

**Health determinants in Australian communities: a multilevel investigation of the  
influence of personal and contextual characteristics**

Joanne Allen, B Psych (Hons)

**Submitted for the Degree of Doctor of Philosophy**

July, 2014

School of Medicine and Public Health, University of Newcastle, Australia.



### **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 the final version of my thesis being made available worldwide when deposited in the University's Digital Repository subject to the provisions of the Copyright Act 1968.



### Statement of Authorship

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 (see Appendix 0.1).

---

Joanne Allen

Date



**Dedication**

To those of us best understood in context

Ryan Michael McKay

(1984-2013)

## Acknowledgements

I would like to acknowledge the support of Xstrata Coal, Beyondblue and the Hunter Medial Research Institute for the eXtending Treatment Education and Networks in Depression project initiative, on which the current thesis is based.

I would like to express sincere gratitude to my primary supervisor, Dr Kerry Inder, for her unwavering professional and personal support through the highs and lows of my candidature.

I would also like to thank my co-supervisors, Professor Brian Kelly and Professor John Attia, for contributing their expert insight and good humour.

I would like to thank Associate Professor Terry Lewin whose support and mentorship began years before my doctoral research and whose curiosity kindled equally the questions and answers that followed. I continue to be inspired to be a more contributing individual, researcher and community member by his example.

I would like to thank my co-authors for their contributions to the studies and manuscripts which make up the body of the current thesis.

I would like to thank the investigators of the Australian Rural Mental Health Study and Hunter Community Study for their commitment to these studies. Their ambition to achieve the greatest benefit from the experiences shared by study participants underlies the eXtending Treatment Education and Networks in Depression project.

I would like to acknowledge the Centre for Epidemiology and Evidence in the NSW Ministry of Health for the opportunity to examine data from the NSW Adult Population Health Survey.

I would like to thank a kindred spirit, Dr Clare Coleman for her model in the diligent collection, collation and dissemination of survey data, whatever the obstacle. I am also grateful to Associate Professor Tim Slade and Professor Helen Berry for discussions that helped me to appreciate the inner and outer limits of my research in light of the available data.

To Henry Anderberg, thank you for sharing a significant part of my life.

## Table of Contents

Synopsis .....	19
References .....	26
<b>Chapter one:</b> Thesis introduction .....	29
The significance of context for identifying appropriate targets for public health intervention .....	30
Physical, mental and ‘overall’ indices of health in public health research .....	33
Multilevel view of health and its determinants: an interaction between individual and contextual determinants of health .....	38
Health related contextual correlates of population size, density and distance from resources .....	48
Health determinants in rural Australia – informing targeted health interventions .....	60
Current study .....	64
Current thesis chapters.....	66
References .....	69
<b>Chapter two:</b> Goals and methodologic issues concerning individual participant data analyses from multiple cohort studies .....	83
Introduction to Chapter two.....	83
Abstract.....	91
Background .....	93
Discussion.....	102
Conclusions .....	120
References .....	123

<b>Chapter three: Differential associations of personal and social networks with psychological distress across urban and remote communities.....</b>	<b>130</b>
Introduction to Chapter three .....	130
Abstract.....	137
Background .....	139
Methods.....	141
Results.....	146
Discussion.....	155
References .....	163

<b>Chapter four: Do indices of health related quality of life measure the same health related constructs across urban and rural cohorts? .....</b>	<b>169</b>
Introduction to Chapter four .....	170
Abstract.....	175
Introduction .....	177
Methods.....	180
Results.....	188
Discussion.....	201
References .....	210

<b>Chapter five: Does the association of health related adversity with health related physical and psychological quality of life differ across urban and rural communities.....</b>	<b>216</b>
Introduction to Chapter five .....	217
Abstract.....	225
Introduction .....	227
Methods.....	230
Results.....	237

Discussion.....	250
References .....	257
<b>Chapter six:</b> Characterising the health related characteristics of sparsely populated rural areas: identifying the stable personal, social and contextual correlates of physical and mental health for rural men and women.....	264
Introduction to Chapter six.....	265
Abstract.....	273
Background .....	274
Data and methods.....	276
Results.....	283
Discussion.....	294
References .....	301
<b>Chapter seven:</b> Potential causal pathways between personal adversity, social networks and physical and mental health outcomes for rural men and women .....	308
Introduction to Chapter seven.....	309
Abstract.....	314
Introduction .....	315
Data and methods.....	317
Results.....	324
Discussion.....	333
References .....	340
<b>Chapter eight:</b> Discussion and conclusions .....	346
Thesis overview: the impact of context on determinants of health across urban to remote areas of Australia .....	347

The combination of individual participant data across multiple studies may be valuable for addressing new research questions.....	357
The moderating influence of remoteness on health and its determinants.....	364
Remoteness and health related contextual effects.....	376
Determinants of health in rural Australia .....	382
Conclusions and recommendations.....	397
References .....	400

<b>APPENDICES.....</b>	<b>I</b>
Appendix 0.1 Statements from co-authors regarding the candidate’s contribution .....	II
Appendix 1.0 Population based studies of urban-rural differences in affective disorders .....	XI
Appendix 2.0 Published manuscript .....	XXI
Appendix 2.0.1 Ethics approval for eXtending Treatments, Education and Networks for Depression (xTEND) study.....	XXXVI
Appendix 3.0 Published manuscript .....	XXXIX
Appendix 4.0 Published manuscript .....	LI
Appendix 4.1 Supplementary documentation and data supporting published paper presented in Chapter four .....	LXVII
Appendix 4.2 AQoL-6D items and scoring. ....	LXXXIII
Appendix 5.0 Published manuscript .....	LXXXVII
Appendix 5.1 supplementary information and analyses supporting paper presented in Chapter five.....	CIII
Appendix 6.1 Supplementary documentation and data supporting paper presented in Chapter six .....	CIX
Appendix 7.1 Supplementary documentation and data supporting paper presented in Chapter seven .....	CXXIX

## List of Tables

### Chapter two

Table 2.1 Reasons for combining experimental or observational research data across cohorts.

Table 2.2 Potential threats to inference when examining data across cohorts.

Table 2.3 Comparability of Australian Rural Mental Health Study (ARMHS) and Hunter Community Study (HCS) measures/samples at baseline and common follow-up.

### Chapter three

Table 3.1 Network and Personal support indices administered by the ARMHS and HCS at baseline but common to three year follow-up.

Table 3.2 Analyses of HCS three year follow-up (N = 1716): Logistic regressions examining predictors of high psychological distress, using social support indices equivalent to those from the ARMHS and HCS at baseline.

Table 3.3 Logistic coefficients for predictors of high distress (N = 4219).

### Chapter four

Table 4.1 Description of number, origin and criteria for cases included in current analyses.

Table 4.2 Sample characteristics and comparisons by cohort and phase.

Table 4.3 Raw and standardized coefficients from separate CFAs for each AQoL-6D domain (N = 7915).

Table 4.4 Model parameter estimates for two higher-order factors from a factor analysis of AQoL-6D domains (N = 7915).

Table 4.5 Mean (SD) AQoL-6D quality of life impairment domain and factor scores by gender and age.

Table 4.6 Pearson's correlation coefficients between AQoL-6D domains and SF-36 scales.

Table 4.7 Associations of AQoL-6D summary scores with concurrent assessments of quality of life (SF-36) and with independent indices of physical and psychological functioning.

### **Chapter five**

Table 5.1 Descriptive statistics and comparison of HCS (N = 3118) and ARMHS (N = 1246) participants.

Table 5.2 Primary analysis: hierarchical linear regression analysis of the correlates of physical and psychological quality of life impairment (N = 4364).

Table 5.3 Secondary analysis of subjective social capital and health service accessibility by remoteness category from NSW Adult Population Health Surveys (years: 2006-2009).

Table 5.4 Sub-analysis: hierarchical linear regression analysis of the correlates of physical and psychological quality of life impairment (N = 1176).

### **Chapter six**

Table 6.1 Overall participant characteristics and their stability over three survey phases.

Table 6.2 Overall cross-sectional predictors of current physical health and the moderating effects of phase and gender.

Table 6.3 Nested model comparisons for phase and gender moderation in physical (A) and mental (B) health outcome models.

Table 6.4 Overall cross-sectional predictors of current mental health and the moderating effects of phase and gender.

Table 6.5 Comparison of parameter strength across physical and mental health outcome models.

## **Chapter seven**

Table 7.1 Temporal stability and cross-sectional multivariate associations of selected adversity and social factors with physical and mental health (N = 3396).

Table 7.2 Nested model comparisons (comparing the fit of less constrained models against those with greater constraints).

Table 7.3 Path coefficients from cross-lagged panel model (M4).

## List of Figures

### Chapter one

Figure 1.1 The main determinants of health: Conceptual model of structural, material, social and individual level factors for purposes of health policy and intervention.

Figure 1.2 Conceptual model of contextual factors driving health inequalities.

Figure 1.3 Influences of inequality and administrative forces or 'the state' on social capital and some mechanisms through which social capital may influence health.

Figure 1.4 Community remoteness as a factor influencing health relevant contextual characteristics.

### Chapter two

Figure 2.1 Bar chart depicting increase in number of journal publications (articles or conference abstracts) including terms referring to pooling raw data, as found by a keyword search between dates 2003-2012 (N = 544).

Figure 2.2 Proportion of the pooled eXtending Treatment, Education and Networks in Depression (xTEND) sample at baseline (T0) and follow-up (T1) by remoteness category and Hunter Community Study (HCS)/Australian Rural Mental Health Study (ARMHS) membership, compared to New South Wales (NSW) population (2008).

### Chapter three

Figure 3.0 The associations of social support ( $p = .001$ ) and age ( $p = .010$ ) with high psychological distress were moderated by remoteness.

Figure 3.1 The effect of social support (A) on the prediction of distress outcome as assessed by the HCS and ARMHS equivalent social support indices.

Figure 3.2 The effect of age on the prediction of distress outcomes by remoteness category.

Figure 3.3 The effect of social support on the prediction of distress outcomes by remoteness category.

#### **Chapter four**

Figure 4.1 Standardized parameter estimates and squared multiple correlations for the two correlated higher-order factor structure of the six AQoL-6D domains (N = 7915).

Figure 4.2 Profile plot of standardized AQoL-6D domain, factor and total scores by group and for those with poorest quality of life on the SF-36.

#### **Chapter five**

Figure 5.0 Moderation of the health impacts of health related adversity by context (Model A).  
Moderation of health impacts of health adversity and financial adversity by context (Model B).

Figure 5.1 Sub-analysis of the association of social capital and psychological impairment by perceived financial difficulty grouping.

#### **Chapter six**

Figure 6.0 Personal and contextual predictors of self-rated physical and mental health in rural Australia.

Figure 6.1 Remoteness categories (colouring) by New South Wales (NSW) area health service regions (black outline) used in defining area-level social capital and health service accessibility characteristics.

## **Chapter seven**

Figure 7.0 Causal associations between variable groups over one and two year time lags.

Figure 7.1 Hypothesised multi-level cross-lagged models of personal adversity, social experiences and health.

Figure 7.2 Significant (solid lines,  $p < .01$ ) and trend level (broken lines,  $p < .05$ ) cross-lagged associations (model M4), standardized coefficients.

Figure 7.3 Causal paths between personal adversity, social networks and physical and mental health observed in the current study.

## **Chapter eight**

Figure 8.0 Local government areas sampled by the ARMHS (green) and Hunter Community Study (Red).

## Synopsis

Health is thought to be influenced by individual, community, material and wider societal factors. Knowledge of how these factors interact to influence health may improve our capacity to implement targeted and equitable health policy and interventions. This thesis focuses on the influence of personal psychosocial determinants of health, such as social networks and experiences of adversity, on health and how these associations may be influenced by health related contextual factors, such as socioeconomic status, social capital and service accessibility. This thesis aims to examine whether the psychosocial determinants of health differ with the changing context associated with community remoteness in Australia. It comprises an introductory chapter, six research chapters that are presented as published papers and papers submitted for publication, and a general discussion chapter. Specific chapters address the quantification of the contextual factors thought to vary with community remoteness and their influence on health and its determinants, namely the influence of personal adversity and social networks on health outcomes. At the time of submission, four papers have been accepted for publication in peer reviewed journals and two have been submitted for review. This thesis makes a significant contribution to understanding methods and challenges of combining cohort studies to answer key research questions; and to describing how community remoteness may interact with a range of recognised psychosocial determinants of health.

The **Introduction (Chapter one)** reviews the literature to present a multidimensional definition of health that includes physical, mental and social well-being. Theoretical and empirical models of the influence of contextual factors on health and its determinants are reviewed and the potential for health determinants to be experienced differently within different contexts discussed. The case of geographic remoteness is used to highlight how broader contextual characteristics such as culture, socioeconomic status and the availability of services may be

influenced by the broader structural and physical characteristics of areas. The potential for these community characteristics to influence the determinants of health is discussed. The importance of this perspective for health in Australia and the need to assess the impacts of context on health and its determinants, to guide the development of targeted health interventions and models of care in these environments, are also discussed. The opportunities to investigate these research questions using existing and ongoing cohort studies are highlighted and the specific research questions addressed in **Chapters two** through **seven** are stated.

**Chapter two**, *'Goals and methodologic issues concerning individual participant data analyses from multiple cohort studies'*, gives an overview of the current body of work by discussing the scope and goals of the project. Specifically, it addresses the current project's intention to combine data from two existing cohort studies, namely the Hunter Community Study (HCS) and Australian Rural Mental Health Study (ARMHS), to represent persons from a range of urban to remote areas of Australia under the auspices of the eXtending Treatments Education and Networks in Depression (xTEND) study. It also addresses the methodological and analytical challenges associated with drawing upon multiple cohort studies and datasets to address new research questions. Where retrospective harmonization of cohorts is considered, the chapter discusses the benefits associated with conducting a common follow-up phase to increase overlap between cohorts, as was undertaken for the purposes of xTEND. This chapter provides recommendations for other research projects considering undertaking similar tasks. The corresponding research paper has been published in BMC Medical Research Methodology.

**Chapter three**, *'Differential associations of personal characteristics and social networks with psychological distress across urban and remote communities'*, presents analyses of the association of social support with an established measure of high psychological distress (Kessler 10 psychological distress scale) [1] in the xTEND sample. It addresses how the

association of health and social support may be moderated by community remoteness (operationalized using a standard index of road distance from nearest service centre). To this end, the chapter presents a preliminary calibration of the different social support indices administered by the ARMHS and HCS at baseline, using data from a common follow-up phase. It concludes that the psychological distress associated with low social support may decrease with greater community remoteness (OR 1.22; 99% CI 1.04-1.44). The corresponding research paper has been published in BMC Public Health.

**Chapter four**, '*Construct validity and invariance of the Assessment of Quality of Life - 6D (AQoL-6D) across urban and rural community cohorts*', addresses the construct validity and measurement invariance of a health related quality of life instrument (AQoL-6D) [2] administered to the ARMHS and HCS cohorts at baseline and follow-up phases. This chapter addresses the conclusions of **Chapter two** regarding potential confounds in interpreting analyses of individual participant data across multiple cohorts. The chapter describes circumstances in which combining data across cohorts and phases may be used in conjunction with multiple imputation techniques to estimate data omitted from a given cohort or phase. A two-factor structure of the AQoL-6D (CFA model fit: RMSEA = .07, SRMR = .03; TLI = .96, CFI = .98) which displays measurement invariance across cohorts [configural invariance: RMSEA = .06 (.05, .06), SRMR = .03; TLI = .95, CFI = .97; metric invariance: RMSEA = .05 (.05, .06), SRMR = .03; TLI = .96, CFI = .97, and; covariance/variance invariance: RMSEA = .05 (.05, .06), SRMR = .04; TLI = .96, CFI = .97] and phases [configural invariance: RMSEA = .06 (.05, .06), SRMR = .03; TLI = .95, CFI = .97; metric invariance: RMSEA = .05 (.05, .05), SRMR = .03; TLI = .96, CFI = .97, and; covariance/variance invariance: RMSEA = .05 (.04, .05), SRMR = .04; TLI = .96, CFI = .97] is identified. Recommendations regarding factor scoring and preliminary normative data from the combined samples are provided. The concurrent, convergent and divergent validation of these factor scores in relation to other indices of health related quality of life, physical and

psychological functioning are examined. The chapter concludes that the AQoL-6D has a two factor structure that represents the same latent physical and psychological dimensions of health related quality of life impairment across the ARMHS and HCS samples. The corresponding research paper has been published in Health and Quality of Life Outcomes.

**Chapter five**, *'Differential associations of personal adversity with physical and psychological health related quality of life across urban and remote communities'*, examines whether the physical and psychological health related quality of life impacts of health related adversity, namely cardiovascular and affective conditions, differ with community remoteness. The chapter addresses conclusions of **Chapter two** regarding potential confounds in interpreting analyses of individual participant data across multiple cohorts and, to this end, the influence of unmeasured cohort factors (confounds) on model outcomes are examined. The chapter draws upon the conclusions of **Chapter four** regarding the comparability of the Physical and Psychological domains of the AQoL-6D across the ARMHS and HCS cohorts. The chapter also utilizes data from the New South Wales Adult Population Health Survey to investigate remoteness as a proxy for contextual health service accessibility and social capital. Finally, a sub-analysis using ARMHS data is used to assess whether the impacts of personal adversity (both health and financial) differ when individual ratings of social capital are used as a proxy for area social capital. Remoteness and social capital influence psychological ( $\beta = 0.02$ ,  $p < .001$  and  $\beta = -0.06$ ,  $p = .028$ , respectively), but not physical impairment. The psychological burdens of personal adversity may be ameliorated by greater social capital (financial difficulty:  $\beta = -0.07$ ,  $p = .014$ ; depression:  $\beta = -0.08$ ,  $p = .012$ , respectively), which displays a non-linear association with community remoteness. Major cities significantly lower social capital than inner regional areas ( $p < .001$ ) which in turn had lower ( $p < .001$ ) social capital compared to outer regional areas, remote and very remote areas, which did not significantly differ from each other. The need for better proxies for health related contextual characteristics in rural

areas is discussed. The corresponding research paper has been published in Health and Quality of Life Outcomes.

**Chapter six**, *'Personal, social and contextual predictors of self-reported overall physical and mental health for rural men and women'*, examines the stable personal and contextual predictors of physical and mental health in the ARMHS sample over three phases of follow-up data collection. This chapter draws upon the conclusions of **Chapters three and five** regarding the potential for the impact of psychosocial health determinants to vary with contextual factors and the conclusions of **Chapter five** regarding the limitations of community remoteness as a proxy for these factors. The chapter introduces a method, driven by theory and available data, of characterising the contextual characteristics of social capital and health service accessibility in sparsely populated areas. Multi-level investigations of 1) the personal demographic, health, social, and contextual correlates of self-rated physical and mental health, 2) the stability of these observations over three phases of data collection, and 3) their potential to be moderated by gender, are assessed. The relative strength of model predictors as correlates of physical and mental health outcomes are investigated. Contextual factors displayed hypothesised associations with physical (area socioeconomic indices:  $\beta = -0.02$ ,  $p = .233$ ; health service accessibility:  $\beta = 0.04$ ,  $p = .017$ ; social capital:  $\beta = 0.04$ ,  $p = .013$ ) and mental (area socioeconomic indices:  $\beta = 0.04$ ,  $p = .013$ ; health service accessibility:  $\beta = 0.00$ ,  $p = .874$ ; social capital:  $\beta = 0.04$ ,  $p = .010$ ) health. Social networks and personal adversity present reliable predictors of physical and mental health in rural areas. Components of social networks have different influences on health for men and women residing in rural areas. Findings provide empirical confirmation of the stronger association of affective conditions with psychological impairment compared to physical impairment (-0.19 vs. -0.08,  $p < .001$ ) and of cardiovascular and financial difficulties with physical impairment compared to psychological impairment (CVD: -0.14 vs. -0.04,  $p < .001$ ; FD: -0.14 vs. -0.06,  $p < .001$ , respectively), as

observed in **Chapter four**. The chapter concludes that theory driven methods of characterising health-relevant contextual factors may provide viable proxies for health relevant contextual factors in rural areas. The corresponding research paper has been submitted to the Journal of Health and Social Behaviour.

**Chapter seven**, *'Causal models of personal adversity, social networks, physical health and mental health over time in rural areas'*, builds on conclusions of **Chapter six** by investigating the reciprocal associations between personal adversity, social networks and physical and mental health over three time points using autoregressive cross lagged panel analyses. The influence of gender on this model is also investigated. Social support and financial adversity display direct impacts on physical and mental health outcomes over time, though the length of time between observations influenced these effects. Mental health influenced physical health over a two-year period ( $B = .15, p < .001$ ), confirming the physical health burdens presented by poor mental health (as well as the mental health issues themselves) as an important point of health intervention. Social networks displayed potential indirect effects on health through reducing exposure to experiences of personal adversity (social support<sub>T0</sub> predicting financial difficulty<sub>T1</sub>:  $B = -.22, p = .002$ ; social visibility<sub>T1</sub> predicted adverse life events<sub>T2</sub>:  $B = .35, p = .005$ , and; sense of belonging<sub>T1</sub> predicted adverse life events<sub>T2</sub>:  $B = -.69, p < .001$ ). Causal models suggest the differential association of social visibility on physical health for men and women observed in **Chapter six** may reflect a negative impact of greater social visibility on physical health for men over time ( $B = -.27, p = .014$ ). The corresponding research paper has been submitted to the Journal of Health and Social Behaviour.

In conclusion (**Chapter eight**), this program of research maximised existing resources to address new questions of interest by: drawing on data from two existing cohort studies; engaging in a common follow-up of these cohorts; geocoding existing indices of remoteness and socioeconomic status to survey participants; and constructing novel indices of social

support and health services accessibility from an existing large representative sample. The potential advantages and confounds of these processes have been carefully considered. These efforts have allowed the exploration of the influence of psychosocial determinants of health on indices of both physical health (i.e., physical health related quality of life and self-rated physical health) and psychological health (i.e., psychological distress, psychological health related quality of life and self-rated mental health), as well as the examination of the moderating influence of contextual factors on health determinants. Models suggest social networks and personal adversity influence both physical and mental health outcomes. Some evidence of a moderating effect of contextual characteristics on the association of psychosocial factors with psychological health was observed, however these analyses are potentially limited by the use of remoteness as a proxy for health related contextual characteristics. Associative models suggest theory driven methods of characterising contextual factors may help overcome the difficulties of directly assessing contextual factors in rural areas. Causal models suggest physical health, mental health, social networks and financial adversity each present appropriate points of health intervention for rural populations.

## References

1. Kessler RC, Andrews G, Colpe LJ, Hiripi E, Mroczek DK, Normand S-LT, Walters EE, Zaslensky AM: Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychol Med* 2002, 32(06):959-976.
2. Richardson J, Peacock S, Hawthorne G, Iezzi A, Elsworth G, Day N: Construction of the descriptive system for the assessment of quality of life AQoL-6D utility instrument. *Health Qual Life Outcomes* 2012, 10(1):38.

## List of citations for papers included in this thesis

**Chapter two.** Allen, J., Inder, K., Lewin, T., Attia, J., Kay-Lambkin, F., Baker, A., et al. (2013). Integrating and extending cohort studies: lessons from the eXtending Treatments, Education and Networks in Depression (xTEND) study. *BMC Medical Research Methodology*, 13(1), 122.

**Chapter three.** Allen, J., Inder, K., Lewin, T.J., Attia, J., & Kelly, B. (2012). Social support and age influence distress outcomes differentially across urban, regional and remote Australia: an exploratory study. *BMC Public Health*, 12, 928.

**Chapter four.** Allen, J., Inder, K., Lewin, T., Attia, J., & Kelly, B. (2013). Construct validity of the Assessment of Quality of Life - 6D (AQoL-6D) in community samples. *Health and Quality of Life Outcomes*, 11, 61.

**Chapter five.** Allen, J., Inder, K. J., Harris, M. L., Lewin, T. J., Attia, J. R., & Kelly, B. J. (2013). Quality of life impact of cardiovascular and affective conditions among older residents from urban and rural communities. *Health and Quality of Life Outcomes*, 11(1), 140.

**Chapter six.** Allen, J., Inder, K. I., Lewin, T. J., Attia, J., & Kelly, B. (submitted). Integrated cross-sectional analysis of personal, social and contextual predictors of self-reported overall physical and mental health. *Journal of Health and Social Behavior*.

**Chapter seven.** Allen, J., Inder, K. J., Lewin, T. J., Attia, J. R., & Kelly, B. J. (submitted). A three phase cross-lagged analysis of relationships between personal adversity, social networks and health in rural areas. *Journal of Health and Social Behavior*.

## **List of additional papers/presentations of relevance to this thesis**

Allen J., Inder K.J., Kelly B.J., Attia J., Lewin T.J. (2010). Does social support differentially influence distress outcomes in rural and urban communities? Poster presented at the annual scientific meeting of the Australasian Society of Psychiatric Research (ASPR), Sydney: Australia, 5 - 8 December.

Allen J, K.J. Inder, B.J. Kelly, J. Attia, T.J. Lewin. (2011). An interaction of social support and remoteness in the prediction of psychological distress. Poster presented at the World Congress of Epidemiology, Edinburgh: Scotland, 7-11 August.

Allen J., K.J. Inder, T.J. Lewin, H Stain, J. Attia, B.J. Kelly. (2011) Perceived stigma, social support and psychological distress in rural Australia. Poster presented at the annual scientific meeting of the Australasian Society of Psychiatric Research (ASPR), Dunedin: New Zealand, 5-8 December.

Allen, J., Inder, K., Lewin, T.J., Attia, J., Kay-Lambkin, F.J., Baker, A.L., Hazell, T., Kelly, B.J. (2013). Integrating and extending cohort studies: lessons from the Extending Treatments, Education and Networks in Depression (xTEND) study. Paper presented at the annual scientific meeting of the International Federation of Psychiatric Epidemiology, Leipzig: Germany 5-8 June.