ended survey.	Open-ended questions regarding smoking characteristics, feelings and experiences regarding smoking, as well as measures of anxiety, depression and stress.	Content and category analysis.	Lack of willpower. Triggering event such as starting new job, marital problems, bereavement. Nothing else to help cope. Weight gain. Social smoking. Contact with other smokers.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
Dunn et al 1998 (54) USA	Explore attitudes and perceptions of smoking during pregnancy, barriers to quitting, second hand smoke exposure, and preference for cessation programs among women of low SES.	Neighbourhood centres and clinics in an urban area. .	n = 57. 100% female Age: 77% aged 25 or younger Ethnicity: African Americans 24; Native Americans 23; white 10. High school education or less: 68%	Focus groups.	Health concerns, sources of advice regarding pregnancy, characteristics of useful programs, health effects of smoking, quitting, passive smoking exposure and attempts to avoid exposure.	Content analysis.	Internal factors: Stress. Boredom. Addiction to nicotine. Withdrawal symptoms. Strong cravings. Weight gain. Belief that smoking was not dangerous enough to warrant quitting. Long term effects which participants do not consider. External factors: Being around friends and family members who smoked, including those who were not supportive of quit attempt. Lack of control over exposure to smoke and influence of others.
Franco et al 2011 (55). AUS	Increase knowledge on the barriers to smoking cessation and the acceptability of addressing smoking in SCSOs	SCSO Illawarra region, NSW Australia	n = 53 83% female	Focus groups.	Smoking and health, smoking cessation, support preferences, acceptability of addressing smoking in SCSO setting.	Notes based analysis.	Ritual. Structures the day. Reward after daily chores. Something to do. Stress management. Concerns about the effectiveness of NRT. Cost of NRT and other treatments too high. Need more support to quit.
Lacey et al 1993 (93). USA.	Increase understanding of the role of smoking and the challenges faced when attempting to quit.	Residents of public housing in Chicago, USA.	n = 6 – 8 participants per focus group (8 focus groups in total). 100% female. Ethnicity: 100% African American. 42% not completed high school	Focus groups.	Day to day activities, life stressors, community and living conditions,	Content analysis.	Social isolation. Lack of support. Racially and economically segregated areas. Fear limited outings to necessary activities. Limited social networks outside of immediate family. Stress management. Substandard, unclean housing. Few opportunities for recreation or employment. Violence and crime. Substance use. Sense of control. One of few attainable pleasures.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
			100% had average yearly income < $13,000 USD.				Legal and harmless for relatively small investment. Perceived alternatives are drugs, alcohol abuse or losing control. Low perceived harm. Fatalistic beliefs/rationalisations/self-exempting beliefs. Other physical illness and disease that took priority – COPD, heart disease, kidney disease. Belief that smoking is normal. Belief that most adults smoke. High prevalence in social network. Hard to avoid smoking. Belief that the only way to quit smoking was to do it cold turkey. Low knowledge regarding how to quit and methods/help available. Absence of specific constructive assistance. Being self-reliant preferred over being dependent on help from someone. Smoking cessation support not seen as effective.
Moffatt et al 2004 (57). AUS	Aim to gain better understanding of the barriers to quitting in blue collar workers	Two antenatal clinics in Brisbane, QLD servicing predominantly low SES participants.	n = 25 100% male Age: between 20 and 53 years old	Semi-structured interviews.	Questions developed from literature review and pilot study.	Constant comparative method – conceptual analysis. NUDIST.	Lack of control over smoking. Long positive association with cigarettes – cool, sophisticated. Lack of support to quit. Withdrawal - negative feelings such as anger/irritability. Peer pressure. Relaxation. Social contexts. Habit – daily routine.
Nichter et al 2007 (58). USA	To uncover the factors that facilitate smoking during pregnancy and those that facilitate quitting; investigate the use of harm	Large urban city.	n = 53 100% female Age: mean = 25, ranged from 18 – 43 years. Ethnicity: Anglo-	Semi-structured interviews	Interview questions developed from pilot material with key informants.	ATLAS ti 5.0 software.	Low social support. Living in more than one residence during pregnancy. Not being head of household/able to make decisions regarding smoking policy and house. No stable employment. No family/peer support. Smoking helped women manage anger, frustration, control and autonomy.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
	reduction practices used by pregnant women and the effects of social networks on smoking and cessation.		American 62%; Mexican American 21%; African American 11%, multiethnic 6%. High school education or less: 74% Unemployed: 60%				Coping strategy. History of depression. Smoking seen as lesser evil compared to alcohol or other drugs. Less clear about direct outcomes for baby. Rationalisations "defence mechanisms/downplaying medical risks/prioritising less stress over smoking damage. No helpful guidance form health professionals.
Paul et al 2010 (29). AUS	Examine the experience of the social context of smoking and whether this experience differed by sociodemographic characteristics	Local community facilities in high and low SEIFA suburbs in Sydney, Aus.	n = 4 – 8 participants per group (8 groups in total).	Focus groups.	Smoking behaviour and history; current and future smoking environments; environmental factors related to smoking.	Thematic analysis.	Nostalgia for smoking that was once cool and sophisticated. Weight control. Not noticing any decrease in the smoking prevalence in their community over time. Social/peer groups predominantly made up of smokers. Social activity. High perceived acceptability of smoking. Work environment being more conducive to smoking. Lack of smoking restriction at workplace. Acceptability of smoking in open air environments in low SEP neighbourhoods.
Peretti-Watel et al 2009 (59). FRA	To increase understanding of low socioeconomic status and smoking through investigating smoking motives.	South –east of France – social work centres and participants homes.	n = 31	In depth semi-structured interviews	Brief topic guide mentioned but not presented.	Based on principles of grounded theory.	Addiction. Pleasure and happiness. Satisfied essential needs. Relieves stress. Fills void in everyday life – nothing else to do. Only leisure activity they can afford. Combat loneliness. Manage other addictions. Stressful life events such as break up of relationship or loss of job.
Roddy et al 2006 (61).	Determine level of awareness of stop smoking services in	Most deprived districts in Greater Nottingham.	n = 39	Focus groups.	Smoking behaviour, cessation experiences, knowledge and	NUD*IST 6 software.	Lack of knowledge of services. Misconceptions about attitudes within services. Being judged by health professionals. Feeling they would need intensive support to quit.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
UK	deprived area and identify specific barriers and motivators to improve access.				perceptions of existing services.		NRT was expensive and ineffective (many contraindications). Bupropion was negatively associated with adverse events reported in media. Stress. Rationalisations. Failed quit attempts in the past.
Stead et al 2001 (62). UK	To investigate how smoking is fostered in areas that experience multiple forms of deprivation	Housing estates within 8 communities in Glasgow having DEPCAT scores of 7 (highest scores of deprivation).	n = 53 Sample selected according to age, gender and smoking status.	Focus groups	Smoking characteristics, smoking history, leisure activities, work and unemployment, cessation history, experiences of the local community.	Thematic analysis.	Coping mechanism – dealing with stress directly related to living in a deprived community. Stressors include: limited income, caring for children, poor local infrastructure, high levels of crime and drug use, limited opportunities for rest and respite from community. High accessibility of cigarettes (legal, illegal and informal sources). Socialising. Main pleasure (cheap and easily accessible). Smoking alleviated anxiety and nervousness. Coping with frustration and demotivation of widespread unemployment. Normative influence of being surrounded by smoking. Accepted smoking as inevitable and preferable to other drug use. Deprived communities experienced feeling cut off from other communities (that were more advantaged) thus weren't exposed to other norms. Belonging and identity. Smoking compensates exclusion and binds communities together. Deepening financial hardship. Fears of not being able to cope without cigarettes. Limited awareness of help available. Lack of trust regarding efficacy of medications and cynicism about health professionals financially exploiting smokers. Little support from community.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
Stewart et al 1996 (63). CAN	Examine the factors associated with barriers and supports to smoking cessation in disadvantaged women.	Atlantic region, Canada.	n = 386 100% female	Semi-structured interviews	Interview guides were used but not described.	Content analysis.	Linked with poverty, isolation, and caregiving. Coping mechanism. Associated fear, anger and anxiety. Reward. Pleasure. Addiction. Short and long term goals – struggle for 'survival'; therefore long term benefits of quitting had little impact. Not using traditional cessation support services – negative reactions from those that had. Personal determination and willpower were integral to success. Cessation aids viewed as ineffective or harmful. Believed that poverty, abuse and alcoholism more damaging to society – antagonistic towards tobacco control measures.
Stewart et al 1996 (64). CAN	Identify social-psychological factors associated with smoking cessation among disadvantaged women.	Atlantic region of Canada Research carried out in sites accessible to participants.	n = 126 100% female	Focus groups and interviews	Reasons for smoking and continuing to smoke, impact of anti-smoking media messages, opinions and experiences regarding smoking cessation, strategies, services and support that would help stop or reduce smoking.	Content analysis.	Weight gain. Low expectation of support from health professionals and health agencies – lack of confidence in GPs and nurses. Rarely contacted national/peak bodies like Lung association or Cancer Society. Geographical isolation, lack of awareness of role and scepticism. Lack of social support – partners, immediate family, friends and acquaintances.
Stewart et al 2011 (65). Canada.	Identify the needs and preference of female smokers from low socioeconomic background ds.	Three large urban cities in Canada.	n = 64 100%female Age: mean = 37 High school education or less: 68%	Focus groups.	Smoking characteristics, cessation attempts and experiences, preferences for support to quit and resources.	Thematic analysis. QSR N6.	Limited employment opportunities. Reliance on welfare and benefit payments. Low socioeconomic status – poverty, low education, unemployment and the stress caused by these factors. Lack of affordable childcare. Management of emotions and stress – anger, upset, anxiety. Coping mechanism. One of few pleasures available.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
							Relaxation. Reward. Boredom, lack of access to recreational activities. Smoking linked to feelings of loneliness and hopelessness regarding poverty. Smoking as habit – linked to other behaviours – drinking coffee etc.
Stillman et al 2007 (66). USA.	Increase knowledge of environmental factors that facilitate or prevent young AA from smoking cessation.	Employment and training and education programs – inner city.	n = 28	Focus groups	Social norms and smoking, how tobacco was sourced, socialisation and smoking and smoking restrictions and advertising.	Atlas.ti v 3. software.	Smoking seen as normal, very common and not problematic. Faced few restrictions regarding smoking. "Loosies" (single cigarettes) were easily accessible.
Tod 2003 (67). UK	Explore the reasons why pregnant women do not quit and are less likely to access smoking cessation services.	South Yorkshire Coalfields (SYC) – deprived area with high prevalence of smoking. Pregnant women known to maternity services within this area. Approached by midwives.	n = 11 100% female Age: ranged from 19 to 38 years old.	Semi-structured interviews via telephone.	Smoking history; obstetric history; factors influencing access to smoking cessation services; knowledge and beliefs; preferences for future services.	Framework analysis.	Addiction. Only cutting down for baby; plan to resume after birth. Enjoyment. Belief that willpower is essential for success. Cutting down but missing that extra strength to finally quit. Pressures and stresses of life. Lack of willpower linked to self-fulfilling prophecy; relapse was viewed as inevitable. Smoking during pregnancy safest, and healthiest, and preferred course of action. Housework; childcare, financial anxieties and relationships. Protecting mental health. Familiar and necessary tool to cope. Smoking controlling appetite for weight concerns and also to control hunger. Food was sacrificed in order to afford cigarettes. Partners' smoking affected motivation to quit. Being around people who were smoking. Timing of smoking cessation advice coinciding with tests for babies' health.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
							Judgemental attitudes from service providers. Lack of childcare options. Minimizing risk of smoking. Participants own experience discredited health advice.
Tsourtos et al 2008 (68). AUS	Understand the barriers to quitting smoking, especially in relation to stress, in order to understand the differences in cessation rates between the groups.	The most disadvantaged are (local government area) in metropolitan Adelaide.	n = 29 48% female.	Focus groups (2) and in depth telephone interviews (11).	Barriers to quitting smoking (focus on stress), reasons for quitting, stress and quit attempts.	Not reported.	Stressful environments including: financial stress, child rearing, family issues, employment disadvantage, increased morbidity and mortality within community (including smoking related illness), and difficulties in the workplace. NRT too expensive to maintain. Financial stress. Stress that arises from childrearing and women having a smoke to get 'time out'. Partner smoking. Increased morbidity and mortality in community, including due to smoking related illness. Habit of smoking; ritualised behaviour. Lack of control. Addiction. Cravings. Boredom. Smoking to alleviate stress. Some respondents held the belief that it was not tobacco/cigarettes themselves that provided stress relief, but the chance to relax.
White & Baird 2013 (71) UK	Explore perspectives of former miners in disadvantaged former coal mining communities on smoking and cessation	Former coal mining towns and villages in Bolsover district, North Derbyshire.	n = 16 All participants white, male and British. Aged between 45 and 68. All former miners.	Interviews	Perspectives on smoking, stopping smoking and stop smoking services.	Content analysis	Attributing health issues to coal dust exposure rather than smoking. Comparing the risks of coal mining to the risks of smoking. Participants reported being able to stop smoking at will with minimal difficulty and need for support, despite all previous attempts being unsuccessful.
Wiltshire et al 2003 (69).	Examine participants' views on quitting smoking and	Two health centres in two areas of	n = 100 50% male	Semi-structured interviews.	Daily consumption patterns, reasons for smoking, wider community	Thematic analysis. NUD*ST.	Stress Management. Coping mechanism. Living, socializing and working with other smokers. Smoking 'deeply embedded' in their lives.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
UK	smoking and how that may be affected by their lives.	deprivation in Scotland.	Housing: 76% council/housing association		environment, experiences of quitting and changes in smoking status, future quit intentions.		Smoking was normalized and routine contact with other smokers made quitting even more difficult. Only way to quit is remove yourself completely from your environment. Addiction to nicotine. Cravings. Withdrawal symptoms and their impact on family/friends. Stressful life circumstances. Belief that NRT not up to task of replacing cigarettes. Cost of NRT. Word of mouth regarding bad/unsuccessful attempts with NRT. Boredom and times of inactivity. Characteristics of living in a disadvantaged area - violence, crime. Willpower was essential in order to be able to quit smoking.
Indigenous studies							
Burgess et al 2007 (72). USA	Explore the cultural factors associated with experience and perceptions regarding tobacco use, cessation and dependence treatments.	Minneapolis/St Paul metropolitan area.	n = 26 American Indian participants 30% female	Focus groups.	Smoking, smoking cessation and tobacco dependence treatments.	Content analysis.	Smoking as highly acceptable and widespread within community. Traditional ceremonial use of tobacco. Addiction. Cravings. Withdrawal symptoms. Stressful circumstances. Suspicion towards pharmacotherapy. Scepticism about benefits of pharmacotherapy and negative views of medical profession in general. For women, smoking was seen as way to care for self in face of multiple responsibilities. Women used to manage stress, negative emotions, deal with life demands including children, work and family. Weight control.
Choi et al 2006 (73).	Assess smoking behaviour, cessation,	Health Centre based within an	n = 41American	Focus groups.	1. Tobacco use (including	Themes identified.	Traditional or ceremonial use of tobacco. Use of tobacco important to maintain an 'Indian' identity.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
USA.	traditional tobacco use and attitudes towards a smoking cessation program in a sample of American Indian participants.	Indian Nations University.	Indian participants 63% female Age: mean = 41 (SD = 12.3) ranged from 21-67 63% some college education		ceremonial and non-ceremonial) 2. Smoking and quitting. 3. Smoking cessation program "Second Wind".		Relapse in social situations. Normative behaviour. Highly prevalent: everyone smokes. Stressful situations. Belief that quitting smoking "takes personal motivation and a person will not be able to quit unless he or she has determination and self-control and really wants to quit". Most had tried NRT – cost was a barrier to getting more NRT. Nightmares were attributed to bupropion and NRT. Largest barriers to NRT use were cost and accessibility.
Dawson et al 2012 (74). AUS	Increase understanding of barriers within Aboriginal Health Worker workforce.	Metropolitan, rural and remote health services.	n = 34 Aboriginal Australian participants 44% female	Semi structured interviews and focus groups.	Factors related to relapse, not wanting to quit, challenges in quitting.	Content analysis. NVivo 8 software.	Stress, grief and loss – due to health concerns, excessive work demands, family issues, inequity in workplace, institutionalised racism and pervasiveness of social disadvantage. Chronic disease, burden of illness, premature deaths in community. Fear – of failure, feeling sick (withdrawal symptoms), weight gain, and losing a coping strategy. Smoking not being a problem – rationalizations as well as just the belief that it's not a problem. Quitting not the greatest priority in their lives. Lack of knowledge about quit methods – unsure about the benefits of certain pharmacological methods. Lack of access to relevant quit smoking aids – culturally appropriate, cost. Nicotine addiction – biological addiction was rarely referenced. Social pressure to smoke – living and socialising with smokers. Situations where alcohol was consumed or with high number of other smokers. Quitting means exclusion from this network. Offence at not participating – maintaining connectedness.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
							Lack of support/role models – few friends and family/community members who had quit successfully, intolerance of mood changes around when quitting. Pressure to quit form non-smokers – 'picked on', line between encouragement and beleaguering. Smoking common in the workplace – acceptable, organisational culture enabled smoking, create bond between clients and workers, challenge sin enforcing smoke free policies. Smoking was pervasive and acceptable within community, inability to avoid smoking – high prevalence impacted by historical role of tobacco, culturally and colonial influence. Smoking behaviours weren't questioned. Lack of policies to promote smoke free environments, short term funding of tobacco programs, inadequate investment for organisations.
Dawson et al 2012 (75). AUS	Explore the perceptions of Aboriginal Health Workers in relation to individual and contextual factors relating to smoking	Metropolitan, rural and remote health services.	n = 34 Aboriginal Australian participants 44% male	Semi-structured interviews	Current smoking and smoking history; reasons for continuing to smoke; typical weekday and weekend when smoking occurred; quit history.	Content analysis. NVivo 8.	Stress: relationships and family issues; financial problems; community issues and work challenges. Poor physical and mental health e.g. anxiety, depression, chronic pain. Associative behaviours: getting in the car; drinking alcohol or caffeinated drinks, watching television, going outside. Habit (tactile) – having something in their hands. Boredom – 'time on one's hand'. Awareness of 'nicotine addiction' only reported by 2 participants. Chronic disease burden – heart disease, emphysema, diabetes, cancer. Grief and loss – reduced life expectancy. Caring for family – health support and advice; financial obligations and housing. Breakdown in family dynamics: single parent families; isolation; stolen generation. Socialisation and connection: social lubricant; belonging.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
							Debriefing opportunity – after stressor. Co-worker, friend, family, client encouragement to smoke. Active and passive encouragement. Demanding work, including out of hours. Job insecurity and financial insecurity. Institutionalised racism. Dispossession of land; collective grief and loss; prevalent racism; social disadvantage; poverty, homelessness; unemployment, chronic disease, drug abuse; gambling, violence, housing issues; imprisonment, lack of education.
Dennis et al 2012 (76). USA	Qualitatively explore tobacco, alcohol and other drug use in a sample of American Indians living on a rural reservation.	Rural reservation in Midwestern state of USA.	n = 49 American Indian participants 61% female Age: 18 – 54 (57.2%)	Focus groups.	Not reported.	Thematic analysis.	Lenient attitudes towards smoking. Generational use (parents and grandparents to children). Accessibility of cigarettes (easy access through friends and family; cheaper to purchase on reservation). Smoking linked with other behaviours (gambling, alcohol use). High prevalence of smoking in community.
Fernandez et al 2008 (77). New Zealand	Investigate the perception of smoking cessation in Maori women	One local Maori organisation	n = 5 Maori participants 100% female	Focus group.	Perceptions of smoking and quitting, triggers for smoking, quit smoking policies and initiatives from the government, and mass media campaigns and marketing.	Thematic analysis.	Observing health professionals smoking. Limited support from other smokers (feeling negatively judged by other smokers when trying to quit). Maori women felt more comfortable accessing health care from a Maori provider rather than a mainstream service. All participants stated they would never ring the National Quitline (trust, disclosing information and allowing someone to assist them who is not known were the reasons cited for this). Asking a stranger for help deemed unacceptable.
Fu et al 2007 (78). USA	Increase understanding of the experiences of smoking cessation in 4	Seven community organizations in Minneapolis/St Paul.	n = 26 American Indian participants (6 focus groups).	Focus groups conducted separately for each	Discussion guide: smoking, smoking cessation, and help with quitting.	Methods for analysing qualitative data. Atlas.ti, v 5.0	Counselling was associated with an unequal power relationship between a white counsellor who was going to shame the participants about their smoking behaviour. Rationalisations: "it's not like I'm dying today".

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
	different ethnic groups: American Indians, Hmong, Vietnamese and African Americans.		44.4% female.	ethnic group.			Cynicism about the medical profession, including beliefs that doctors are untrustworthy, driven by monetary gain, and hypocritical. Negative experiences with particular doctors including doctors being confrontational, blaming and impersonal. Most had low levels of knowledge about the functional benefits of pharmacotherapy. Participants did not understand that pharmacotherapy could be used to help them with cravings and withdrawal symptoms. Concerns about side effects (e.g., overestimation of risks of side effects compared to risks of smoking). Cost of medications and lack of accessibility perceived as major barriers to their use. Word of mouth was a powerful influence on decisions to use or not use pharmacotherapy. American Indian smokers, in particular, associated pills with Western medicine, and viewed them with scepticism.
Gould et al, 2013 AUS	Explore issues for pregnant ATSI women in terms of smoking and smoking in the household	Regional NSW, Australia Aboriginal maternal and infant health service.	18 Aboriginal and/or Torres Strait Islander peoples (83% female) Mean age: 30.3 (SD = 11.70) Age range: 17-53 years	5 focus groups	Experiences of and attitudes towards smoking during pregnancy and cessation	Content analysis	Smoking usual in families. Several smokers in one household, difficult to avoid being around smoke. Smoking provides sense of social connection. Isolation if attempting to quit. Shared activity, and an anticipated part of mutual exchange (socialising). Low levels of support from family and friends to quit. Pressure to quit from family and friends. Pregnancy specific barriers: offset diabetes or keep baby small. Babies and individuals turned out "healthy". Not receiving understanding from doctors (judgemental). Stress and anxious situations. Cravings and withdrawal symptoms. Meal times and work breaks (habit). Yarning and socialising.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
							Sporting events, watching TV, boredom, TV ads, drinking alcohol and smelling tobacco smoke. Smoking cannabis. Being around other smokers, after birth. Quitting "too hard". Negative views of NRT due to adverse effects, preference to quit unaided, didn't understand how NRT could help. Hopelessness after trying many methods.
Gryczynski et al 2010 (81). USA	Inform the development of a culturally appropriate smoking cessation program for American Indians by looking at their preference for smoking cessation and associated programs.	Local community-based American Indian health service organization	n = 35 American Indian participants. 51.4% female Age: 45.7% between ages of 41 – 50.	Focus groups.	Cultural and social factors associated with smoking; smoking cessation experiences; attitudes towards cessation aids and programs.	Variant of the thematic framework approach.	Values of self-reliance and pride that are intertwined with American Indian identity. Enjoyment of smoking. Addiction to nicotine (deeply entrenched learned behaviour). Linked to very heavy smoking behaviours (waking up during the night to smoke). Association between other behaviours and smoking (coffee, alcohol, sex, other drug use). Smoking as a form of stress relief (given the highly stressful nature of low socioeconomic status). Ubiquity of cigarette use in life, friends and family. While physicians were seen as a good source of smoking cessation help, it was noted that many AI do not have private health insurance. Also physicians were not seen for non-emergency care. Cost, incorrect use, ineffectiveness and negative side effects prevented use of NRT. High number of family friends also smokers.
Hodge et al 2006 (82). USA.	Investigate tobacco use, attitudes, knowledge and practices in American Indian sample.	Reservation sites.	n = 51 American Indian participants 56.9% female.	Focus groups.	History of tobacco use in tribal context, knowledge and attitudes regarding cigarette smoking.	Krueger's (1998) focus group analysis methodology.	Lenient attitudes towards smoking including: acceptance of smoking as a social norm; belief in autonomy and people's right to experiment with tobacco; and low numbers of household smoking bans. Cultural phenomenon of independence and non-interference. Reluctance to tell others what to do, or to move away from someone who begins to smoke.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
							Low harm value assigned to smoking – in light of other day to day issues faced. Participants were aware of the risks but downplayed the seriousness of those risks. Enjoyment of smoking. Maintaining the ritual of smoking. Brand loyalty (several brands of tobacco that have AI names e.g. Seneca, Mohawk etc.). Ceremonial use of tobacco was an important cultural custom. Learning how to use tobacco in ceremonies as a young person was important. The loyalty to the tribe overrides tobacco's ill effects.
Johnston et al 2008 (83). AUS	To gain a better understanding of the reasons why Indigenous Australians smoke.	Health professional and community members from a coastal community in Northern Territory.	n = 25 Indigenous Australian community members 52% female	Semi-structured interviews.	Flexible interview schedule developed through literature review and discussions with service providers – details not given.	Thematic analysis. Atlas-ti (Version 5).	Social pressure to smoke – both implicit and explicit. Smoking is everywhere – smokers live or socialise with smokers. Tobacco as a normative substance in this community. Communal and collective activity. Tobacco used for reciprocal social exchange; ceremony and sharing. Sharing was a very important part of Indigenous culture as a way to influence behaviour, relationships and social control. Refusing to share cigarettes may be seen as a betrayal of the kinship they share and as an offensive act. Not sharing cigarettes may lead to isolation, as the sharing of cigarettes contributes to a sense of belonging and social identity. Some participants were derided for their decision to quit (but others were supported). Some state that the only way they could quit smoking is to distance themselves from family and friends, an entirely unfeasible proposition. Sharing a cigarette gives opportunity for a 'yarn' – enjoyment. Other positive effects including feeling more alert, happy, good, more able to complete tasks, relief, and allowing a sense of control.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
							Habit, addiction and hooked – nicotine dependence. Overcrowding in homes. Stress was most often mentioned in conjunction with smoking relapse, and more often by women than men. An outlet, a stress management, and to manage grief.
Kaholokula et al, 2007 (84). USA	Identify supports for and barriers to smoking cessation for this ethnic population., and to inform the development of a smoking cessation program for this population.	Northern rural community.	n = 52 Native Hawaiian participants. 48% male Age: mean = 51.8 (SD = 12.4)	Focus groups.	Smoking cessation advice and experience; barriers and facilitators to cessation; preferences in smoking cessation programs; differences between males and females. Ex-smokers were also asked about aids to quitting and preferences.	Thematic analysis.	Social factors: presence of friends, family and co-workers who were smokers, nagging to quit smoking. Psychological factors: stress, negative emotions, lack of 'willpower', thinking about the need to smoke. Physical factors: physical experience on nicotine addiction and withdrawal, weight gain. Behavioural : habitual nature of smoking, smoking linked to other behaviours (alcohol, reading the paper).
Passey et al 2011 (85). AUS	Explore the factors contributing to smoking initiation and the social context within which smoking behaviour occurs.	Coastal, river region of NSW – Aboriginal Maternal and Infant Health Strategy antenatal teams.	n = 36 Aboriginal Australian participants. 100% female Age (of women interview n = 22): mean = 24.9, ranged from 17 to 41. Education: Less than ten years of education 68%	3 Focus groups and 22 semi-structured interviews.	Topic areas – social and environmental factors that maintained or encouraged smoking and smoking initiation.	Content analysis.	Colonisation and introduction of tobacco: Disruption to Aboriginal society including dispossession of traditional lands, removal of children, loss of traditional lifestyle and introduction of new substances. The traditional and ceremonial limits that used to apply to smoking are no longer applicable. Social networks and community norms: Aboriginal community remains largely isolated. Many aboriginal people have limited interaction with non-smokers. High prevalence of smoking which allows the normalisation of smoking to occur. Limited interaction with non-smokers also limits exposure to changing attitude towards smoking. Disadvantaged lives: High unemployment, associated poverty, affordable housing, overcrowding, relationship difficulties, loss

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
							of family members through death/removal of children, grief and loss, abuse, perceived racism and negative stereotypes –smoking helped manage and navigate their way through these factors. Maintaining relationships and sharing: Relationships may be given higher priority over individual needs. Reciprocity – obligations to share time and resources including cigarettes – to give and to accept those given to you. Sharing and having a yarn was an important social activity.
Patten et al, 2009 (86). USA	Preferences and acceptability of different tobacco cessation strategies and the barriers and unmet needs of Alaskan Native adolescents who want to quit smoking.	3 remote villages on the coast of western Alaska (populations ranging from 750 to 1,000) Most residents live subsistence lifestyles.	n = 49 Alaskan Native participants 61% female Age: mean = 14.6 (SD = 1.6).	Focus groups.	Motives for quitting, barriers to quitting, role of family members and others in quitting, preference for tobacco cessation methods, preference for study recruitment and retention methods.	Content analysis.	Cravings. Use as a stress/anger management. Use of traditional forms of tobacco. Manages mood. Relieves boredom. High prevalence and acceptance of tobacco use in villages Lack of encouragement by peers and other community members to stop. Lack of effective resources to help quit
Wood et al 2008 (87). AUS	The aim of this study was to explore the experience of tobacco smoking and cessation within a pregnant Aboriginal and Torres Strait Islander sample.	Perth (State capital), Western Australia.	n = 40 Aboriginal women and 10 Aboriginal Health Workers Age: ranged from 14 to 50 years, with most less than 30 years.	Focus groups and in-depth interviews.	A semi-structured discussion guide with open-ended questions was developed in consultation with the reference group.	Thematic analysis. QSR N6 NUDIST.	Smoking as an accepted behaviour. Stress management. Low priority in terms of health. Stress. Difficult life circumstances. Relaxation, chance to catch up with others. Pregnancy acted as a barrier as it increased boredom/stress. High levels of smoking amongst friends, family and wider community. To quit you would have to avoid family and friends. Knowledge about the specific risks to the foetus was low. References to babies being healthy despite smoking during pregnancy.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
Mental illness							
Clancy et al, 2013 (102) AUS	Explore experiences of smokers with self-reported depression	Large cluster randomized control study	n = 16	Semi-structured interviews.	Semi-structured interview Attitude towards smoking, relationship between smoking and mental health, quitting process.	Thematic analysis. nVivo 9.	Low mood. Sense of hopelessness. Lack of control over one's life. Lack of meaningful activities.
Davis et al 2010 (89). USA	Investigate how people with severe mental illness perceive risks from smoking/risks posed by smoking.	Large urban psychosocial rehabilitation agency.	n = 31 54% female Ethnicity: 54.8% Caucasian; 35% African American	Semi-structured interviews.	General health and healthy lifestyle questions, smoking status, smoking history, quit attempts and barriers to and facilitators of cessation.	Inductive data analysis. Atlas-ti.	Enjoyment of smoking – pleasurable activity/coping mechanism. Maintain good mental health. Stress management. Worried that without stress management of smoking: relapse, rehospitalisation, suicidal thoughts or suicide were possible. Allowed people to manage other addictions. Not experiencing symptoms of smoking related illness currently. Smoking certain brands, types or flavours of cigarettes because they are less likely to cause cancer. Extreme trauma and negative life experiences act as a protective factor for smoking related illness – "I've made it through life this far, I don't think I'll get sick from smoking too" belief. Examples of friends and family who are/were smokers and have never been ill. Examples of friends/family who are not smokers who are still unhealthy. Friends and family socialising and smoking at the same time.
Howard et al 2012 (91).	Investigate the specific barriers to smoking cessation faced by pregnant smokers.	Maternity and perinatal psychiatry services.	n = 27 100% female Age: mean = 29 (SD = 1.1), ranged from 17 – 41.	Semi-structured interviews.	Not reported.	Framework analysis.	Smoking used as a way of losing weight (for participants diagnosed with SMI and eating disorder). Maintain good mental health. Only occurring during manic/depressive cycles. Fear that attempts to quit would increase symptoms of mental illness.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
UK			Ethnicity: 13 White; 4 Black African; 6 Black Caribbean and 4 Mixed/Other.				Prioritisation of mental health over smoking cessation by health professionals. Social environment – family, partner and social network of peers – high prevalence of smoking and lack of support. Accessibility of cigarettes. Psychological and physical addiction to cigarettes. Quit smoking services and resources: judgemental, lack of proactive follow up, lack of continuity of care, prioritisation of mental health over smoking.
Kerr et al 2013 (92). UK	To determine the principle barriers and facilitators to smoking cessation for people with mental health problems	Recruited from three Health Boards in Scotland, UK.	n = 27 participants with mental health problems 41% male Age: median = 49, ranged from 30 to 60. Diagnosis: 41% Schizophrenia/ delusional disorder; 30% Affective disorder; 22% Schizoaffective disorder; 4% neurotic disorder and 4% neurotic-affective disorder.	Semi-structured interviews.	Smoking history; positive and negative aspects of smoking perceived barriers and facilitators to smoking cessation; times when smoke more or less; impact of mental health problem on smoking and cessation	Framework analysis. NVivo 8.	Socialising and habits of family and friends Smoking as a calming agent; dealing with general stressors and anxiety linked to mental health problems. Stopping smoking would mean loss of coping mechanism/support. Maintain good mental health. Deterioration in mental health increases need for smoking. Stimulant effect helped overcome side effects from medications, in particular antipsychotics. Habit and addiction (small numbers). Enjoyment. Lacking motivation and confidence to give up. Lack of support from health professionals – uncommon to raise issue of smoking, offer encouragement support to stop. Some reports of professionals actively discouraging cessation attempts.
Lawn et al 2002 (93).	Describe the experience of mental health clients as they relate to smoking	Mental health services.	n = 24 50% female Age: ranged from 25 – 63 years old.	Semi-structured interviews.	Cigarette use; quit history, use of NRT and other aids; meanings of smoking, attempts	Thematic analysis.	Cigarettes as a symbol of control, fulfilling needs of: safety, reassurance, predictability, autonomy. Allowed greater freedom to take part in social activity.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
	behaviour, the relationship of smoking behaviour to the course of their mental illness and its management and to their attempts to quit smoking.		Diagnosis: 6 chronic paranoid schizophrenia; 6 major depressive disorder; 6 bi-polar affective disorder; and 6 borderline personality disorder.		to quit, relationship between smoking and mental illness, experiences in hospital.		Promote more control – over symptoms, mood, and emotions. Cigarettes sued by staff as tools to reward, punish or control behaviour. Smoking is the most effective means of avoiding relapse. Smoking as freedom, rebellion and protest. Little hope for recovery. An alternative way out to taking direct action – suicide'. Enjoyment. Compensation for losses in other areas of life. Smoking to relieve physical symptoms of mental illness – while many of their symptoms could be described as withdrawal/cravings form cigarette, most attributed these to symptoms of relapse to MI. Tools for decision making, clear thoughts, compartmentalise time, avoidance. Relieve stress, anxiety, to relax. Aid sleep, motivation, stabilise mood swings. Identity as a smoker – companionship of cigarettes. Families, friends, peers all smokers. Service providers and family condoning or colluding with their smoking. Few participants thought they could be successful. Few participants had tried NRT, citing cost as the main barrier. Excluded from mainstream quit programmes. Misunderstood and judged, double dose of stigma from smoking policy changes.
Lucksted et al 2000 (94). USA.	Explore pros and cons of smoking and quitting smoking in psychosocial rehabilitation clients.	One urban and one suburban psychosocial rehabilitation groups.	n = 40 70% male Demographic characteristics (including diagnosis) were not assessed.	Focus groups.	Semi-structured discussion guide: Positive and negative things about quitting, barriers and facilitators to	Thematic analysis.	The positive anti-depressive, anti-anxiety, calming, and cognitive-focusing effects of tobacco. Symptom management (symptoms of mental illness and also side effects from medications). Boredom. Enjoyment

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
					quitting, other issues.		Others beliefs – friends and family encouraging smoking as it was perceived to be one of few positive things in the individual's life. Ignoring health effects and health campaigns or accepting the risks. Lack of motivation. Smoking offered sense of identity and feeling included.
Morris et al 2009 (95). USA.	To explore the perceptions of clients and staff on how best to quit smoking.	Consumers of mental health services in both rural and urban areas of Colorado.	n = 62	Focus groups.	Preferences for smoking cessation, views on current resources available, health professional practices that aid in cessation, factors that prevent cessation.	Content analysis. NVivo 7.	Lack of resources to aid in cessation. Seeing health professionals smoking had a negative impact on participants' motivation to quit. Earning smoking as a behavioural reward. Negative expectations of the ability of people with a mental illness to quit smoking. Little knowledge of the negative health effects of cigarette smoking. Smoking to manage stress/anxiety/tension, psychiatric symptoms, and to enhance cognitive ability. Boredom. Smoking viewed as a social event, as a way of connecting with others. Peer smoking.
Nawaz et al 2012 (96). USA	To explore the smoking and quitting beliefs, attitudes and behaviours amongst smokers with severe mental illness from three different race/ethnicity groups.	Large psychiatric rehabilitation agency in Chicago, Illinois.	n = 36 Ethnicity: 17 African American; 12 Latino; 7 White. Diagnosis: 14.3 – 33.3% Schizophrenia/ Schizo-affective; 14.3 – 23.5% bipolar depression; 35.3 – 50% Major	Focus groups.	Not reported.	Qualitative analysis. Atlas.ti.5.7.1.	Tobacco use promoted, normalized and reinforced in mental health treatment community. Smoking ameliorated illness symptoms and memories of traumatic experiences. Manage daily stress that might otherwise aggravate mental illness symptoms. Smoking norm amongst peers in treatment settings – highly prevalent. Use of cigarettes to manage/reward behaviour. Policies that prohibited smoking in only parts of treatment centres/halfway houses etc. Difficulty of quitting Lack of access to treatment – directly linked to poor health insurance and poverty. Financial cost of NRT and other pharmacotherapies.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
			depression; 11.8 – 28.6% not specified.				
Prochaska et al 2013 (103) USA	Aimed to obtain formative data to guide development of a tobacco cessation smoking program for youth with co-occurring mental health disorders	Outpatient mental health settings in the san Francisco bay area.	n = 14 43% female. Between ages of 16 – 23.	Semi-structured interviews.	Semi-structured interviews: reasons for smoking, perceived relationship between tobacco use and mental health issues, perceptions of smoking and preferences for program characteristics.	Content analysis. ATLAS.ti	Failure to enforce no smoking ban in the home Parental smoking Peers who smoke being a negative influence Difficulty maintaining relationships if quit smoking Stress Affect Other substances Addiction Media images
Ratschen et al 2010 (105) UK	To explore patients' experience, smoking behaviour and symptoms of nicotine withdrawal in the context of a comprehensive smokefree policy on mental health acute wards.	Two acute mental health wards and one ten bed intensive care unit.	n = 15 60% male Mean age: 42.3 (ranged from 27 – 61). Mental illness diagnoses: Schizophrenia, schizotypal disorders (n = 5); mood and affective disorders (n = 7); neurotic, stress related and somatoform disorders (n =	Semi-structured interviews.	Current smoking behaviour, their individual experience, knowledge, beliefs, and feelings related to smoking, quitting smoking, the smoke-free policy and the environment of the wards; the support offered to them on the wards; and their potential interest in further support.	Framework analysis.	Dealing with stress. Dealing with boredom. Habit. Enjoyment. Anxiety. Peer pressure. NRT use: Disliked the taste of nicotine gum, reported allergic skin reactions to patches, and, for one participant, a fear of NRT. Negative reactions to taking additional medication on top of that for their mental illness

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
			1); organic disorder (n = 1).				
Snyder et al 2008 (97). USA.	Identify multi-level factors that impact on smoking cessation with people with mental illness.	Two psychiatric rehabilitation centres within the mid-west of the USA. One dual diagnosis, one offering rehabilitation services for predominantly African American people with mental illness.	n = 25 75% male Aged between 24 and 55. Diagnoses not reported.	Focus groups.	Views and perspectives on smoking and cessation, factors that acted as motivators for smoking, factors that motivated cessation.	Iterative analysis process. QSR NUDI*ST N4.	Low confidence in quitting. Desire to smoke was stronger than desire to quit. NRT seen as ineffective leading to feelings of hopelessness. Sense of autonomy over behaviour; participants felt that making the choice to smoke was empowering. Conversely, a sense of having no control over smoking due to addiction was also a barrier. Smoking as a central part of life. Coping mechanism for stress, anxiety, depression, boredom and loneliness. Cigarettes were an affordable luxury. Being able to purchase cigarettes was a source of self-esteem. Belief that if they quit, they would have nothing else enjoyable to do. Beliefs around the health effects of smoking: Participants reported health benefits from smoking and minimised health risks. Non-smokers are able to refrain from smoking because they are not disadvantaged. Belief that non-smokers don't have as much fun. Feeling judged or nagged by non-smokers. Smoking offering opportunity for connection and social interaction. Boredom; days left relatively unstructured so smoking filled in the time.
Solway et al, 2011 (98). USA.	Explore the perceptions of people with mental illness on smoking and smoking cessation.	Outpatient mental health services	n = 26 38% female Mean age: 62 (ranged from 41 – 82). Nearly all participants had been diagnosed	Focus groups.	Semi-structured interview protocol.	Constructivist grounded theory.	Perceived benefits of smoking outweigh the negative health risks. Enjoyment. Relaxation. Experience cravings when feeling anxious or upset or in the company of other smokers. Sense of control over emotions.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
			with severe mental illness.				Feeling extremely daunted about the quit process and withdrawal symptoms in general. Cost and accessibility of NRT. Lack of willpower, motivation and the right frame of mind. Smoking provides an identity and also acts as a source of connectedness over the sense of exclusion/stigma of having mental illness. Freedom, exercise their right to choose and maintain independence. Smoking as a 'friend'. Symptom management. Continued smoking eliminates withdrawal symptoms. Other's expectations of their ability to quit smoking. Feeling that smoking and medications to treat mental illness are related. Smoking to relieve side effects of medication. Weight gain.
Tsourtos et al 2008 (99). AUS	Explore why non-smokers appear to be resilient to smoking in a highly acceptable and prevalent group.	General practice and a range of mental health services	n = 34 58% female All had diagnoses of depression.	Semi-structured interviews.	Smoking and participants' social environment throughout the lifecourse.	Components of Grounded Theory were used with an analytic framework. NVivo 8.	Smoking to deal with stress: Stressors included: boredom; physical injury; death of a loved one; stressful occupation; relationship breakdown; one or more medically diagnosed disorders. Coping mechanism. Relaxation. Comfort. Strength. Quitting smoking would exacerbate stress. Depression and anxiety made quitting more difficult.
Homeless							
Okuyemi et al 2006 (108).	Examine the views of homeless people on smoking practices, knowledge and	Homeless service facilities	n = 62 68% response rate 70% male Ethnicity: 58% black; 37%	Focus groups.	Smoking history; quitting experiences; smoking cessation aids (NRT and other medications);	Principles outlined by Morgan and Krueger. Atlas-ti v 4.1 used for coding.	Low self-efficacy. Limited access to care (cost of cessation aids). Service providers offer limited support to quit. Competing needs e.g. food, shelter. Uncertainty associated with being homeless. Limited structure and routine – keeping busy to avoid boredom.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
USA.	barriers to and interest in quitting.		white and 5% other. Age: mean = 41.5 (SD = 9.3). Education:73% high school educated or lower.		preferences for smoking cessation treatment.		Smoking as a socially acceptable behaviour in homeless settings. Few restrictions in homeless services. Fear that quitting smoking may result in changes in emotion/stress levels that may impact negatively on other areas of life. Concerns about using NRT and cost, taste, proper usage and side effects, interactions with other medications and effect on other health conditions. Concern about becoming addicted to NRT.
Prisoners							
Richmond et al 2009 (110). AUS.	Investigate tobacco and its role in prisons.	One maximum security prison and one community justice restorative centre.	n = 40 (9 prisoners and 31 ex-prisoners). 30% female Age: ranged from mid 20s to late 40s. Ethnicity: 4 Aboriginal Australian participants	Focus groups.	Role of tobacco in prisons, reasons for smoking initiation, smoking cessation, methods to quit.	Content analysis.	Poor knowledge of cessation strategies. Some had not heard of bupropion, would not attend a doctor for assistance and would not attend quit smoking programs once in the community. Smoking as a normal practice in prison. Cigarettes as a substitute for money. Boredom, stress, anxiety regarding legal matters, being locked up for large portions of the day and social isolation. Cigarettes/smoking used as a reward. Transfer to another wing or prison. Bullying, missing family, isolation,
At risk youth							
Lewis et al 2013(111) UK	Aims to contribute to the existing literature on smoking and young people and to clarify how factors related to young people and smoking play out in disadvantaged communities.	Communities in North East of England – deindustrialisation – former coal mining village.	n = 52 58% female Aged between 11 to 18 years.	Participant observation.	NA	Thematic analysis.	Surrounded by other smokers makes it too hard to quit. A lot of family and friends smoke Helps with stress – conflicting messages – some participants felt it did and did not relieve stress. For fun and enjoyment. Accessibility and availability: tab (cigarette) houses – private dwellings where people can buy cigarettes- always sell to underage people. Buying a packet from the tab houses and then selling at school.

Author, Year, Country	Study aims	Setting	Sample	Method	Interview schedule/discussion guide	Type of analysis	Barriers to quitting
							Mixed messages regarding smoking: people in authority not discouraging or addressing smoking (e.g. teachers, police force).
Multiple groups							
Garner et al 2013 (112) UK	Explore homeless smokers' views, attitudes, experiences and knowledge with regard to smoking and quitting in an urban UK setting.	One drug harm reduction and sexual health service commissioned by the NHS in Nottingham city centre.	n = 15 73% male Aged between 18 to 53 years; mean = 33.	Semi-structured interviews.	Demographics, smoking history, nicotine dependence, quitting related behaviours, experiences and attitudes.	Framework analysis.	Low confidence. High prevalence of peer smoking behaviour. Exposure to a social environment where smoking was the norm. Homeless service staff providing cigarettes. Use of cigarettes as a reward for carrying out small jobs around the service. Use of other substances including alcohol and other drugs. Stress management within already stressful life circumstances. Lack of encouragement or active discouragement by health professionals to quit.

Appendix 14.4 Supplementary file 4. Summaries of the included mixed methods studies by disadvantaged group (n = 3).

Author, Year, Country	Study aims	Setting	Sample	Response rate	Type of survey (cross-sectional, etc)	Outcome measure (and info on survey instrument)	Qualitative method and type of analysis	Quantitative results (barrier and prevalence)	Qualitative data (barriers identified)
Indigenous studies									
Glover, 2005 (79). NZ.	Increase the understanding of smoking in Maori populations and best ways to affect smoking cessation.	Not reported.	n = 130 self-identified Maori participants. 78% female. Age: mean = 35 (ranged from 16 – 62).	Not reported.	Pre and post interviews after a quit attempt (both open and close ended questions).	Smoking history, Smoking behaviour, Quit history, Fagerstrom NDT, Experience of relapse, Reasons for smoking, Motivation to quit, Self-efficacy, Stage of Change, Methods of quitting, Quit abstinence –	Semi-structured interviews General inductive approach. QSR NUD*IST Release V4.0.	Habit: 73% Normal to smoke: 11.5% Coping with stress: 48% Coping with emotions: 23% Addiction: 39% Socialising/drinking: 34% Bored: 29% Enjoyment: 25% Time out/reward: 17%	Relapse was also related to poor self-esteem and a tendency to attribute blame to themselves. Living with other smokers. Family (Whanau) directly or indirectly supporting relapse. Socialising. Others smoking.

Author, Year, Country	Study aims	Setting	Sample	Response rate	Type of survey (cross-sectional, etc)	Outcome measure (and info on survey instrument)	Qualitative method and type of analysis	Quantitative results (barrier and prevalence)	Qualitative data (barriers identified)
						not biochemically verified.			
Mental illness studies									
Goldberg et al 1996 (90). CAN	Identify what clients identify as barriers and facilitators to cessation.	Community based psychiatric rehabilitation program (mid-sized urban Canadian).	n = 105 68% male Age: mean = 35 (ranged from 20 to 58 years). Diagnoses not reported.	93%	Telephone and face to face interviews.	Reasons for smoking, why it is hard to quit, beliefs about support required to change smoking behaviour.	Focus groups. Type of analysis not specified.	Addiction: 53% Difficulty resisting cravings: 33% Enjoyment: 20% Relieving symptoms: 20% Habit: 19% Boredom: 17% Most or all friends are smokers: 12.5% Low cost of cigarettes: 8% to smoke, lack of support to quit. Smoking as a social activity.	Afraid of giving up old friend. Withdrawal symptoms. Enhanced mood. Cheap thrill. Coping strategy when stressed. Something to do. Apathy and daily drudgery associated with psychiatric disability. Peer pressure to smoke. Lack of support from peers to quit. Smoking as a social activity. Receiving cigarettes form family and friends.
Van Dongen et al 1999 (100). USA	Examine the experiences of persons with persistent mental	Outpatient clinic, Midwest, USA.	n = 36 75% male Age: mean ranged from 45 to 49. Diagnosis:	Not reported	Cross-sectional survey.	Not reported.	Interviews. Content analysis.	Habit and routine: 58% Socialization: 58% Relaxation: 42% Addiction to nicotine: 33%	Smoking provided structure and activity. Something to do. Way to deal with stress.

Author, Year, Country	Study aims	Setting	Sample	Response rate	Type of survey (cross-sectional, etc)	Outcome measure (and info on survey instrument)	Qualitative method and type of analysis	Quantitative results (barrier and prevalence)	Qualitative data (barriers identified)
	illness and smoking.		Schizophrenia (70% - 90%); schizoaffective and mood disorders were the other diagnoses present.						

Appendix 14.5 Supplementary file 5. Overview of study characteristics

Study characteristics

Approximately half (52%) of the studies had been published from 2009 onwards. Apart from three studies (86, 103, 111), all participants were adults aged 18 years and over. Studies were carried out in the USA (n=29) (49, 51, 54, 56, 60, 66, 70, 72, 73, 76, 78, 81, 82, 84, 86, 88, 89, 94-98, 100, 101, 103, 104, 106-108); Australia (n=15) (29, 52, 55, 57, 68, 74, 75, 80, 83, 85, 87, 93, 99, 102, 110); the United Kingdom (n=13)(50, 53, 61, 62, 67, 69, 71, 91, 92, 105, 109, 111, 112); Canada (n=5) , New Zealand (n=2) (77, 79) and France (n=1) (59). Qualitative (n=54) (29, 49-59, 61-69, 71-78, 80-87, 89, 91-99, 102, 103, 105, 108, 110-112); quantitative (n=8) (26, 60, 70, 88, 101, 106, 107, 109) and mixed method studies (n=3) (79, 90, 100) were included. Of the qualitative studies, 26 used focus group methods (29, 49, 51, 52, 54-56, 61, 62, 65, 66, 72, 73, 76-78, 80-82, 84, 86, 94, 96, 97, 108, 110); 19 used interviews (50, 53, 57-59, 67, 69, 71, 75, 83, 89, 91-93, 99, 102, 103, 105, 112) and eight used a combination of interviews and focus groups (63, 64, 68, 74, 85, 87, 95, 98). One qualitative paper used participant observation methods (111). All eight quantitative studies utilised cross-sectional survey methods (26, 60, 70, 88, 101, 106, 107, 109). Two mixed methods studies used both cross-sectional surveys and interview ((79, 100) and one mixed methods study used cross-sectional surveys and focus groups (90). Twelve studies included only female participants (53, 54, 56, 58, 63-65, 67, 76, 85, 87, 91), five of which were carried out with pregnant women (54, 58, 67, 87, 91). Two studies were carried out with men only; partners of women who were pregnant (57) and disadvantaged former miners (71).

Quality assessment of qualitative studies

This figure includes assessment of the qualitative components of the mixed methods studies. The majority of studies did not explicitly state their study design (n = 42); of those that did, most used Grounded Theory (57, 59, 61, 93, 98, 99). Most studies provided adequate descriptions of the study sites; participants; data collection methods and analysis techniques. Only a small number of studies (n = 11) (51, 54, 58, 75, 76, 78, 83, 84, 96, 111, 112) addressed the role of the relationship between participants and the researcher and fewer still identified potential assumptions and biases of the researcher (n = 5) (51, 54, 61, 83, 98). Studies generally performed poorly when assessed on four components of trustworthiness, with only 17 studies meeting all four criteria (credibility; transferability; dependability and confirmability) (49, 52, 56, 58, 65, 67, 71, 73, 74, 77, 78, 80, 82, 83, 85, 86, 93). It should be

noted that none of the mixed methods studies explicitly described their methodology as mixed methods nor did they report integrating the qualitative and quantitative findings in a systematic way.

Quality assessment of quantitative studies

The results of the quality assessment of quantitative studies are provided in Supplementary file 6. This table also provides assessment of the quantitative components of included mixed methods studies. Sample sizes in the quantitative studies ranged from 36 to 500 participants. Response rates ranged from 42% to over 97% (four studies did not provide response rates) (79, 100, 104, 106). All but one study (90) clearly stated eligibility criteria. The majority of studies adequately described the research aims (60, 70, 79, 88, 90, 101, 104, 106, 107); source of participants(60, 88, 90, 100, 106, 107) and addressed potential sources of bias within their analysis (60, 88, 107, 109). All studies stated their outcome *a priori* and no conflicts of interest were identified. Eight studies used convenience sampling (88, 90, 100, 101, 104, 106, 107, 109). The validity and reliability of survey measures used to assess barriers to cessation were reported in one study (60). Three studies employed techniques such as pilot testing and input from key stakeholders in developing the tools used (60, 70, 109).

Number of studies meeting all criteria for quality assessment

(Bar chart with the following values)

Category	Number of studies
Study design	7
Sampling	10
Data collection	3
Procedural rigour	38
Data analyses	42
Auditability	5
Theoretical connections	54
Overall rigour	17

Legend: Number of studies meeting all criteria for quality assessment
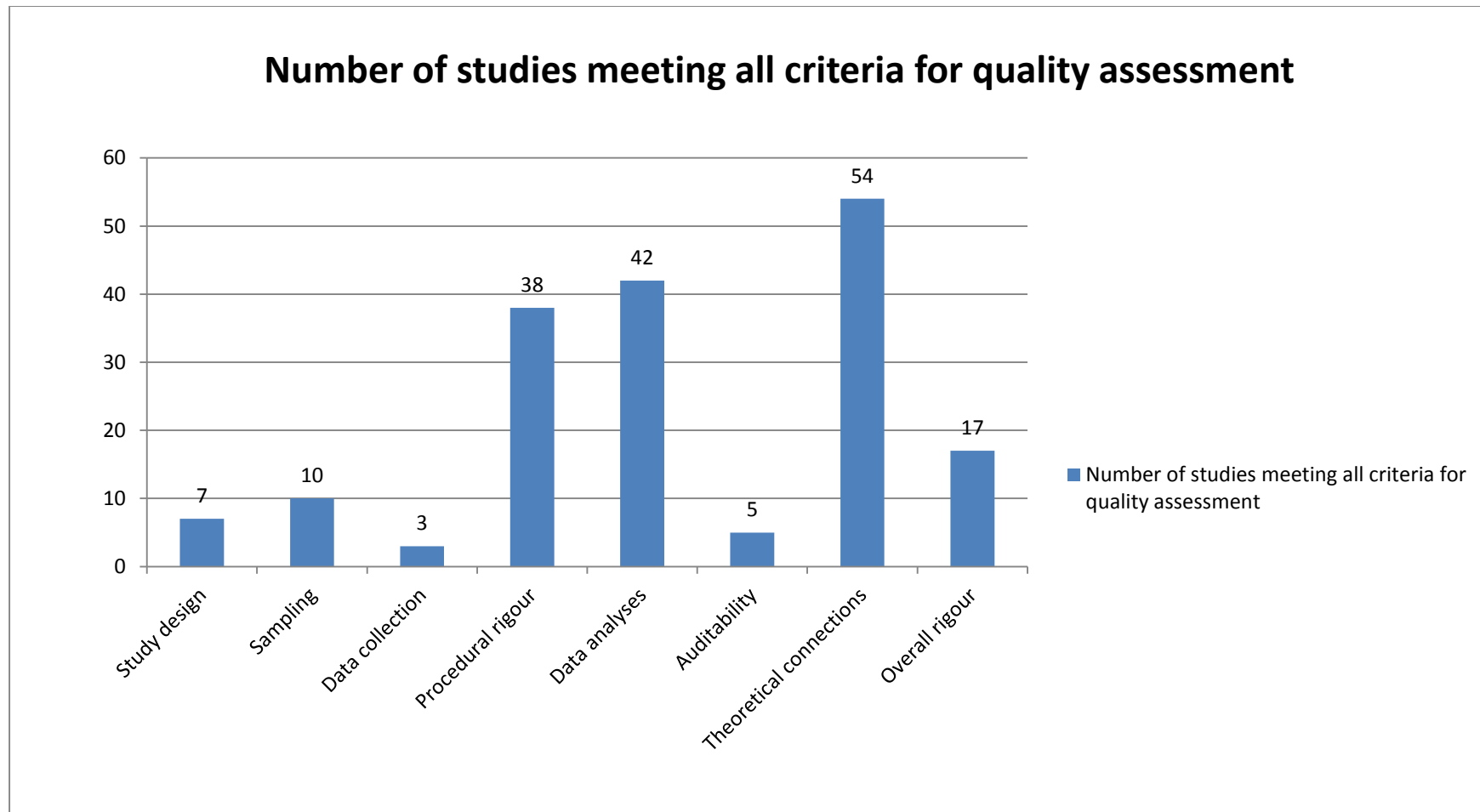
Appendix 14.6 Supplementary file 6. Quality of included qualitative studies and qualitative components of mixed methods studies (n = 57)

Appendix 14.7 Supplementary file 7. Results of the quality assessment of quantitative studies and quantitative components of mixed methods studies

Study author and year	Aims	Selection methods			Was the measurement of variables appropriate?			Control of bias			Was the use of statistics appropriate?		Conflict of interest
	Aims clearly stated?	Eligibility criteria stated?	Source of participants described?	Selection method?	Validity of measures?	Reliability of measures?	Other method used?	Potential sources of bias?	Methods to deal with bias?	Response rate (%)?	Sample size?	Primary outcome stated a priori?	None stated?
Price et al 1994 (60)	✓	✓	✓	Random sampling	✓	✓	✓	✓	✗	42	500	✓	✓
Rosenthal et al 2013 (70)	✓	✗	✓	Random sampling	✗	✗	✓	✓	✗	73	350	✓	✓
Dickens et al 2005 (109)	✗	✓	✓	Convenience sample	✗	✗	✓	✓	✗	44.1	45	✓	✓
Connor et al 2002 (107)	✓	✓	✓	Convenience sample	✗	✗	✗	✓	✓	>97	236	✓	✓
Asher et al 2003 (101)	✓	✓	✓	Convenience sample	✗	✗	✗	✗	✗	73	96	✓	✓
Carosella et al 1999 (88)	✓	✓	✓	Convenience sample	✗	✗	✗	✓	✗	80.9	89	✓	✓
Orleans et al 1993(104)	✓	✗	✓	Convenience sample	✗	✗	✓	✗	✗	✗	✗	✓	✗

Study author and year	Aims	Selection methods			Was the measurement of variables appropriate?			Control of bias			Was the use of statistics appropriate?		Conflict of interest
	Aims clearly stated?	Eligibility criteria stated?	Source of participants described?	Selection method?	Validity of measures?	Reliability of measures?	Other method used?	Potential sources of bias?	Methods to deal with bias?	Response rate (%)?	Sample size?	Primary outcome stated a priori?	None stated?
Arnsten et al 2004(106)	✓	Y	✗	Convenience sample.	✗	✗	✗	✗	✗	✗	98	✓	✓
Glover et al 2005 (79)	✓	✓	✗	Not reported	✗	✗	✗	✗	✗	✗	130	✓	✓
Van Dongen et al 1999(100)	✗	✓	✓	Convenience sample	✓	✗	✗	✗	✗	✗	36	✓	✓
Goldberg et al 1996(90)	✓	✓	✓	Convenience sample	✗	✗	✗	✗	✗	93	105	✓	✓

Appendix 14.8 Supplementary file 8: Detailed summary of barriers identified

Individual & lifestyle factors

Relaxation, stress and mood management

Forty qualitative studies identified stress management as a significant barrier to smoking cessation (50-56, 58, 59, 61-63, 65, 67-69, 72, 74, 75, 80, 81, 83, 84, 86, 87, 89, 90, 92, 93, 95-97, 99, 100, 103, 105, 108, 110-112). Smoking was used as a coping mechanism (52, 58, 62-65, 69, 74, 89, 90, 92, 97, 99) in reaction to daily stressors as well as the stress inherent in disadvantaged lives. Three quantitative studies reported stress management as a barrier to quitting with Maori participants (48%) (79), participants with substance use disorders (39%) (104) and homeless participants (44%) (107). Of note, participants in two studies reported that smoking also directly contributed to the stress experienced by participants (51, 111). Participants also reported using smoking to manage their emotions and mood (58, 65, 72, 83, 84, 90, 93, 98, 103, 113). Twenty three percent of participants from a Maori sample indicated managing emotions was a barrier to quitting (79), 42% of individuals with a substance use disorder (101).

Enjoyment of smoking

Across 22 studies, smoking was described as an enjoyable activity (50, 55, 56, 59, 62, 63, 65, 67, 79, 81-83, 88-90, 92-94, 97, 98, 105, 111). In quantitative studies, proportions of participants who said enjoyment prevented them from quitting ranged from 25% (79) to 47.2% (88). Smoking was viewed as an affordable, rewarding luxury (50, 55, 63, 79, 93, 97) and the only pleasurable activity some participants had (50, 56, 59, 62, 65).

Physical addiction to nicotine

Addiction to nicotine was reported as a barrier in 15 qualitative studies (49, 50, 54, 59, 67-69, 72, 74, 75, 81, 83, 84, 91, 92) (103) and four quantitative studies (60, 79, 90, 100). Proportions of individuals who reported addiction to nicotine as a barrier ranged from 33% (100) to 86% (60). The experience of withdrawal symptoms was a barrier to quitting in nine studies (54, 57, 69, 72, 74, 80, 84, 90, 98). Management of cravings was a barrier in ten qualitative studies (49, 54, 68, 69, 72, 80, 84, 86, 90, 98) and one quantitative study (107) where 50% of homeless participants cited cravings as a barrier to cessation. Withdrawal symptoms were especially a barrier for individuals with substance use disorder, with 87% feeling tense or irritable if they quit smoking, and 48% saying their cravings would be so strong they couldn't stand it (101) .

Behavioural habit of smoking

Five quantitative studies (60, 79, 88, 90, 100) and ten qualitative studies (50, 57, 65, 68, 75, 80, 83, 84, 92, 105) reported habit as a barrier to smoking. Proportions of participants who endorsed habit as a barrier ranged from 19% to 58% in studies carried out with people with a mental illness (88, 90, 100); 82% in a low income sample (60) and 73% in a study conducted with Maori participants (79).

Perceived mental health benefits of smoking

Smoking in order to manage the symptoms of mental illness was identified in the majority of studies carried out with participants with a mental illness (88-98, 102) as well as managing the side effects from medications (92, 94, 98). Smoking in order to protect mental health was also found in one study conducted with low income pregnant women (67). In two community surveys a history of depression was reported as a barrier to smoking cessation (58, 74). Participants with mental illness in two studies perceived that the benefits of continuing to smoke far outweighed the potential risks of stopping, which included relapse, rehospitalisation and suicidal thoughts (89, 98). A large portion (78%) of individual's with substance use disorder would feel anxious if they tried to quit (101).

Avoidance of weight gain

Fourteen studies reported that smoking was used in weight management, and that potential weight gain was a barrier to quitting (29, 49, 52-54, 64, 67, 72, 74, 84, 91, 98, 101, 107) . Twenty percent of homeless participants endorsed weight gain as a barrier to quitting (107) and in 20% of individual with substance use disorder (101). Smoking was also used to suppress appetite for individuals diagnosed with an eating disorder (91) and for low income pregnant women (67).

Competing priorities and needs

Competing needs, including finding shelter or food for those who were homeless (108); addressing mental health issues (89, 98); or addressing other physical illnesses (56, 74, 99) often meant that smoking cessation was not a priority for participants or those involved in their care in ten studies (56, 63, 74, 75, 87, 89, 91, 98, 99, 108).

Rationalisations to continue smoking

Lack of acknowledgement of the health-related harm of tobacco use was reported in eight studies (56, 58, 67, 74, 82, 87, 89, 97). Rationalisations to continue smoking were also reported in ten studies (54, 55, 58, 61, 67, 74, 78, 82, 89, 97) and included the belief that smoking certain brands/strengths of cigarettes meant a lower likelihood of developing cancer (82); not experiencing any signs or symptoms of smoking related illness at the present time (54, 58); fatalistic beliefs (56); providing examples of relatives or other persons who are

smokers and who are healthy (80, 87); and the experience of disadvantage as a protective factor against developing smoking related illness (89).

Other substance use

Participants identified associations between smoking and other behaviours in eight studies including alcohol use (49, 74, 76, 80, 84, 112) cannabis and caffeine (49, 81, 112). Approximately one third (34%) of Maori participants identified alcohol use as a barrier to quitting smoking(79). Smoking was used to manage other addictions and prevent relapse (59, 89, 103). Alternatives to smoking included drug use, relapse to alcohol addiction and losing control; all of which were unacceptable to participants (56, 62, 89). For 41% of those diagnosed with a substance use disorder, quitting would make it harder to remain sober and 13% wouldn't be able to control their cravings for other substances if they quit smoking (101).

Sense of autonomy

Participants across seven studies reported that smoking provided a sense of autonomy, control (56, 58, 68, 83, 93, 97, 98) and power (99) over lives that were often chaotic and out of control. On the other hand, participants with mental illness identified the lack of control they had over smoking as a barrier to quitting (102).

Low confidence and perceived difficulty of quitting

Low self-efficacy (52, 93, 106, 107) and low confidence (92, 97, 112) was reported in seven studies. The belief that willpower was the single-most important factor needed to successfully quit was reported in five studies (51, 52, 64, 67, 69). Participants also reported that the process of quitting smoking was too hard (52, 80, 96, 98), including 73.5% of prisoners and ex-prisoners surveyed (109) and 58% of individuals with a substance use disorder (101). Smokers with depression reported it was hopeless to try to quit (102). However, the opposite was reported by a sample of former miners, who maintained they were able to stop smoking at will, with minimal difficulty and need for support (71). Twenty five percent of individuals with substance abuse disorder said they did not know how to quit (101).

Perceived cognitive benefits of smoking

Enhanced concentration and other cognitive benefits associated with smoking were reported in six studies (51, 83, 90, 93-95), including 56% of individuals with a substance use disorder (101).

Combatting loneliness

Smoking provided a way of reducing loneliness in six studies (52, 59, 65, 93, 97, 98); providing companionship (93) and was described as a friend (52, 98) by participants.

Perceived low individual risk of harm

Whilst most of the studies reported that participants had good knowledge of the health risks associated with smoking, low levels of knowledge about the risks of smoking were identified as barriers to cessation (58, 87, 95, 97) including one study conducted with pregnant women (58) and two studies conducted with Indigenous Australian pregnant women (80, 87). Low knowledge of the risks of smoking whilst pregnant were also identified (58, 87). In a study conducted with former miners, participants were more likely to attribute their current health issues to coal dust exposure, rather than smoking. Additionally, participants rationalised continuing smoking by weighing the risks of smoking in comparison to the risks of coal mining (71).

Low motivation

Low levels of motivation to quit smoking were reported in four studies, all of which were carried out with participants who were diagnosed with a mental illness (92, 94, 97, 98). Additionally, 38% of individuals from a low income areas (70) and 47% of individuals diagnosed with a substance use disorder (101) also reported low levels of motivation to quit.

Failed past quit attempts

Past failed attempts to quit smoking were identified as barriers to future attempts in two qualitative studies (61, 74) as was a sense of hopelessness after trying many methods and remaining unsuccessful (87).

Positive smoker image

Two studies within low income samples reported associations between smoking and perceptions of being cool and sophisticated (29, 57) and one study with persons with a mental illness found that participants believed that non-smokers do not have as much fun as smokers (97). In a sample of young people with mental illness, positive media images were also reported as barriers to quitting (103).

Social and community networks

High prevalence and acceptability of smoking in community

Eight qualitative (53, 54, 69, 75, 79, 80, 98, 111) and four quantitative (60, 101, 107, 109) studies found that being around other smokers was a barrier to quitting. This finding is compounded by participants describing the high prevalence of smoking amongst family and friends in 23 studies (29, 51, 52, 56, 62, 68, 69, 72, 74, 76, 81, 83, 85-87, 90, 93, 95, 96, 103, 105, 111, 112) and in the wider community in 18 studies (29, 51, 52, 56, 62, 66, 69, 72, 74, 76, 81, 83, 85-87, 93, 96, 112). Tobacco was readily available and easily accessible within disadvantaged communities (51, 62, 66, 76, 83, 90, 91, 111) and smoking was considered to

be a highly acceptable (29, 79, 81-83, 85-87) and normalised behaviour (52, 56, 62, 66, 69, 79, 81-83, 85, 87).

Lack of social support

A lack of social support to quit smoking was reported in 12 studies (29, 56, 58, 64, 67, 68, 75, 79, 84, 98, 107, 108) and a lack of support from family and friends in particular was a barrier in 14 qualitative studies (49, 54, 55, 58, 69, 74, 75, 77, 79, 83, 84, 87, 91, 94). In one quantitative study, only 21% of homeless individuals agreed that close friends or family would be helpful in quitting smoking and only 29% believed that close friends and family wanted them to quit very much (106). Similarly, 26% of homeless respondents cited a lack of support during a quit attempt as a barrier to successfully quit (107).

Smoking as a social activity

Tobacco use and socialising were linked in two quantitative studies (88, 100) and 20 qualitative studies (29, 49, 53, 57, 62, 73-75, 79, 80, 85, 87, 89, 90, 92, 93, 95, 97, 98, 103): where participants reported that using tobacco helped to facilitate social connections amongst family, friends and strangers.

Lack of health and other professional support to quit

Thirteen qualitative studies (52, 55, 56, 58, 74, 77, 83, 86, 91, 92, 95, 108, 112) and one quantitative study (109) reported a perceived lack of support from health professionals regarding smoking cessation. Cases of family members and health professionals actively discouraging quit attempts and encouraging maintenance of smoking due to concerns about the individual's mental health (92, 93, 95, 96, 112) or because smoking was perceived to be the individual's only source of enjoyment (54, 77, 79, 83) were reported. Three studies identified tobacco use by health professionals and others involved in the participants' care as a barrier to cessation (77, 95, 109) and one study reported service staff providing cigarettes to homeless clients as a barrier (112). Over half (55.9%) of prisoners surveyed reported observing members of staff smoking as a barrier to quitting (109). Participants also reported that cigarettes were used as a way to reward or punish behaviour by health professionals and other service providers (93, 95, 96, 110). Twenty-nine percent of prisoners also indicated that not receiving cessation support from prison staff prevented them from quitting smoking (109). Twenty-six percent of substance abusing individuals reported they did not have enough support to quit. The study involving at risk youth identified mixed messages sent by those in places of authority (for example teachers, members of the police force) also acted as a barrier for at risk youth (111).

Living and working conditions

Access to resources to quit

Thirteen studies cited the cost of Nicotine Replacement Therapy (NRT) and other pharmacological interventions as a barrier to access that directly prevented cessation (52, 55, 61, 68, 69, 73, 74, 78, 81, 93, 96, 98, 108). Cost was also a barrier for 40% of participants diagnosed with substance abuse disorder (101). There was also poor knowledge and low uptake of programs available to participants (52, 56, 61-63, 72, 74, 78, 86, 96, 108, 110). Social and geographical isolation were reported in four studies as barriers to quitting (56, 62, 64, 85). Geographical isolation referred to the lack of access to cessation services that rural and remote communities experience. Social isolation referred to the racial and economic segregation that separates disadvantaged neighbourhoods and individuals from others (56) further contributing to differences in perceived acceptability and prevalence of tobacco use (62, 85). Unsafe neighbourhoods also limited unnecessary outings and inhibited accessing smoking cessation support (56).

Boredom and limited structure in day to day life

Fourteen qualitative studies (50-52, 54, 55, 65, 75, 86, 94, 95, 97, 99, 108, 110) and four quantitative studies (60, 79, 88, 90) indicated that smoking alleviated boredom. Limited opportunities for leisure and high levels of unemployment often meant that participants had large amounts of free time and smoking was used to mark the transition from one task or part of the day to another (56, 59, 93, 97, 102, 108).

Concerns regarding cessation treatment and services

Ten qualitative studies reported that participants were reluctant to access psychological or pharmacological resources to quit smoking due to a belief that these treatments were largely ineffective (56, 58, 61-63, 69, 72, 80, 81, 97). In one survey almost a third (31%) of homeless participants reported that no existing pharmacological treatments would be able to help them stop smoking (107).

The possible side effects of pharmacological interventions (50, 73, 78, 81, 105, 108), uncertainty about the correct use of pharmacological interventions (52, 81, 108); or the possible interactions between NRT and other medications (108) presented barriers to cessation. Participants in one study reported reluctance to add NRT on top of the medications they were already using (105). Homeless participants in one study expressed concerns about the possibility of becoming addicted to NRT (108). Concerns about existing treatment services included lack of continuity of care(91); being capable of addressing smoking simultaneously with mental health issues (91, 93, 96); cultural appropriateness (74, 77, 78,

86); feeling judged by programs (61, 67, 91, 93) and a cynicism regarding the medical profession (77). Telephone quitlines were not viewed as culturally appropriate resources (77) and participants were sceptical of the effectiveness of quitline support (52).

Stressful factors

Participants across ten studies (56, 58, 59, 62, 63, 65, 68, 74, 75, 85) reported that increased stress due to the events and life circumstances intrinsically linked to their socioeconomic position were barriers to quitting smoking. The following situations compounded feelings of stress, hopelessness and meant that cessation was not prioritised: unemployment (56, 58, 59, 62, 63, 65, 68, 85); poverty and financial stress (62, 65, 75, 85); housing issues including substandard housing, homelessness and overcrowding (56, 58, 75, 85); violence and crime (56, 62, 68, 75); drug use (56, 62, 75); increased morbidity and mortality (68, 74, 75, 85); chronic disease (74, 75); low education (65, 75); and limited recreational activities (62, 65).

Two studies carried out with Indigenous Australians found that additional stressors experienced by this group included racism, stigma, dispossession of traditional lands, high burden of illness, premature deaths within the community and collective grief and loss relating to the Stolen Generation and the removal of children (74, 75, 85). Unique stressors facing prisoners including; transfers within and across prisons; legal matters; bullying; missing family; and restricted movement for most of the day were also identified (110).

Living and working environments

Participants reported lack of control over exposure to smoking due to others smoking in the home; a lack of smoke free policies or policies that did not cover the whole environment or were only partially enforced were barriers to quitting smoking (54, 58, 74, 96, 103, 107). In one study involving prisoners, 59% of participants reported that the 'smoky atmosphere' within the prison was a barrier to quitting (109). Work environments that were conducive to smoking also presented a barrier in one study (29).

Cultural, socioeconomic and environmental factors

Cultural norms

The importance of tobacco use in traditional and ceremonial contexts was expressed in three studies concerning American Indian participants (72, 73, 82) and one study including Aboriginal and Torres Strait Islander participants (85) and one study including Alaska Native participants (86). Cultural values of self-reliance, pride and independence prevented American Indian participants from seeking cessation support in two studies (81, 82) and in one study with low income African Americans (56). Historical factors including dispossession of land, colonisation and collective grief and loss of cultural identity were

reported as barriers to cessation in three studies of Aboriginal and Torres Strait Islanders (74, 75, 85). Studies carried out with American Indian participants (73, 82) and Aboriginal and Torres Strait Islanders (74, 75, 83, 85) highlighted the function of smoking as a way of maintaining cultural identity and belonging. Maintenance of identity and belonging were also reported in three studies concerning people with a mental illness (93, 94, 98) and one study carried out with low income participants in the UK (62). In prison settings, use of cigarettes as a substitute currency also provided a barrier to cessation (110).

Socioeconomic factors

Two qualitative studies reported participants linking their status as smokers and their inability to quit smoking with their lower socioeconomic position (65, 97). In a study conducted with people with a mental illness, participants endorsed the belief that non-smokers were able to refrain from becoming smokers because they were more advantaged (97) and in a study of low income women, participants referred to their low socioeconomic position and poverty as a barrier to quitting smoking (65).

Appendix 14.9: Critical Review Form – Qualitative Studies
© Law, M., Stewart, D., Letts, L., Pollock, N., Bouch, J., & Westmorland, M., 1998
McMaster University

Citation:

	Comments
STUDY PURPOSE Was the purpose stated clearly? _____ Yes _____ No	Outline of the purpose of the study.
LITERATURE: Was relevant background literature reviewed: _____ Yes _____ No What area(s) of occupational therapy were studied? _____ self care _____ productivity _____ leisure _____ performance components _____ environmental components _____ occupation	Describe the justification of the need for this study. How does the study apply to professionals and/or to your research question?
STUDY DESIGN: What was the design: _____ ethnography _____ grounded theory _____ participatory action research _____ phenomenology _____ other _____	What was the study design? Was the design appropriate for the study question? (e.g, for knowledge level about the issue, ethical issues)
Was theoretical perspective identified? _____ Yes	Describe the theoretical perspective for this study.

Note: The words "Occupational Therapist" were changed to "therapist" or "professional" throughout this document for use by the TRIPSCY Evidence-based Journal Club.

_____ No	
Method (s) used: _____ participant observation _____ interviews _____ historical _____ focus groups _____ other _____	Describe the method(s) used to answer the research question.
SAMPLING: The process of purposeful selection was described _____ Yes _____ No Sampling was done until redundancy in data was reached _____ Yes _____ No _____ Not addressed Was informed consent obtained? _____ Yes _____ No _____ Not addressed	Describe sampling methods used. Was flexibility in the sampling process demonstrated? Describe ethics procedure.

DATA COLLECTION:
 	
Descriptive Clarity
Clear & complete description of
site: _____ Y _____ N
participants: _____ Y _____ N
researcher's credentials
             _____ Y _____ N
Role of researcher & relationship
with participants
             _____ Y _____ N
Identification (bracketing) of
assumptions of researcher
             _____ Y _____ N
 	
Procedural Rigor
Procedural rigor was used in the
data collection strategies:
	Describe the context of the study. Was it sufficient for understanding of the "whole" picture?
	
	Describe how elements of the study were documented. What was missing?
	
	Describe data collection methods. How were the data representative of the "whole" picture? Describe any flexibility in the design & data collection methods.

Note: The words "Occupational Therapist" were changed to "therapist" or "professional" throughout this document for use by the TRIPSCY Evidence-based Journal Club.

_____ Yes _____ No _____ Not addressed	
DATA ANALYSIS: **Analytical Preciseness** ____Y ____ N ____ Not addressed Findings were consistent with & reflective of data _____ Y _____ N **Auditability** Decision trail developed & rules reported ___ Y ___ N ___ Not addressed Process of transforming data into themes/codes was described adequately ___ Y ___ N ___ Not addressed **Theoretical Connections** Did a meaningful picture of the phenomenon under study emerge? _____ Yes _____ No	Describe methods (s) of data analysis. Were the methods appropriate? What alternative explanations were explored? Describe the decisions of the researcher re: transformation of data to themes/codes. Outline the rationale given for development of themes. How were concepts under study clarified & refined, and relationships made clear? Describe any conceptual frameworks that emerged.
TRUSTWORTHINESS Triangulation was reported for Sources/data _____ Y _____ N Methods _____ Y _____ N Researchers _____ Y _____ N Theories _____ Y _____ N Member checking was used to verify findings ___ Y ___ N ___ Not addressed	Describe the strategies used to ensure trustworthiness of the findings.
CONCLUSIONS & IMPLICATIONS Conclusions were appropriate given the findings	What did the study conclude? What were the implications of the findings for occupational therapy (practice & research)? What were the main limitations in the study?

Note: The words "Occupational Therapist" were changed to "therapist" or "professional" throughout this document for use by the TRIPSCY Evidence-based Journal Club.

| _____ Y _____ N

 The findings contributed to theory development & future therapy practice/research
 _____ Y _____ N | |

Appendix 14.10: Checklist devised for this study to assess the quality of observational studies (Adapted from Barley et al, 2011).

(answer items 1-5 'yes' or 'no')

Screening: was there a clear aim?

1.) Was the selection of participants appropriate?(consider source population, inclusion or exclusion criteria, methods of selection)

2.) Was the measurement of variables appropriate? (consider validity and reliability of instruments/measures used)

3.) Was there appropriate control of bias? (consider sources of bias, were appropriate methods outlined to deal with any issues such as recall bias, interviewer bias, non-responders, note response rate)

4) Was the use of statistics appropriate? (consider primary outcome stated a priori, note sample size)

5.) Was the study free of conflict of interest? (consider declarations of conflict of interest or identification of funding sources)

6.) List any other limitations of the study

BMJ Open

Perceived barriers to smoking cessation in selected vulnerable groups: a systematic review of the qualitative and quantitative literature

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ABSTRACT

Objectives: To identify barriers that are common and unique to six selected vulnerable groups: low socioeconomic status; Indigenous; mental illness and substance abuse; homeless; prisoners; and at-risk youth.

Design: A systematic review was carried out to identify the perceived barriers to smoking cessation within six vulnerable groups.

Data sources: MEDLINE, EMBASE, CINAHL and PsycInfo were searched using keywords and MeSH terms from each database's inception published prior to March 2014.

Study selection: Studies that provided either qualitative or quantitative (ie, longitudinal, cross-sectional or cohort surveys) descriptions of self-reported perceived barriers to quitting smoking in one of the six aforementioned vulnerable groups were included.

Data extraction: Two authors independently assessed studies for inclusion and extracted data.

Results: 65 eligible papers were identified: 24 with low socioeconomic groups, 16 with Indigenous groups, 18 involving people with a mental illness, 3 with homeless groups, 2 involving prisoners and 1 involving at-risk youth. One study identified was carried out with participants who were homeless and addicted to alcohol and/or other drugs. Barriers common to all vulnerable groups included: smoking for stress management, lack of support from health and other service providers, and the high prevalence and acceptability of smoking in vulnerable communities. Unique barriers were identified for people with a mental illness (eg, maintenance of mental health), Indigenous groups (eg, cultural and historical norms), prisoners (eg, living conditions), people who are homeless (eg, competing priorities) and at-risk youth (eg, high accessibility of tobacco).

Conclusions: Vulnerable groups experience common barriers to smoking cessation, in addition to barriers that are unique to specific vulnerable groups. Individual-level, community-level and social network-level interventions are priority areas for future smoking cessation interventions within vulnerable groups.

Trial registration number: A protocol for this review has been registered with PROSPERO International

Strengths and limitations of this study

- This study provides a valuable synthesis of the literature examining the perceived barriers to smoking cessation common and unique across six vulnerable groups.
- The comparison between vulnerable groups allowed for the identification of common barriers shared across vulnerable groups that are modifiable through short term public health behaviour change strategies.
- While the overall quality of the studies included in this review was acceptable, most studies failed to provide information regarding the trustworthiness (qualitative studies) or reliability and validity (quantitative studies) of the research.

INTRODUCTION

Tobacco use is the leading global cause of avoidable death worldwide[1] and a key modifiable risk factor for the development of a range of diseases, including cardiovascular disease, chronic obstructive pulmonary disease and some cancers.[1]

The prevalence of tobacco smoking is inversely related to socioeconomic position (SEP) in high-income countries.[1] For example, in 2010 in Australia, the prevalence of smoking was 24.6% in the lowest socio-economic areas compared with 12.5% in the highest socioeconomic areas.[2] The highest rates of smoking are evident among those who, in addition to low socioeconomic status, have other characteristics that distinguish them from the general population such as Indigenous groups (31–51.8%);[3–5] people with a mental illness (31.7–32.4%),[6] those with substance abuse disorders (77%);[7] the homeless (73%);[8] and prisoners (78–

84%).[9] [10] These groups were selected because they represent a large proportion of those classified as vulnerable to socioeconomic disadvantage.[11] It should be noted that although members of vulnerable groups are more likely to be socioeconomically disadvantaged, not all members are. For the purposes of this review, vulnerable groups are defined as groups that are more likely to experience social and material disadvantage due to lower income, cultural differences and social exclusion.[12]

Conflicting evidence exists regarding whether the rates of quit attempts in low SEPs are similar to[13] [14] or lower[15–18] than the rates made by smokers in higher SEPs. However, the success rate of quit attempts for lower SEP individuals is much lower than the success rate in their higher SEP counterparts.[14] [19]

There are many reasons quit success may be lower in vulnerable groups.[20] [21] Within the health behaviour literature, factors that prevent an individual from undertaking health behaviour change have been referred to as barriers. Barriers are often conceptualised as either structural or individual psychosocial factors.[22] Structural barriers include systems, organisations and the relationship between systems and individuals, for example, lack of accessible smoking cessation programmes. Individual barriers refer to the subjective experience of the individual, for example, physical addiction to nicotine.

This definition of barriers is congruent with the social determinants of health framework (SDHF).[23] The SDHF holds that an individual's health is influenced by factors across many levels, from individual genetic and physical characteristics, social and community networks, to broader influences of culture, socioeconomic determinants and the environment. This framework has been used to examine the determinants of health inequities.[24] Because the SDHF classifies determinants of health as individual, social, and broader cultural and environmental factors, it also allows the identification of distinct levels of intervention for health policies.

Within the general population, cross-sectional studies have found variation in the most commonly reported barriers to cessation. Enjoyment (79%);[25] cravings (75%);[25] and stress management (36–63%)[25] [26] are the most frequently reported barriers. Irritability (39–42%);[27] habit (39%);[26] withdrawal symptoms (28–48%);[25] [26] fear of failure (17–32%);[25] [26] and concern about weight gain (27–34%)[25–27] are also identified as barriers to cessation.

The effect of SEP on perceived barriers to quitting was examined in a representative sample (n=2133) in the UK.[28] Enjoyment (51%) and stress relief (47%) were the most frequently endorsed motives for continuing to smoke across the sample; however, as SEP decreased, the likelihood of reporting stress management and avoiding boredom as motives to continue to smoke increased. This suggests that smokers from vulnerable groups may experience barriers to smoking cessation differently than those in the general population.[28]

Smoking in vulnerable groups is known to be influenced and perpetuated by a complex range of social, cultural

and environmental factors,[29] including high acceptability of smoking[30] and more tobacco retail outlets in low socioeconomic areas.[31] Two previous studies have reviewed the literature to examine barriers to quitting smoking among vulnerable groups. One focused on Aboriginal pregnant women,[32] and one focused on the barriers to smoking cessation service utilisation among low-income smokers.[33] Both reviews found that pro-smoking social norms, inadequate knowledge regarding smoking-related risks and lack of access to appropriate cessation services inhibited participants' ability to quit.

As the term 'vulnerable' applies to multiple discrete groups, it is important to understand which barriers (if any) are unique, for example, cultural factors that inhibit smoking cessation may be unique to some Indigenous groups.[32] A systematic examination of potential unique barriers would be valuable in order to develop and deliver appropriate suites of intervention techniques for specific vulnerable groups.

Understanding the perceived barriers to quitting is important in order to better understand smoking, relapse and quitting-related behaviours, to inform appropriate policy, and to facilitate the development of effective tailored smoking cessation interventions. Given the exceptionally high smoking rates and low quit success among vulnerable groups, there is a critical need for a systematic and comprehensive review of the literature of the perceived barriers to quitting smoking among vulnerable smokers.

Aims

This systematic review aims to provide a comprehensive synthesis of the self-reported barriers to quitting smoking within six vulnerable groups by reviewing the qualitative and quantitative literature. The review will focus on the perceived, self-reported barriers to smoking cessation in six selected vulnerable groups: low socioeconomic status (low SES); Indigenous; mental illness and substance abuse; homeless; prisoners; and at-risk youth. These groups were selected because they represent a large proportion of those classified as vulnerable to socioeconomic disadvantage;[11] who exhibit smoking rates higher than those of the general population;[2–10] and who are identified as priority groups targeted for smoking cessation programmes and policies by peak health authorities.[34–36] Specifically, the review aims to:

A. Identify barriers that are common across all vulnerable groups included in the review; and
B. Identify barriers that may be unique to specific groups.

The results of the review will be used to develop a practical model to help understand the barriers to quitting among vulnerable groups and to aid smoking cessation intervention development.

METHOD
Study design
Guidelines for the reporting of systematic reviews (PRISMA)[37] and qualitative synthesis (ENTREQ)[38] were

Table 1 Search strategy

1	Tobacco/
2	Tobacco use/
3	Tobacco use cessation/
4	Tobacco smoking/
5	Smoking/
6	Smoking Cessation/
7	Tobacco use cessation/
8	Tobacco dependence/
9	Cigarette smoking/
10	Or/1–9
11	Homeless youth/
12	Homeless persons/
13	Housing/
14	Homeless mentally ill/
15	Homelessness or homeless/
16	Community programs/
17	Or/11–16
18	Prisoner or Prisons/
19	Correctional Health Services/
20	Correctional facilities/
21	Jail/
22	Or/18–21
23	Anxiety/
24	Depression/
25	Schizophrenia/
26	Mentally Ill persons/
27	Mental health/
28	Mental illness/
29	Mental disorder/
30	Mental disease/
31	Mental patient/
32	Mental health services/
33	Substance-related disorders/
34	Drug use/
35	Drug abuse/
36	Alcohol-related disorders/
37	Or/23–36
38	Adolescent behaviour/
39	Juvenile delinquency/
40	Juvenile offenders/
41	Disruptive Behaviors or disruptive behaviours/
42	At-risk youth/
43	At-risk young people/
44	Or/38–43
45	Indigenous/
46	Indigenous health/
47	Indigenous peoples/
48	Indigenous populations/
49	Aboriginal/
50	Aboriginal and Torres Strait Islanders/
51	Inuits/
52	Eskimo/
53	Alaska Native/
54	Indians/
55	Native American/
56	Native Hawaiian/
57	American Indian/
58	Indians, North American/
59	Indians, South American/
60	Indians, Central American/
61	First Nations/
62	Pacific Islander/
63	Maori/
64	Oceanic ancestry group/
65	American Native Continental Ancestry Group/
66	Or/45–65
67	Poverty
68	Social status
69	Social class
70	Low income population
71	Inequalities
72	Socioeconomic status
73	Socioeconomic factors
74	Disadvantaged
75	Underserved
76	Or/67–75
77	Related to smoking cessation/quitting smoking
78	Correlated with smoking cessation/quitting smoking
79	Associated with smoking cessation/quitting smoking
80	That affect smoking cessation/quitting smoking
81	That inhibit smoking cessation/quitting smoking
82	That prevent smoking cessation/quitting smoking
83	Barriers to smoking cessation/quitting smoking
84	Factor$ or Determinant$ or Variable$ or Covariable$ or Predictor$ or Barrier$
85	Or/77–84
86	10 AND 85 AND 17
87	10 AND 85 AND 22
88	10 AND 85 AND 37
89	10 AND 85 AND 44
90	10 AND 85 AND 66
91	10 AND 85 AND 76

Continued

followed. A protocol for this review was registered with PROSPERO International Prospective Register of Systematic Reviews (Identifier: CRD42013005761).

Databases and search

MEDLINE, EMBASE, CINAHL and PsycInfo were searched using keywords and MeSH terms from each database's inception published prior to March 2014. The reference lists of key articles and reviews were also manually searched in order to identify any other relevant articles. An extensive list of search terms was used in order to ensure that as many relevant articles as possible were captured (see table 1).

Inclusion and exclusion criteria

Studies that provided either qualitative or quantitative (ie, longitudinal, cross-sectional or cohort surveys) descriptions of perceived self-reported barriers to quitting smoking in low SES groups, Indigenous groups, people with a mental illness or substance abuse problems, people who are homeless, prisoners or at-risk youth were included. See table 2 for definitions used as inclusion criteria for each vulnerable group. Only studies carried out in high-income countries were included as middle-income and low-income countries

Table 2	Inclusion criteria definitions of each group
Group	**Definition**
Low SES	Because definitions of low SES vary across high-income countries this study used an inclusive definition of low SES. Studies were included if they described participants as being low SES and gave at least one measure of SES. This measure could be income (above/below poverty level); address in deprived neighbourhood, etc
Indigenous groups	The following definition was used to define potential Indigenous studies in accordance with previous studies:[39] "the experiences shared by a group of people who have inhabited a country for thousands of years, which often contrast with those of other groups residing in the same country for a few hundred years"[40]
Mental illness	People with a mental illness were defined as individuals who had been diagnosed with a mental illness, severe mental illness or were described as inpatients or outpatients in a mental health rehabilitation facility. Substance use disorders were also included. All mental illnesses were included
At-risk youth	At-risk youth were defined as individuals under the age of 21 who have experienced or are experiencing: problems at school; physical, sexual or psychological abuse; mental or physical health problems; economic disadvantage; or who have committed a violent or delinquent act (USA Code[36])
Prisoners	Prisoners included those currently incarcerated and also ex-prisoners living in the community
Homeless	Homeless individuals were defined as those individuals described as meeting national criteria for homelessness or those individuals accessing services provided to homeless persons
Smoker	Smokers were defined as self-reported daily or occasional cigarette smokers. Studies that also assessed ex-smokers were only included if the majority of participants were current smokers, or if the results were reported by smoking status. Studies were excluded if they focused solely on ex-smokers or non-smokers

SES, socioeconomic status.

may present different contextual, political and economic barriers that require separate consideration. Only studies published in English were included as resources required to translate articles were beyond the scope of this review. Intervention studies were excluded, as barriers discussed within these studies related to use of the intervention being tested and not barriers to smoking cessation per se. Studies examining factors associated with quit attempts or success were excluded unless they included results on the perceived barriers self-reported by participants from vulnerable groups. Studies describing *provider* reports of the barriers to the provision of smoking cessation support or treatment, and unpublished grey literature, were also excluded. There were no cut-offs for sample size.

Data extraction

The titles and abstracts of retrieved publications were assessed by one reviewer (LT) against eligibility criteria and excluded if they did not meet inclusion criteria. A second reviewer (a research assistant) independently assessed 20% of the returned abstracts for inclusion with 100% agreement between reviewers. Data from included journal articles were extracted into summary tables independently by one reviewer (LT) and a random 20% checked by a second (research assistant). Agreement was again high (97%). Discrepancies were settled by discussion between the reviewers. Data extracted from the articles included: study aims, setting, sample characteristics, response rates, study methodology, data analysis and the barriers identified. Barriers were defined as factors that prevented smoking cessation and/or quit attempts or were reported as primary reasons for continuing to smoke.

Risk of bias in individual studies

Quality assessment was performed independently by all authors, with two reviewers per manuscript. The methodological quality of qualitative studies was assessed using the McMaster Qualitative Criteria Form.[41] Quantitative studies were assessed using a tool adapted from the STROBE statement.[42] As there is a lack of an agreed, valid and reliable measure to assess the quality of mixed methods studies,[43] the McMaster guidelines as well as the adapted quantitative framework were applied to the corresponding qualitative and quantitative components of any mixed methods studies identified.

Synthesis of results

Results were synthesised by vulnerable group using narrative synthesis and inductive data analysis techniques. Narrative synthesis allows the examination of studies that are highly heterogeneous in their research questions, samples and methods.[44 45] In order to avoid potential biases, care was taken to also identify points of difference between studies.[46] Where a barrier was reported in more than one study, this was recorded. In quantitative studies, the proportion of respondents reporting each barrier was calculated. Barriers were combined into categories and then classified using the SDHF.[23] For the purposes of this review, individual factors were defined as physical or psychological barriers to quitting smoking: for example, the individual's level of nicotine dependence or motivation to quit. Lifestyle factors were defined as health behaviours (including alcohol and other drug use) that impeded an individual's ability to quit. Social and community networks were defined as the impact of an individual's family and friend networks, and the

wider community. Living and working conditions encompassed factors including housing, healthcare, education and employment. The final domain was the broader socioeconomic, cultural and environmental background perceived to influence smoking cessation.

RESULTS

Search results

After duplicates were removed, 21 767 studies were identified from electronic searches and a further 27 from manual searches. Of those, 65 studies met inclusion criteria and were included in the review (see figure 1). Online supplementary file 1 contains a list of full text articles that were retrieved, reviewed and excluded as per the inclusion criteria. Two systematic reviews concerning Indigenous Australian pregnant women[32] and pregnant women,[47] and two critical reviews providing summaries of the barriers to quitting,[33 48] were also identified from hand searches.

Study characteristics

The majority of studies (n=24) identified barriers to smoking cessation in low SES groups,[30 49–71] Indigenous groups (n=16)[72–87] and people with a mental illness (n=18)[88–105] including two concerning those with substance use disorders.[101 104] Three studies reported barriers to quitting within the homeless[106–108] and two reported barriers within prisoner groups.[109 110] One study with at-risk youth was identified.[111] Two other studies concerning Alaska Native participants (age range from 11 to 18)[86] and people with a mental illness (age range from 16 to 23)[103] included younger people as participants. One study was identified that was carried out with participants who were homeless as well as addicted to drugs and/or alcohol.[112] Since the study comprised participants who met criteria for inclusion in two of the vulnerable groups included in this review (the homeless and mental illness/substance use groups), this study was included in a seventh category containing 'multiple' participant groups. Online supplementary files 2–4 summarise the included quantitative, qualitative and mixed methods studies, respectively. An overview of the characteristics of included studies can be found in online supplementary file 5.

Quality assessment of qualitative studies

The results of the quality assessment of qualitative studies are presented in supplementary file 6. Overall, the quality of studies varied widely. The majority of studies did not explicitly state their study design (n=38); of those that did, most used Grounded Theory.[57 59 61 93 98 99] Most studies provided adequate descriptions of the study sites; participants; data collection methods and analysis techniques. Studies generally performed poorly when assessed on four components of trustworthiness, with only 17 studies meeting all four criteria (credibility; transferability; dependability and confirmability).[49 52 56 58 65 67 71 73 74 77 78 70 82 83 85 86 93]

It should be noted that none of the mixed methods studies explicitly described their methodology as mixed methods nor did they report integrating the qualitative and quantitative findings in a systematic way.

Quality assessment of quantitative studies

The results of the quality assessment of quantitative studies are presented in online supplementary file 7. Sample sizes in the quantitative studies ranged from 36 to 500 participants. Response rates ranged from 42% to over 97% (three studies did not provide response rates).[100 104 106] All but one study[104] clearly stated eligibility criteria. All studies stated their outcome a priori and no conflicts of interest were identified. The validity and reliability of survey measures used to assess barriers to cessation were reported in one study.[60] Three studies employed techniques such as pilot testing and input from key stakeholders in developing the tools used.[70 104 109]

### Perceived barriers to smoking cessation

The barriers to quitting smoking endorsed over multiple studies included: smoking for stress management; enjoyment of smoking; addiction to nicotine; habit; social acceptability of smoking; lack of support to quit and access to quit resources; boredom; stressful life factors; pro-smoking living environments; smoking cultural norms; and socioeconomic disadvantage. Figure 2 demonstrates the barriers reported in this review categorised by the SDHF. For brevity, the current results section will focus on those barriers that were common across all groups and unique to certain vulnerable groups. Online supplementary file 8 provides a detailed description of all the barriers identified in this review. Table 3 provides a summary of the barriers extracted from the qualitative studies. References of studies that report one or more barriers at a given level of the SDHF are included in table 3. Table 4 provides a summary of the results of quantitative studies including the proportion of participants endorsing the barrier and the study reference.

Barriers common across all groups

Three barriers were present in all six vulnerable groups included in this review: (1) stress management, (2) lack of support to quit from health professionals and other service providers, and (3) high prevalence and acceptability of smoking within vulnerable communities.

Within the SDHF, stress management was categorised as an individual level barrier. Forty qualitative studies identified stress management as a significant barrier to smoking cessation.[50–56 58 59 61–63 65 67–69 72 74 75 80 81 83 84 86 87 89 90 92 93 95–97 99 100 103 105 108 110–112]

Smoking was used as a coping mechanism[52 58 62–65 69 74 89 90 92 97 99] in reaction to daily stressors as well as the stress inherent in vulnerable lives. Three quantitative studies reported stress management as a barrier to quitting with Maori participants (48%),[79] participants with substance use disorders (39%)[104] and homeless participants (44%).[107] Of note, participants in two studies

Figure 1 Database search results (SES, socioeconomic status).
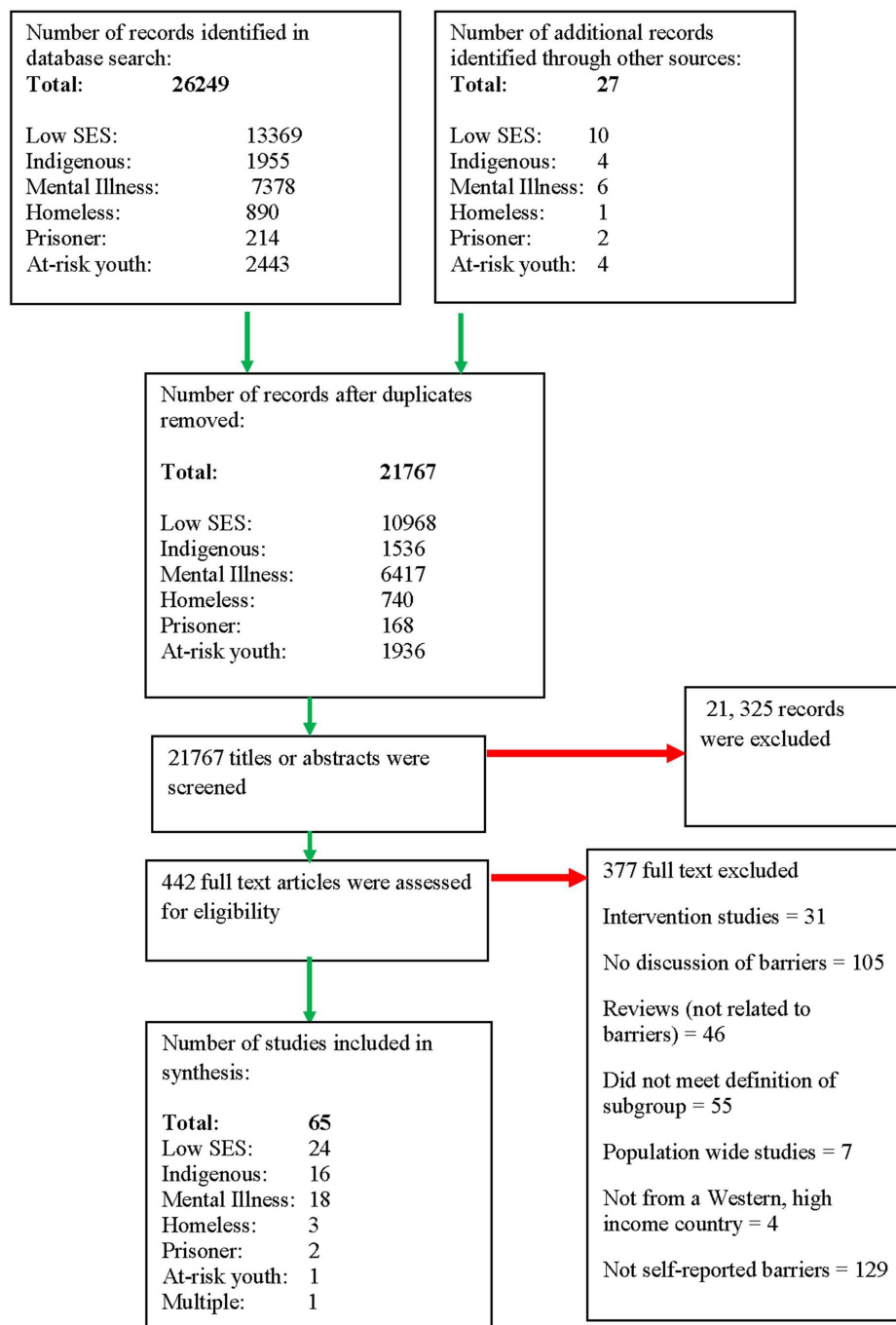
reported that smoking also directly contributed to the stress experienced by participants.[51 111] Participants also reported using smoking to manage their emotions and mood.[58 65 72 83 84 90 93 98 103] Twenty-three per cent of participants from a Maori sample indicated managing emotions was a barrier to quitting,[79] 42% of these individuals had a substance use disorder.[101]

High prevalence and acceptability of smoking within vulnerable communities was categorised as a community and social network level barrier. Eight qualitative[53 54 69 75 79 80 98 111] and four quantitative[60 101 107 109] studies found that being around other smokers was a barrier to quitting. This finding is reinforced by participants describing the high prevalence of smoking among family

and friends in 22 studies[30 51 52 56 62 68 69 72 74 76 81 83 85–87 90 93 95 96 103 111 112] and in the wider community in 18 studies.[30 51 52 56 62 66 69 72 74 76 81 83 85–87 93 96 112] Tobacco was readily available and easily accessible within vulnerable communities[51 62 66 76 83 90 91 111] and smoking was considered to be highly acceptable[30 79 81–83 85–87] and normalised behaviour.[52 56 62 66 69 79 81–83 85 87]

Lack of support to quit from health and other service providers was also categorised as a social and community network barrier. Other service providers include management and staff in prisons, homeless shelters and organisations, and members of the community. Thirteen qualitative studies[52 55 56 58 74 77 83 86 91 92 95 108 112] and one quantitative study[109] reported a perceived lack of
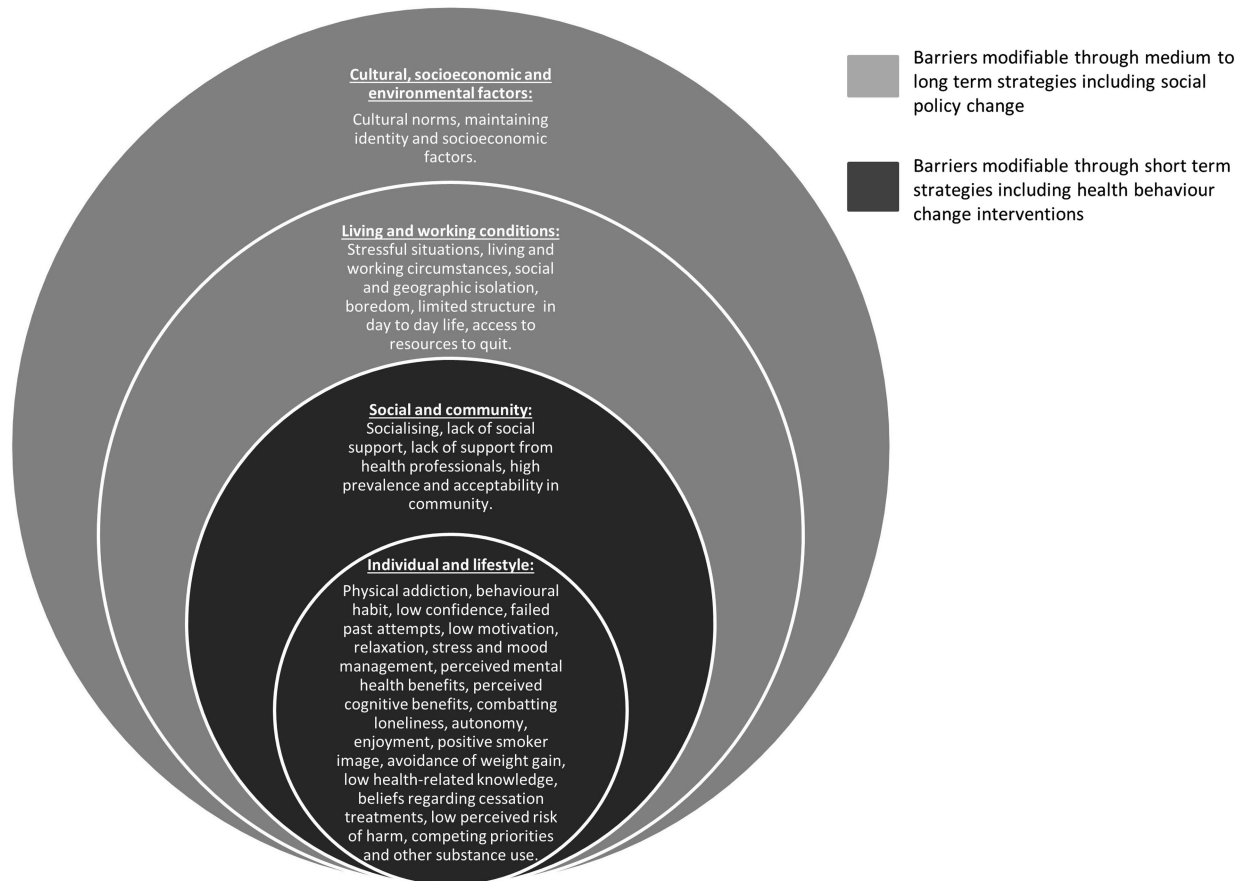
Figure 2 Model of the barriers to smoking cessation.

support from health professionals regarding smoking cessation. Cases of family members and health professionals actively discouraging quit attempts and encouraging maintenance of smoking due to concerns about the individual's mental health[92 93 95 96 112] or because smoking was perceived to be the individual's only source of enjoyment[54 77 79 83] were reported. Three studies identified tobacco use by health professionals and others involved in the participants' care as a barrier to cessation.[77 95 109] Over half (55.9%) of prisoners surveyed reported observing members of staff smoking as a barrier to quitting.[109] Studies involving people with a mental illness and prisoners identified use of cigarettes in order to reward or punish behaviour by health professionals and other service providers[93 95 96 110] as a barrier to quitting. Twenty-nine per cent of prisoners also indicated that not receiving cessation support from prison staff prevented them from quitting smoking.[109] Twenty-six per cent of substance abusing individuals reported they did not have enough support to quit. One study involving at risk youth identified smoking being unaddressed by teachers and members of the police force as a barrier to smoking cessation.[111]

Barriers unique to certain vulnerable groups

Indigenous, prisoner, mentally ill, homeless and at-risk youth reported unique barriers to smoking cessation.

Racism, historical factors,[74 75 85] ceremonial use of tobacco,[72 73 82 85 86] cultural values that promote sharing, kinship and reciprocity,[83] cultural values of pride, independence and self-reliance that affect help-seeking behaviour,[81 82] cultural values concerning health and privacy,[84] and maintenance of cultural identity[73–75 82 83 85] were identified as barriers within Indigenous groups. Smoking cessation could therefore exclude an individual from fully participating in their culture or potentially challenge their family, personal or community relationships.

Living environments and the stressful context of prison presented unique barriers for prisoners, including social isolation, anxiety regarding legal matters, transfers to other prisons, use of cigarettes as currency, use of cigarettes as a way to reward or punish behaviour, bullying, missing family and restricted movement throughout the day.[110]

Low levels of motivation,[92 94 97 98] concerns about ability of cessation services to handle mental health issues,[91 93 96] identity and belonging,[93 94 98] and symptom management[88–98] were barriers for people with mental illness.

Competing needs and prioritising the need to find shelter/place to live were unique barriers for individuals who were homeless.[108] Very high levels of accessibility of cigarettes and the regular practice of selling cigarettes to those under 18 years of age were identified by one study with at-risk youth as a unique barrier.[111]

Table 3 A summary of the self-reported barriers to smoking cessation—qualitative and mixed methods studies by vulnerable group

Barrier	Low SES groups (n=22)	Indigenous groups (n=16)	People with a mental illness(n=13)	Homeless groups (n=3)	Prisoner groups (n=2)	At-risk youth (n=1)	Multiple groups (n=1)
Individual and lifestyle factors							
Stress management	50–59 61–63 65–69	72 74 75 79 81 83 84 86 87	89 90 92 93 95–98 105	108	110	111	112
Enjoyment	50 54–56 59 62 63 65 67	79 81–83	89 90 92–94 97 98 105			111	
Addiction	49 50 54 57 59 67–69	72 74 75 81 83 84 86	90–92 98				
Habit	50 57 65 68	75 79 83 84	92 105				
Mental health benefits	58 67	74	89 91–99				
Weight gain	30 49 52–54 64 67	72 74 84	91 98				
Competing priorities	56 63	74 75 87	89 91 98 99	108			
Rationalisations	54–56 58 61 67	74 78 82 87	89 97				
Other substance use	49 56 59 62	74 76 81 84	89				112
Autonomy	56 58 68	83	93 97–99				
Low confidence	52 53 56 63 67 69	73 84	92 96 98				112
Cognitive benefits	51	83	93–95				
Loneliness	52 59 65		93 97 98				
Low risk of harm	58	87	95 97				
Low motivation			92 94 97 98				
Past failed attempts	61	74					
Positive smoker image	30 57		97				
Social and community networks							
Prevalence and acceptability	30 51–54 56 62 66 68 69	72 74 76 79 83 85–87	90 91 93 95 96 105	108	110	111	112
Lack of social support	30 49 54–56 58 64 67–69	74 75 77 79 83 84	91 94 98	108			
Social activity	30 49 53 57 62	73–75 79 85 87	89 90 92 93 95 97 98				
Lack of health and other professional support	52 54–56 58	74 77 79 83 86	91–93 95 96	108	110	111	112
Living and working conditions							
Access to quit resources	52 55 56 61–64	72–74 78 81 85 86	93 96 98	108	110		
Boredom	50–52 54–56 59 65	75 86	90 94 95 97 99	108	110		
Concerns regarding treatment	50 52 56 58 61–63 69	72–74 77 78 81 86	91 93 96 105	108			
Stressful factors	56 58 59 62 63 65 68	74 75 85			110		
Living and working circumstances	30 54 58	74	96				
Cultural, socioeconomic and environmental factors							
Cultural norms	56 62	72–75 78 81–83 85–87	93 94 98		110		
Socioeconomic factors	65		97				

SES, socioeconomic status.

Table 4 A summary of the barriers to smoking cessation—reported prevalence of each barrier by vulnerable group for studies using quantitative and mixed methods*,†

Barrier	Reported prevalence of each barrier N/total N (%)				
	Low SES groups (n=2)	Indigenous groups (n=1)	People with a mental illness (n=5)	Homeless groups (n=2)	Prisoner groups (n=1)
Individual and lifestyle factors					
Stress management		63/130 (48)[79]	30/78 (39)[104]	82/186 (44)[107]	
Relaxation	261/500 (52) ([60])	22/130 (17)[79]	13/30 (42)[100] 7/72 (10)[88]		
Enjoyment		33/130 (25)[79]	34/72 (47)[88] 21/105 (20)[90] 30/78 (39)[104]		
Addiction	431/500 (86)[60]	51/130 (39)[79]	56 (53)[90] 10/30 (33)[100]	93/186 (50)[107]	
Cravings			53/78 (68)[104] 47/96 (48)[101]		
Withdrawal symptoms			85/96 (87)[101]		
Habit	411/500 (82)[60]	95/130 (73)[79]	26/72 (36)[88] 20/105 (19)[90] 17/30 (58)[100]		
Perceived mental health benefits		6–30/130 (5–23)[79]	21/105 (20)[90] 7–8/72 (10–11)[88] 41/78 (53)[104] 41–76/96 (42–78)[101]		
Concentration			27–56/96 (28–55)[101]		
Low levels of motivation	131/350 (38)[70]		46/96 (47)[101]		
Weight gain	69/350 (20)[70]	6/130 (5)[79]	3/72 (4)[88] 39/96 (40)[101]	38/186 (20)[107]	
Other substance use			3/72 (4)[88] 2–8/78 (3–10)[104] 13–40/96 (13–41)[101]		
Problems getting to sleep			23/96 (23)[101]		
Low confidence and perceived difficulty	87–202/350 (25–58)[70]		22/78 (24)[104]		25/34 (74)[109]
Social and community networks					
High prevalence and acceptability in the community	332/500 (66)[60] 116/350 (33)[70]	5/130 (12)[79]	13/105 (13)[90] 5/72 (7)[88] 34/78 (43)[104]	78/186 (42)[107]	27/34 (79)[109]
Lack of social support	90/350 (26)[70]			48/186 (26)[107] 70–79/98 (71–79)[106]	10/34 (29)[109]
Lack of health and other professional support			3/72 (4)[88]		19/34 (56)[109]
Social activity		44/130 (34)[79]	17/30 (58)[100] 2/72 (3)[88]		
Availability of cigarettes		5/130 (4)[79]	8/105 (8)[90] 5/72 (7)[88]		
Living and working conditions					
Access to quit resources	108/350 (31)[70]				9/34 (27)[109]
Boredom	242/500 (48)[60]	38/130 (29)[79]	9/72 (13)[88] 13/105 (13)[90]		
Stressful factors			4/72 (6)[88]		
Living environments					20 (59)[109]

*Decimals rounded to nearest whole number where appropriate.
†Numerators/denominators are presented first, followed by proportion (in parentheses), followed by reference.
SES, socioeconomic status.

DISCUSSION

This is the first systematic review reporting perceived barriers to smoking cessation across a range of vulnerable groups. The findings from 54 qualitative, 8 quantitative and 3 mixed methods studies demonstrate that barriers to quitting smoking operate at multiple levels, including individual and lifestyle factors; social and community networks; living conditions; and cultural and socioeconomic factors. These include: smoking for stress management; enjoyment of smoking; addiction to nicotine; habit; social acceptability of smoking; lack of support to quit and access to quit resources; boredom; stressful life factors; pro-smoking living environments; cultural norms; and socioeconomic disadvantage. Stress management, lack of support from health professionals and other service providers, and the high prevalence and acceptability of smoking in communities were the three barriers common across all six vulnerable groups included in this review. The identification of perceived barriers common across vulnerable groups is an extension of the previous literature.

The identified barriers broadly reflect those reported in two systematic reviews limited to pregnant smokers[47] and Indigenous Australian pregnant smokers,[32] and two critical reviews providing summaries of the challenges to cessation among low-income smokers[33] and low income, rural, homeless, hard core, immigrant and HIV-positive smokers.[48] Addiction to nicotine, habit, stress management, enjoyment and weight gain are typically reported barriers to smoking cessation within the general population.[26–28 114] No studies were found that directly compared barriers experienced by vulnerable groups and smokers in the general population. To the authors' knowledge, only one study has assessed the effect of SEP on barriers to quitting smoking, and identified that decreasing SEP was associated with higher likelihood of reporting stress management and boredom as barriers.[28] This review did not aim to provide direct comparisons between vulnerable groups and the general population due to the heterogeneity of studies. Additionally, comparisons by gender were beyond the scope of this review, but should be considered for further research, as socioeconomic disadvantage has differential effects on males and females,[20] and preliminary evidence suggests barriers to cessation may differ by gender.[28 70]

Nevertheless, the novel results of this review indicate that vulnerable smokers report a number of additional barriers to cessation that operate within their social and community networks, living conditions, and wider cultural and socioeconomic contexts. Social and community barriers include: lack of support to quit from peers as well as health and other professionals; high prevalence and acceptability of smoking within vulnerable communities; and smoking as a social activity. Living conditions include: stressful factors; pro-smoking living and working circumstances; lack of access to quit resources; social and geographical isolation; and boredom. Cultural norms and socioeconomic disadvantage also presented barriers to quitting.

Main barriers identified across *all* vulnerable groups

Stress management

Stress management was a frequently reported individual-level barrier. Smokers typically demonstrate higher levels of stress and low mood than non-smokers and ex-smokers.[115–117] Smoking may provide a coping mechanism for individuals who are prone to higher levels of stress[118–120] or smoking may act as a stressor due to neurobiological processes or through the experience of withdrawal symptoms.[120] Stressors associated with vulnerable groups (eg, unemployment, financial stress and poverty) may compound stress levels within vulnerable groups. Given that vulnerable smokers may be more likely to report smoking in order to relieve stress,[28] incorporating stress management techniques into interventions targeted at vulnerable groups may help to increase cessation.

Lack of support to quit from health professionals and other service providers

At the social and community level, a lack of support to quit from health professionals and other service providers was identified. This reflects research that suggests smokers from low SEPs are less likely to receive advice to quit from a healthcare provider than their more higher SEP counterparts,[121] despite evidence demonstrating brief advice can increase the likelihood of successful quitting.[122 123] Organisational and individual factors both affect the provision of quit advice by health and other service providers. These include lack of time, confidence, knowledge and counselling skills.[124] Efforts should be focused on improving health professionals' ability to offer quit advice, and may benefit from examining how best to ensure compliance to existing guidelines that provide clear recommendations on identifying individuals who are at higher risk of smoking and addressing the unique issues that these individuals face.

Tailoring interventions to the specific needs of vulnerable groups may be effective. Tailored interventions for behaviour change have been found to be effective compared with no intervention or dissemination of guidelines or educational materials alone.[125] Given that this review identified three common barriers across the six vulnerable groups included in this review, we argue that subsequent smoking cessation interventions in vulnerable groups should seek to address these factors. Programmes should include specific modules on stress management techniques and how best to combat stress in vulnerable groups, as well as educating smokers about how stress relief and relief from nicotine withdrawal symptoms can be confounded.

Smoking cessation interventions should be designed to maximise participation by vulnerable groups, addressing the key barriers around acceptability and access to interventions. Utilising existing services and organisations that are highly accessed by vulnerable groups and are a trusted source of help for vulnerable groups is also necessary. There is accumulating evidence that social

and community service organisations are well placed to provide brief smoking cessation advice to highly vulnerable clients.[126 127]

High prevalence and acceptability of smoking

The high prevalence and social acceptability of smoking within vulnerable communities was frequently reported. Considerable measures have been taken to address the denormalisation of smoking in the general population through regulation and legislative changes such as restrictions in advertising, smoke-free environment policies and point-of-sale restriction.[1 128 129] Participants who were homeless, experiencing mental illness and prisoners cited a lack of restrictions on smoking within their living environments (or lack of enforcement of existing policies) as a factor that reinforced their smoking. While there are challenges associated with their implementation, smoke-free areas can be successfully implemented within mental health treatment centres and prisons,[130–132] and there is potential to extend these restrictions to homeless shelters and public housing developments.

Efforts to encourage the denormalisation of smoking in the environments of vulnerable communities require further exploration. Providing access to acceptable and effective behavioural and pharmacological supports should ensure that denormalisation does not result in compounding stigma and further isolating vulnerable groups.[128 133]

Barriers specific to certain groups
Indigenous groups

Indigenous groups identified unique stressors linked to smoking including racism and historical factors; cultural practices including ceremonial use of tobacco and cultural values that promote sharing, kinship and reciprocity, and the importance of smoking as a way to maintain cultural identity. Cultural values also had effects on the willingness of Indigenous participants to access smoking support services. Certain Indigenous groups may be less likely to receive advice to quit or engage with services designed to aid in cessation.[134] However, it is important to note that smoking cessation programmes have been shown to be effective within Indigenous groups.[113 135] Culturally appropriate interventions tailored to the needs of Indigenous smokers should continue to be developed, implemented and evaluated. These programmes should acknowledge the cultural significance of tobacco use, and the important historical and social factors associated with Indigenous groups and smoking.[136]

Prisoners

Prisoners identified unique stressors within their living conditions that contributed to their smoking including social isolation, anxiety regarding legal matters and transfers to other prisons. A recent multicomponent randomised controlled trial that included improving stress management skills in prisoners found similar point prevalence abstinence rates as another trial conducted with prisoners[9 137 138] and other community-based studies. Thus, smoking cessation programmes can be effective even in prison environments that are highly conducive to smoking and should form a part of routine care within prison systems.

People with a mental illness

Low motivation to quit smoking was only reported in studies involving smokers with a mental illness. This contradicts research showing no difference in motivation to quit between those with severe mental illness and the general population.[139] A recent review concluded there is some evidence to suggest that individuals diagnosed with a psychotic disorder are slightly less motivated to quit than those diagnosed with depression.[139] Possible reasons for this include the symptoms associated with schizophrenia (including amotivation), management of side effects of medications (including parkinsonism), limited support systems, low perceived vulnerability to smoking-related disease, lack of alternate coping mechanisms and poverty.[139 140] Information on the diagnoses of participants was only reported in one of the studies reporting motivation as a barrier in this review,[92] where the majority of participants were diagnosed with a psychotic disorder. However, other studies did not provide information on participants' diagnoses and further exploration is beyond the scope of this review.

Symptom management also presented a significant barrier within studies concerning people with a mental illness. There is evidence to suggest that biochemical processes between nicotine and other substances in tobacco improve some symptoms of mental illness.[140] Additionally, smokers with a mental illness may be more likely to misattribute their withdrawal symptoms as recurring mental illness symptoms. Further investigation and education regarding cessation and symptom management with people with a mental illness is warranted. Integrating smoking cessation care with mental health and addiction treatments can be effective at promoting cessation rates in groups with mental illness.[131 132] However, future studies need to investigate ways to maintain long-term smoking cessation as well as systems-level changes that may support smoking cessation in people with mental illness.[141]

Barriers to smoking cessation in vulnerable groups: a model

Figure 2 visually demonstrates the broad range of barriers to cessation reported by vulnerable groups, many of which exist outside the realm of the individual. This model demonstrates the interconnectedness of individual and lifestyle factors with the wider social and community factors, living conditions and cultural, socioeconomic and environmental factors. The two darker spheres

holding social and community networks, and individual and lifestyle factors, identify those factors that are potentially modifiable through short-term health behaviour change interventions. This model does not provide an exhaustive list of all the factors that prevent vulnerable individuals from smoking cessation. It does provide a framework for understanding the perceived self-reported barriers to quitting smoking identified in this review.

Strengths and limitations

This synthesis of the literature provides evidence of the perceived barriers to smoking cessation by examining the methodological quality of studies, and comparing between and within selected vulnerable groups. However, this review has some limitations. While the overall quality of the studies included in this review was acceptable, most qualitative studies failed to provide information regarding the trustworthiness of the research, and most quantitative studies failed to provide information on the validity and reliability of the survey measures used to assess barriers. Strategies for enhancing the trustworthiness of qualitative research have been concisely summarised[142] and future qualitative studies should seek to employ these strategies where possible. Future quantitative studies should seek to report at least brief psychometric properties of survey measures used to assess barriers to smoking cessation, including reliability and validity.

Of the quantitative studies included, the majority used convenience samples. It is not generally feasible to target vulnerable and hard to reach populations using random population sampling procedures. This limits the generalisability and transferability of the included studies to wider vulnerable populations. Nevertheless, the agreement in findings between qualitative studies does suggest that these results are robust.

The nature of the studies included in this review means that no weight is given to the different barriers and the authors cannot provide comment on which, if any, barriers should be made a priority to target in smoking cessation interventions with vulnerable groups. Given limited resources and funds, addressing all barriers is rarely possible. Future research is needed to identify those barriers that are most important to address first, and to prioritise resourcing and intervention development.

The results of this review were broadly categorised according to the SDHF, however, these categories are not mutually exclusive and certain barriers were able to be included in multiple categories (eg, stress and stressful factors could be categorised as either individual-level barriers or barriers within the living conditions level). The reviewed studies do not directly clarify whether the nature of stress experienced in vulnerable groups is personal or contextual. Constructs such as coping and resilience[143][143a] have been hypothesised as mediators between stress and smoking in low socioeconomic groups.[144]

Similarly, as this review sought to provide a summary of vulnerable smokers' perceived self-reported barriers to cessation, other barriers that may be important determinants of quit attempts and success were not considered. Barriers such as the knowledge and attitudes of staff and health professionals, and the capacity of services to offer smoking cessation programmes, which have been identified within the literature,[124] should also be considered when examining the challenges facing vulnerable groups.

This review was only able to identify five studies that examined the barriers to quitting smoking within prisoner (n=2 studies) and homeless (n=3) groups, and one study focusing on at-risk youth. These results indicate more research is required with these groups to examine the barriers to smoking cessation. More studies investigating the barriers to cessation within these groups may lead to identification of additional common and unique barriers across vulnerable groups. Additionally, this review was limited to studies conducted within one of six vulnerable groups. Other groups that show high rates of smoking include lesbian, gay, bisexual and transgender groups;[145] culturally and linguistically diverse groups;[146] and rural and remote communities.[147] The authors acknowledge the disparity in smoking prevalence in these groups, however, their inclusion would have increased the breadth of the review to a level that would be too broad and complex to be useful. These groups may experience barriers to cessation different to those experienced by the groups included in this review. It should also be noted that individuals within the included groups often experience multiple forms of disadvantage, for example, people who are homeless are more likely to experience a mental illness[148] and Indigenous communities are more likely to be over-represented in lower SEPs.[3]

CONCLUSIONS

These results support findings that vulnerable groups experience common barriers to smoking cessation, and also barriers which are unique to specific vulnerable groups. Stress management, high prevalence and acceptability of smoking, and lack of support to quit were identified as priority areas for cessation research, programme implementation and policy change. Many of the barriers identified within this review are modifiable through short-term health behaviour change strategies. For heterogeneous groups of vulnerable individuals, intervention development should seek to address those barriers common to all vulnerable groups identified in this review. For relatively homogeneous groups of vulnerable individuals, interventions should seek to address the unique barriers faced by those groups in addition to those barriers identified as common to all vulnerable groups.

These findings, coupled with lower success rates in quitting within vulnerable groups relative to the success rates in more advantaged groups,[14][19] suggest that interventions with vulnerable groups need to address wider social, community and cultural factors as well as

individualised cessation support. Addressing the predictors of cessation found within the general population, such as nicotine dependence and enjoyment, remain important for vulnerable groups.

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BMJ Open

Perceived barriers to smoking cessation in selected vulnerable groups: a systematic review of the qualitative and quantitative literature

Laura Twyman, Billie Bonevski, Christine Paul and Jamie Bryant

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These include:

Supplementary Material	Supplementary material can be found at: **http://bmjopen.bmj.com/content/suppl/2014/12/22/bmjopen-2014-006414.DC1.html**
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Topic Collections	Articles on similar topics can be found in the following collections Smoking and tobacco (140)

Notes

Paper Three Appendices

15.1 Ethics Variation

15.2 Information Statement

15.3 Campbelltown Barriers Survey

15.4 Supplementary file 1. Barriers scale

15.5 Supplementary file 2: Confirmatory factor analysis results

Appendix 15.1 Ethics approval for variation to complete barriers study.

HUMAN RESEARCH ETHICS COMMITTEE

THE UNIVERSITY OF
NEWCASTLE
AUSTRALIA

Notification of Expedited Approval

To Chief Investigator or Project Supervisor:	**Associate Professor Billie Bonevski**
Cc Co-investigators / Research Students:	**Doctor Jamie Bryant** **Associate Professor Christine Paul** **Conjoint Professor Afaf Girgis** **Professor Catherine d'Este** **Miss Laura Twyman**
Re Protocol:	**RCT of a client-centred, caseworker-delivered smoking cessation intervention for a socially disadvantaged population**
Date:	**15-Aug-2013**
Reference No:	**H-2010-1002**

Thank you for your **Variation** submission to the Human Research Ethics Committee (HREC) seeking approval in relation to a variation to the above protocol.

Variation to:

1. Add a new research site - ANGLICARE Campbelltown. This involvement of this site will be limited to completing a similar touchscreen survey (for smokers only) with the intention of gathering further information about the barriers to quitting smoking.

2. Amend the survey for this site with the addition of the following items:
a. Barriers Scale;
b. Cannabis use items; and
c. Technology use items.

3. Amend the amount of reimbursement offered to participants at the new site *from* a $20 Woolworths Essentials Gift Card *to* a $10 value Gift Card (to reflect the reduced level of participation).

- Information Statement for ANGLICARE Campbelltown Site (v1, dated 01/07/2013)
- Campbelltown Barriers Survey (v1, submitted 03/07/2013)

Your submission was considered under **Expedited** review by the Chair/Deputy Chair.

I am pleased to advise that the decision on your submission is **Approved** effective **15-Aug-2013**.

The full Committee will be asked to ratify this decision at its next scheduled meeting. A formal *Certificate of Approval* will be available upon request.

***Please note for future reference:
The old Word version of the variation application form is no longer in use. While it is acknowledged that the variation e-form on RIMS does not always provide sufficient space to describe the variation details/justification etc. this can be addressed by uploading the additional information in a free-form Word document. The application should then refer to reader to the additional document for further details.

Submitting an application which includes an old Word version of the variation application form is potentially confusing.

Professor Allyson Holbrook
Chair, Human Research Ethics Committee

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RIMS website - https://RIMS.newcastle.edu.au/login.asp

Linked University of Newcastle administered funding:

Funding body	Funding project title	First named investigator	Grant Ref
NHMRC (National Health & Medical Research Council)/Project Grant(**)	RCT of a client-centred, caseworker-delivered smoking cessation intervention for a socially disadvantaged population	Bonevski Billie,	G0190197

A/Prof. Billie Bonevski (PhD)
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THE UNIVERSITY OF

NEWCASTLE

AUSTRALIA

Appendix 15.2
INFORMATION SHEET
Smoking Cessation Barriers Project
Document Version 1: 01/07/2013

You are invited to take part in a research project looking at smoker's feelings and thoughts about the barriers to quitting smoking, any cannabis use, and how you use internet technology.

Who is conducting this research?
This research is part of Laura Twyman's studies at the University of Newcastle, supervised by A/Prof. Billie Bonevski, A/Prof Chris Paul and Dr. Jamie Bryant.

Who can take part in the research?
People aged over 18 years who can read, speak and understand English, and are current smokers are invited to take part. People who do not feel well today may wish not to take part.

What will the research involve?
If you agree to take part, you will be asked to answer questions on a touch screen computer. The questions will ask about the things you think may be barriers to quitting smoking, any cannabis use, and how you use internet technology. We can help you complete the survey if you like. The survey will take about 10 mins to complete and you will be reimbursed with a $10 Woolworths "Essentials" Grocery gift card (excludes purchase of tobacco, alcohol and gift cards) for your time.

What choice do you have?
Taking part in this research is up to you. Only people who agree to take part will be included in the project. Whether or not you decide to participate will not affect the care you receive at [INSERT CSO HERE] in any way. If you do decide to take part, you can change your mind at any time without giving a reason.

What will the information collected be used for?
This research will provide information about what people think are some of the barriers to quitting smoking, and will help guide the development of better programs to help people quit. The information gathered about cannabis use and internet technology use will be used in the same way – to develop more tailored quit smoking programs that cover all issues smokers face and the best ways to deliver the program. The information may be used to develop future quit smoking programs, may be published in health journals, used in presentations, and included in a thesis submitted for Miss Twyman's University studies.

How will your privacy be protected?
This is an anonymous survey, and therefore we will not being collecting any personally identifying information. All computer survey information that we do collect is private, and data will be kept in password-protected files that can only be accessed by the researchers. At the end of the study, any paper documents will be stored in locked storage, and electronic information will be stored in password protected files for a minimum of 5 years.

What are the risks and benefits of participating?
By participating in this research you are providing us with information that may assist in the development of quit smoking programs and to better support those people trying to quit. We do not think there are any risks to participating in this research; however there is the potential for some individuals to find some of the survey questions upsetting. If completing the survey brings up any personal issues you would like to discuss the following free telephone services may be helpful: Quitline on 13 78 48 or Lifeline on 13 11 14. If you do change your mind and no longer want to complete the survey, you can stop at any time and this decision will not affect the care you receive from [INSERT CSO HERE].

What do you need to do to participate?
Please read this information statement and be sure you understand its contents before you consent to participate.

If you would like a copy of the research results, you can contact Laura Twyman on the number or email address listed below, or alternatively copies of the summary of the project and results will be left with the front desk at [INSERT CSO HERE].

For more information
If you have any questions about participating in the study, please speak to the research assistant who gave you this information sheet or contact Laura Twyman on (02) 4033 5714 or by email on Laura.Twyman@newcastle.edu.au

Thank you for considering this invitation.

Yours sincerely,

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*This project has been approved by the University's Human Research Ethics Committee, Approval No.***H-2010-1002.** *Should you have concerns about your rights as a participant in this research, or you have a complaint about the manner in which the research is conducted, it may be given to the researcher, or, if an independent person is preferred, to the Human Research Ethics Officer, Research Office, The Chancellery, The University of Newcastle, University Drive, Callaghan NSW 2308, telephone (02 49216333, email Human-Ethics@newcastle.edu.au*

Appendix 15.3 Campbelltown Barriers Survey

First, we would like to know a little bit about you.

1. Are you

Male	1
Female	2

2. In what year were you born?

1	9		

3. What is the postcode of the suburb where you live? If you don't know the postcode, please type '0000'. (Press CLR if you make a mistake)

4. What type of housing do you live in?

Own house	1
Rental house	2
With family or friends	3
Supported accommodation	4
Government housing	5
Hotel/motel	6
No home/street living	7
Other	8

5. Are you of Aboriginal or Torres Strait Islander origin?

Yes, Aboriginal	1
Yes, Torres Strait Islander	2
Yes, both	3
No	4

6. What best describes your marital status?

Married	1
De facto or living with a partner	2
Separated or divorced	3
Never married or single	4
Widowed	5

7. What is the highest level of education that you have <u>completed</u>?

Primary school	1
Completed year 10 (School Certificate)	2
Completed year 12 (Higher School Certificate)	3
TAFE or other trade qualification	4
University Degree	5

8. What is your take-home household income each week (that is, after tax has been taken out)?

Less than $100 per week	1
Between $101 -$200 per week	2
Between $201-$300 per week	3
Between $301-$400 per week	4
Between $401-500 per week	5
More than $500 per week	6
Prefer not to answer	7

9. What is your main source of income?

Paid employment (either full time, part time or casual)	1
Government pension or benefit	2
Family member	3
Personal savings	4
Other	5

SMOKING STATUS

10. Do you currently smoke tobacco products?

Yes, Daily	1
Yes, At least once a week	2
Yes, but less often than once a week	3
No, Not at all	4

IF Q10 = 1 GO TO Q12

IF Q10 = 2 OR 3 GO TO Q 11

IF Q10 = 4 GO TO END OF SURVEY.

11. Have you smoked at least 100 cigarettes or a similar amount of tobacco in your life?

Yes	1
No	2
Not sure	3

SMOKER PROFILE

12. What type of tobacco do you NORMALLY use (CHOOSE ONE ONLY)?

Cigarettes (Pre-rolled)	1
Cigarettes (Roll your own)	2
Chop chop (cheaper loose leaf tobacco)	3
Cigars or Pipe	4
Chewing tobacco	5
Snuff (powder tobacco)	6

IF Q12 = 1, 2 OR 3 GO TO Q13.

IF Q12 = 4,5, OR 6 GO TO END OF SURVEY.

13. On an average day, how many cigarettes do you smoke? Press CLR if you make a mistake

14. At what age did you first start smoking?

years

15. How soon after waking up do you smoke?

Within 5 minutes	1
6-30 minutes	2
31-60 minutes	3
After 60 minutes	4

QUITTING

[CURRENT SMOKERS ONLY] (Q10=1 or Q10=2-3 AND Q11=1)

16. Have you ever tried to quit smoking before?

Yes	1
No	2

LINK: IF Q16=2 GO TO Q19

17. How many serious attempts to stop smoking have you made in the last 12 months? By serious attempt I mean you decided that you would try to make sure you never smoked again. Please include any attempt that you are currently. Press CLR if you make a mistake

☐

18. How long did your most recent serious quit attempt last before you went back to smoking?

Less than a day	1
Less than a week	2
Between one week and three months	3
Between three to six months	4
Between six months to one year	5
More than one year	6
Don't Know/Can't remember	7

19. Which statement best describes how interested you are in quitting?

I am not interested in quitting smoking	1
I am a bit interested in quitting smoking	2
I am very interested in quitting smoking	3

20. What are your intentions regarding quitting? Do you plan to:

Quit in the next 30 days	1
Quit in the next 6 months	2
Quit, but not in the next 6 months	3
Never quit	4
Don't know	5

21. On a scale of one to ten rate your current motivation to give up smoking.

   (Very low)   (Very high)

1----2----3----4----5----6----7----8----9----10

22. If you decided to give up smoking completely in the next 6 months, how sure are you that you would succeed?

Not at all sure	1
Slightly sure	2
Moderately sure	3
Very sure	4
Extremely sure	5

23. Have you ever called the Quit line for help with quitting smoking?

Yes	1
No	2

24. If you decided to quit smoking in the future, would you call a Quitline for help?

Yes	1
No	2

25. This section is about reasons why you **<u>might not</u>** call a quitline. Read each one and decide whether it is not at all true, somewhat true, mostly true, or completely true for you right now

Item	Not at all true for me	Somewhat true for me	Mostly true for me	Completely true for me
I'm sure that I can quit on my own.	1	2	3	4
I don't like to talk on the telephone.	1	2	3	4
Talking about smoking may make it harder for me to quit.	1	2	3	4
I doubt that the quit line can help me with my real barriers to quitting.	1	2	3	4
I don't think the advice I would get from a quit line would help me.	1	2	3	4
If I called, the staff probably wouldn't be able to relate to my experiences.	1	2	3	4
I don't think they could help me with the larger problems in my life that make it hard for me to quit.	1	2	3	4
I wouldn't like telling my personal concerns to a stranger.	1	2	3	4
If I called, it might be hard for me to talk with the person.	1	2	3	4
If I called the quit line and didn't quit, I'd feel embarrassed.	1	2	3	4
My problems are too complex to be fixed with brief help given over the phone.	1	2	3	4

26. Would you be more likely to call the quitline in the next 30 days if:

Item	Definitely not	Probably not	Possibly	Probably	Definitely
You had the phone number handy	1	2	3	4	5
The quit line was staffed by ex-smokers	1	2	3	4	5
You knew that smokers who get help through the quit line are more successful in stopping smoking	1	2	3	4	5
You knew you could end the quit line calls at any time	1	2	3	4	5
You knew that lots of smokers use the quit line	1	2	3	4	5
The quit line was staffed by people who are similar to you	1	2	3	4	5

27. Do you know how to contact the Quitline?

Yes	1
No	2

28. This section is about reasons for quitting. Here is a list of twenty reasons that smokers may have for quitting. Read each one and decide whether it is not at all true, a little true, moderately true, quite true or extremely true for you right now.

Reasons to quit	Not at all true	A little true	Moderately true	Quite true	Extremely true
Health					
Because I am afraid I will get sick	1	2	3	4	5
Because smoking is hurting my health	1	2	3	4	5
Because I am afraid smoking will shorten my life	1	2	3	4	5
Because I am worried smoking might be hurting my children or family	1	2	3	4	5
Self-control					
To prove I can quit	1	2	3	4	5
To feel in control of my life	1	2	3	4	5
To show I can do other things that are important to me	1	2	3	4	5
Immediate reinforcement					
To save money that I spent on cigarettes	1	2	3	4	5
So my house or car wouldn't smell	1	2	3	4	5
So I wouldn't burn holes in clothes or furniture	1	2	3	4	5
Because it is hard to find places where it is ok to smoke	1	2	3	4	5
Social influence					
So people will stop nagging me	1	2	3	4	5
Because people I am close to will be mad if I don't quit	1	2	3	4	5
Because someone is making me quit	1	2	3	4	5
Because I feel like people judge me when I smoke	1	2	3	4	5

Cannabis

29. Have you ever used Cannabis (marijuana, dope, grass, hash, pot)?

Yes	1
No	2

IF Q29 = 1 GO TO Q30

IF Q29 = 2 GO TO Q32

30. During the past month how often did you use cannabis?

6 – 7 days each week	1
4 – 5 days each week	2
2 – 3 days each week	3
One day each week	4
1 day each fortnight	5
Once in the last month	6
Not at all in the last month	7

31. Do you mix tobacco with cannabis (marijuana, dope, grass, hash, pot)?

Yes	1
No	2

Internet Access

32. In the last 12 months, how often have you accessed the Internet?

☐ Everyday   ☐ About once a week

☐ Less than once a week   ☐ Not at all

33. In the last 12 months did you access the internet through any of the following?

	Yes	No
Computer (desktop or laptop)	1	2
Smart phone (e.g iPhone or Android)	1	2
Tablet (e.g. iPad)	1	2
A device not owned by you (e.g. a friend's smartphone, library or work computer)	1	2
Other	1	2

34. Would you use the Internet to help you improve your health?

Yes	1
No	2

E-cigarettes

The following questions are about electronic cigarettes or e-cigarettes. An e-cigarette (like the one shown on the left here) uses a battery and may also light up or have smoke (vapour) coming from it like a real cigarette [Insert picture of e-cigarettes and inhalers].

35. Before now, have you ever heard of electronic cigarettes or e-cigarettes?

Yes	1
No	2

IF Q35 = 1 GO TO Q 36

IF Q35 = 2 GO TO END

36. In the last 12 months, have you ever tried electronic cigarettes or e-cigarettes, even just one time?

Yes	1
No	2

IF Q36 = 1 GO TO Q37

IF Q36 = 2 GO TO Q38

37. Where did you get the e-cigarette(s) from?

Internet/online	
Tobacco shop (tobacconist)	
Friend or stranger	
While travelling overseas	
Other	

38. For the following statements, indicate how strongly you agree or disagree by selecting from 1-5:

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
E-cigarettes can help people quit smoking tobacco.					
I would switch to e-cigarettes completely if they are cheaper than tobacco cigarettes.					
E-cigarettes are safer to use than tobacco cigarettes.					
I would give e-cigarettes a go to help me quit smoking.					

39. Please rate the following items in terms of how much they are a barrier to you quitting smoking:

It's hard for me to quit smoking because:	Not a barrier	Small barrier	Medium barrier	Large barrier	Not applicable
Individual Factors	0	1	2	3	NA
Addiction					
1. I am addicted to smoking					
2. I won't be able to manage the withdrawal symptoms (e.g. cravings, irritability)					
Motivational factors					
3. I don't have the willpower					
4. I am not motivated					
5. I wouldn't succeed					
6. I don't have the confidence					
7. It is too hard for me					
Perceived benefits of smoking					
8. I enjoy smoking					
9. Smoking helps me deal with stress					
10. Smoking helps me manage my emotions					
11. If I quit I will gain weight					
12. Smoking helps me manage anxiety or depression					
13. Smoking helps me to relax					
14. Smoking makes me feel in control					
15. Smoking helps my concentration					
16. I smoke for something to do					
17. Smoking helps me socialise					
Knowledge and beliefs regarding smoking and cessation					
18. I don't think smoking is that bad for me					
19. I know other people who were smokers who never got sick					
20. There are other priorities I should be focussing on					
Lifestyle factors					
21. I don't have any alternatives to smoking					
22. Smoking helps me avoid other drugs					
Social and community networks					
23. I wouldn't get support from family or friends to quit					
24. I wouldn't get any help from health professionals to quit					
High prevalence in community					
25. I wouldn't fit in if I stopped smoking					
26. Smoking is acceptable in my community					

27. Most of the people in my community are smokers					
28. Most of my friends and family/the people I live with are smokers					
Living and working conditions					
29. There are too many stressful events in my life					
Access to resources to quit					
30. The patches/gum etc. don't work					
31. The patches/gum etc. have bad side effects					
32. The patches/gum etc. are too expensive					
33. Other medications like Zyban (buproprion) and Champix (varenicline) don't work					
34. Other medications Zyban (buproprion) and Champix (varenicline) are too expensive					
35. Other medications like Zyban (buproprion) and Champix (varenicline) have bad side effects					
36. I don't know where to go to get help to quit smoking					
37. People would judge me if I asked for help quitting smoking					
Culture					
38. Smoking is a part of my culture					

Appendix 15.4 Supplementary file 1. Barriers to Cessation in Disadvantaged Smokers scale (ABCDs)

1. Please rate the following items in terms of how much they are a barrier to you quitting smoking:

Item	Not a barrier	Small barrier	Medium barrier	Large barrier	Not applicable
Individual Factors	0	1	2	3	NA
Addiction					
1. I am addicted to smoking					
2. I won't be able to manage the withdrawal symptoms (e.g. cravings, irritability)					
Motivational factors					
3. I don't have the willpower					
4. I am not motivated					
5. I wouldn't succeed					
6. I don't have the confidence					
7. It is too hard for me					
Perceived benefits of smoking					
8. I enjoy smoking					
9. Smoking helps me deal with stress					
10. Smoking helps me manage my emotions					
11. If I quit I will gain weight					
12. Smoking helps me manage anxiety or depression					
13. Smoking helps me to relax					
14. Smoking makes me feel in control					
15. Smoking helps my concentration					
16. I smoke for something to do					
17. Smoking helps me socialise					
Knowledge and beliefs regarding smoking and cessation					
18. I don't think smoking is that bad for me					
19. I know other people who were smokers who never got sick					
20. There are other priorities I should be focussing on					
Lifestyle factors					
21. I don't have any alternatives to smoking					
22. Smoking helps me avoid other drugs					
Social and community networks					
23. I wouldn't get support from family or friends to quit					
24. I wouldn't get any help from health professionals to quit					
High prevalence in community					
25. I wouldn't fit in if I stopped smoking					
26. Smoking is acceptable in my community					

27. Most of the people in my community are smokers					
28. Most of my friends and family/the people I live with are smokers					
Living and working conditions					
29. There are too many stressful events in my life					
Access to resources to quit					
30. The patches/gum etc. don't work					
31. The patches/gum etc. have bad side effects					
32. The patches/gum etc. are too expensive					
33. Other medications like Zyban (buproprion) and Champix (varenicline) don't work					
34. Other medications Zyban (buproprion) and Champix (varenicline) are too expensive					
35. Other medications like Zyban (buproprion) and Champix (varenicline) have bad side effects					
36. I don't know where to go to get help to quit smoking					
37. People would judge me if I asked for help quitting smoking					
Culture					
38. Smoking is a part of my culture					

2. Please rank the following barriers from one to three in terms of how important they are to address before you can quit smoking: (Note participants could then select from a list that was populated with all of the barriers they had rated as large in question 1 above).

Appendix 15.5 Supplementary file 2: Confirmatory factor analysis of the Assessment of Barriers to Cessation in Disadvantaged Smokers scale (ABCDs)

Barrier	Factor										Squared multiple correlations
Question	Addiction	Motivation	Benefits	Beliefs	Lifestyle	Social	Prevalence	Conditions	Resources	Culture	R-square
1	0.75 (0.06)*	.	.	.	.	.	.	.	.	.	0.45
2	0.97 (0.05)*	.	.	.	.	.	.	.	.	.	0.73
3	.	0.9 (0.05)*	.	.	.	.	.	.	.	.	0.68
4	.	0.72 (0.05)*	.	.	.	.	.	.	.	.	0.42
5	.	0.84 (0.05)*	.	.	.	.	.	.	.	.	0.60
6	.	0.76 (0.05)*	.	.	.	.	.	.	.	.	0.50
7	.	0.86 (0.05)*	.	.	.	.	.	.	.	.	0.63
8	.	.	0.6 (0.06)*	.	.	.	.	.	.	.	0.29
9	.	.	0.78 (0.05)*	.	.	.	.	.	.	.	0.53
10	.	.	0.83 (0.05)*	.	.	.	.	.	.	.	0.56
11	.	.	0.61 (0.06)*	.	.	.	.	.	.	.	0.24
12	.	.	0.87 (0.05)*	.	.	.	.	.	.	.	0.55
13	.	.	0.77 (0.05)*	.	.	.	.	.	.	.	0.51
14	.	.	0.7 (0.05)*	.	.	.	.	.	.	.	0.43
15	.	.	0.71 (0.05)*	.	.	.	.	.	.	.	0.41

| Barrier | Factor | | | | | | | | | | Squared multiple correlations |
Question	Addiction	Motivation	Benefits	Beliefs	Lifestyle	Social	Prevalence	Conditions	Resources	Culture	R-square
16	.	.	0.65 (0.06)*	.	.	.	.	.	.	.	0.31
17	.	.	0.55 (0.06)*	.	.	.	.	.	.	.	0.26
18	.	.	.	0.64 (0.07)*	.	.	.	.	.	.	0.27
19	.	.	.	0.82 (0.06)*	.	.	.	.	.	.	0.53
20	.	.	.	0.71 (0.07)*	.	.	.	.	.	.	0.36
21	.	.	.	.	0.85 (0.06)*	.	.	.	.	.	0.58
22	.	.	.	.	0.58 (0.06)*	.	.	.	.	.	0.29
23	.	.	.	.	.	0.71 (0.05)*	.	.	.	.	0.47
24	.	.	.	.	.	0.7 (0.05)*	.	.	.	.	0.52
25	.	.	.	.	.	.	0.63 (0.05)*	.	.	.	0.45
26	.	.	.	.	.	.	0.85 (0.05)*	.	.	.	0.55
27	.	.	.	.	.	.	0.9 (0.06)*	.	.	.	0.54
28	.	.	.	.	.	.	0.83 (0.06)*	.	.	.	0.46
29	.	.	.	.	.	.	.	1.14 (0.21)*	.	.	0.99

Barrier	Factor										Squared multiple correlations
Question	Addiction	Motivation	Benefits	Beliefs	Lifestyle	Social	Prevalence	Conditions	Resources	Culture	R-square
30	.	.	.	.	.	.	.	.	0.85 (0.06)*	.	0.52
31	.	.	.	.	.	.	.	.	0.85 (0.05)*	.	0.53
32	.	.	.	.	.	.	.	.	0.81 (0.06)*	.	0.40
33	.	.	.	.	.	.	.	.	0.87 (0.05)*	.	0.62
34	.	.	.	.	.	.	.	.	0.86 (0.06)*	.	0.46
35	.	.	.	.	.	.	.	.	0.91 (0.06)*	.	0.56
36	.	.	.	.	.	.	.	.	0.54 (0.05)*	.	0.27
37	.	.	.	.	.	.	.	.	0.47 (0.04)*	.	0.28
38	.	.	.	.	.	.	.	.	.	1.2 (0.2)*	.

*$p<0.001$; Model fit: RMSEA= 0.0621, SRMSR= 0.0663, Bentler's CFI= 0.8584, NNFI= 0.84, NFI= 0.78. Overall, the model seems to be a moderately good fit for the data

Paper Four Appendices

16.1 Reviewers comments and response to reviewers' comments

Appendix 16.1 Reviewers comments Substance use and misuse 20/7/2015

Reviewer: 1

Comments to the Author

I have some suggestions on the presentation of the paper:

1. The paper describes smoking and alcohol use in a group of clients of a non-government welfare agency. No information on the agency and the type of program it provides is given in the paper. I think this would be useful contextual information. I'm assuming that clients of the agency are accessing these services because of some need and the types of problems clients are seeking help for and that this agency addresses would potentially offer some clue as to the other life challenges that this group of clients face.

In the paper we provide a general statement of the types of services CSOs provide: "This community based welfare agency provides a wide range of material and financial assistance to clients experiencing high levels of disadvantage.". We have added further information regarding CSOs and the type of programs they provide to clients:

"CSOs offer help with issues such as mental illness, homelessness, alcohol and other drug problems, Aboriginal health, at risk youth and family support. They provide a wide range of services to clients including crisis relief (for example financial aid to pay electricity bills), food vouchers, employment services, and relationship counselling. Clients of CSOs represent some of the groups most likely to experience socioeconomic disadvantage, including sole parents, people living with a disability, people who are of Aboriginal or Torres Strait Islander origin and people who are currently unemployed (Australian Council of Social Service, 2011).

2. In the abstract concurrent users are described as more likely to have some contact with family. From reading the full paper, I believe this is meant to mean more likely to have "only some" contact rather than "a lot" of contact with family, but this isn't obvious from the abstract.

We have changed the abstract to refer to "only some contact" rather than "a lot".

3. Some of the scales used in the study are extremely brief, particularly the PHQ4. This is noted in the limitations section, but I think this deserves another sentence or two to note that stronger measures of some markers of disadvantage or psychosocial stress may have produced different results.

We have added in a sentence acknowledging that longer or different measures of these constructs may have produced different results. "Use of longer or more comprehensive measures of these constructs may have provided different results.".

4. I was a little surprised that the significance level had been set at 0.01, because of the "relatively large sample size". I would have thought this sample size was moderate for the nature of the investigation being conducted. Indeed later it is noted that "Potentially, this study was only adequately powered to detect moderate to large associations". I think the word "potentially" should be removed. With the sample size and analysis methods known there should be no impediment to calculating the power of the study, and I suspect the authors are accurate in their description of the study power.

Because of the sample size and the number of comparisons made in this analysis we took a conservative approach by setting the significance level to 0.01. We have clarified this in the manuscript (p9, par 1). We have also removed the word "potentially".

5. In the discussion the authors cite a number of references to make the point that smoking and heavy drinking are higher in this sample than in the general population. I feel that quoting population rates to give context to the size of the difference would strengthen this point. This should also be done for concurrent users if comparable figures can be sourced from the National Drug Survey or a similar collection.

Population rates of tobacco and lifetime risky alcohol use for Australia have been quoted. Additionally, rates of concurrent use based on population estimates in the USA and Australia are also provided.

6. Implications. The authors suggest the results imply campaigns for this group are needed in order to encourage smoking cessation. There is other literature to suggest that disadvantaged smokers do want to, and do try to quit, and possibly it is the success at quitting that is the main difference between the groups. While the data from this study don't address whether the problem is motivating quit attempts or success at quitting, I would suggest both issues could be discussed in this section.

We suggest that campaigns that inform disadvantaged smokers of the effects that alcohol and smoking can have on health and on attempts to quit smoking are needed. We then discuss the need for targeted interventions that could potentially address both smoking AND heavy drinking, but also caution that there is a need for more information regarding the treatment sequences and preferences of disadvantaged smokers. We have now addressed both motivation to quit and success at maintaining cessation in the discussion.

"Evidence from smoking cessation literature suggests that while disadvantaged smokers make attempts to quit smoking at rates similar to those within the general population, the success rates of these quit attempts are lower (Hyland et al., 2006; Kotz & West, 2009). Therefore, there is a need for targeted, evidence based interventions that address both behaviours and promote sustained behaviour change.".

7. An additional point that could possibly be addressed in the discussion section relates to the nature of the services being supplied by the community organisation, and the nature of the problems clients are seeking help for. The implications section suggests tackling smoking and drinking together, which makes sense. It may also make sense for organisations providing support services to disadvantaged clients to tackle smoking and drinking together with whatever support they are providing as an overall holistic approach.

We have now addressed the potential of CSOs to provide services to tackle smoking and alcohol issues with their clients.

CSOs may be well placed to address smoking and heavy drinking with their clients in tandem with the other issues clients present with (including unemployment and financial stress) (Christiansen, Brooks, Keller, Theobald, & Fiore, 2010). Addressing smoking in CSOs has been identified as acceptable and feasible by both CSO staff and clients (Bryant, Bonevski, & Paul, 2011; Bryant, Bonevski, Paul, Hull, & O'Brien, 2012). However, careful planning and involvement with CSO staff is necessary in order to ensure they have the capacity to address these behaviours, as evidence suggests CSOs are already struggling to meet demand for services (Australian Council of Social Service, 2014).

Reviewer: 2

Comments to the Author

1. Clarify that this was a convenience sample

We have clarified that this was a convenience sample.

2. Inclusion of a brief explanation as to why such a large sample was recruited. There are more than sufficient data points for the set of eight variables

This survey included a range of questions for a number of sub-studies. The larger sample size was required for all the analyses.

3. Inclusion of a reference for completion of the survey was taken as consent (eg National Statement on Ethical Conduct in Human Research, 2007 (updated 2013)

A reference has now been included for survey completion taken as consent.

4. The classifications of participants could be more emphasized in the 2.6 Data Analysis section by presenting as sub-heading or bullet points (when reading the tables I found myself returning to these classifications)

The classifications of participants have now been made clearer by using subheadings.

6. To make the results more accessible to readers, further explanatory notes in the results rather than a plethora of tables, may be useful

We have provided more detail in the results regarding the smoking and drinking profile (Table 1), the demographic characteristics (Table 2) and psychosocial characteristics (Table 3) of the participants.

7. The paper recommends further research into multiple substance misuse within clients of community services. Why was this information not collected?

This survey assessed a wide range of factors but focussed on tobacco use practices and cognitions amongst a socially disadvantaged sample. We did not want to make the survey too long and burdensome for participants. Future research may be devoted to multiple substance use questions.

8. While I agree that there is a need for intervention studies as compared to descriptive research, the conclusions could be strengthened by tentative but more specific recommendations in light of the results eg with smoking status of friends and family an important influence, family-centred approaches as well as peer support could be recommended; opportunistic interventions for those who are homeless; capacity-building for community services to provide some interventions.

The potential for CSOs to provide interventions with clients has now been discussed. We now also refer to the potential of community and family based approaches to address smoking and alcohol,

given the family based approaches show modest levels of effectiveness at preventing young people from initiating smoking and reducing children's exposure to second-hand smoke.

Paper Six Appendices

17.1 E-cigarette image

17.2 Published manuscript (copy-edited version)

Appendix 17.1 Supplementary file 1: E-cigarette image used in survey