SCHOOL OF NURSING AND MIDWIFERY

Identifying those at risk of depression following a diagnosis of acute coronary syndrome: Developing a screening intervention for use in the acute hospital setting.

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Declaration

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature: ……..…….

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Abstract

Introduction

Depression is important to identify in patients with a diagnosis of acute coronary syndrome (ACS) because it is a prevalent comorbid diagnosis that confers an increased risk of mortality, disability and a reduced health related quality of life. Identifying patients at risk of developing depression following a diagnosis of ACS is a new strategy that creates an important opportunity for the provision of early psychological support at a critical phase in a patient's recovery. The aim of this research programme was to develop a brief depression risk assessment instrument for use by nurses in the clinical setting and test its psychometric properties using a mixed method approach.

Methods

The Depression Risk Assessment Questionnaire (DRAQ) was developed using a four step approach starting from a literature review, drafting of key points for review by an expert panel, preliminary tool development and contextual survey, and lastly preliminary psychometric testing. Initially a systematic review and critique of the literature to identify risk factors for depression in cardiac populations was conducted. Databases were searched for studies conducted during the period of January 1990 to January 2010. To be included in the review articles had to be published in English, refer to research conducted with adult participants ($\geq$ 18 years) of either sex, describe a primary research study using a quantitative methodology and report results of risk factors for depression obtained from prospective data or correlations between factors obtained from cross-sectional data. These studies were further graded for the quality of the evidence using the Oxford Centre for Evidence-based Medicine Levels of Evidence (2009). The results of the review were then developed into the first draft DRAQ.

The comprehensiveness and content validity of the DRAQ was then assessed by a panel of eight experts and items retained or removed based on the Content Validity Index score. The DRAQ was then tested for internal consistency, reliability and

temporal stability in a sample of 220 patients admitted to a coronary care unit with a diagnosis of ACS. Patient acceptability of the DRAQ as part of a routine clinical assessment was established in a sample of 11 study participants. Contextual data regarding barriers and facilitators to a screening intervention were generated from semi-structured qualitative interviews conducted with 10 members of the cardiology clinical team.

Results

In total 1,887 full-text papers were assessed and 1,860 papers were excluded from the systematic review on eligibility and methodological grounds. Twenty-seven articles, reporting 24 studies, met the selection criteria and were included in the review. Based on evidence from these studies, and supporting evidence from the psychosocial literature, 13 risk factors were identified as highly relevant to the risk of developing depression.

Items were generated from the risk factors and two draft questionnaires were developed, one designed for patients containing 15 questions and the other for staff members containing 7 questions. The structure, layout and choice of question type were influenced by the need to consider a high level of clinical utility. Following assessment of the comprehensiveness and content validity, the patient questionnaire (DRAQ) retained nine questions and the staff questionnaire retained five questions. Only the DRAQ was further developed and underwent psychometric testing in a sample of ACS patients.

The internal consistency of the DRAQ was determined by calculating the Cronbach's coefficient alpha based on raw (0.71) and standardized (0.68) variables. Temporal stability was assessed by calculating the kappa statistic based on data collected at two time points. The kappa result for question 5 was a negative value indicating no agreement. The remaining results ranged from 0.47 indicating 'fair agreement' to 1.00 indicating 'excellent agreement'. The 11 patient participants reviewing the acceptability of the DRAQ reported that the questions were clear, relevant and appropriate to the clinical situation.

Interpretation of the qualitative data from the staff contextual survey revealed 12 major interrelated issues. Staff reported a lack of a systematic approach to the identification of depression and a lack of access to specialised psychiatric support services. Key barriers to the introduction of a screening intervention were perceived time constraints, stigma, lack of mental health related skills and knowledge related to depression in cardiac patients, however, there was overall support for a depression screening intervention.

Conclusion

The results of the preliminary psychometric testing of the DRAQ have demonstrated acceptable levels of internal consistency reliability and temporal stability. Further research is needed to establish a systematic approach to depression screening in cardiac patients and the identification of high risk patient groups. Detecting such groups creates opportunities to explore preventive therapies rather than observing the onset of depression and then treating the disease. The DRAQ has been developed in response to the increasing recognition of psychological factors mediating health outcomes in ACS and the need to move beyond depression screening as a single strategy towards an integrated screening and collaborative care model.

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Glossary of Terms

Acute coronary syndrome: A sequela of coronary artery plaque disruption leading to varying signs and symptoms associated with myocardial ischaemia

Bias: Any tendency to influence the results of a trial (or their interpretation) other than the experimental intervention.

Case-control study: The observational epidemiologic study of persons with the disease (or other outcome variable) of interest and a suitable control (comparison, reference) group of persons without the disease. The relationship of an attribute to the disease is examined by comparing the diseased and non-diseased with regard to how frequently the attribute is present or, if quantitative, the levels of the attribute, in each of the groups.

Clinical practice guideline: A systematically developed statement designed to assist health care professionals and patients make decisions about appropriate health care for specific clinical circumstances.

Cohort study: The analytic method of epidemiologic study in which subsets of a defined population can be identified who are, have been, or in the future may be exposed or not exposed, or exposed in different degrees, to a factor or factors hypothesized to influence the probability of occurrence of a given disease or other outcome. The main feature of cohort study is observation of large numbers over a long period (commonly years) with comparison of incidence rates in groups that differ in exposure levels.

Confounding variable: A variable which is not the one you are interested in but which may affect the results of trial.

Heterogeneity: In systematic reviews, the amount of incompatibility between trials included in the review, whether clinical (ie the studies are clinically different) or statistical (ie the results are different from one another).

Observational study: A family of studies in which investigators compare people who take an intervention with those who do not. The investigators neither allocate patients to receive the intervention not administer the intervention. Instead, they compare records of patients who had taken an intervention and been treated in routine practice with similar patients who had not taken the intervention. The most common observational designs are case-studies, case-series, case-control studies, cohort studies, and historically controlled studies.

Odds: A ratio of events to non-events. If the event rate for a disease is 0.2 (20%), its non-event rate is 0.8 and therefore its odds are 2/8.

Prevalence: The baseline risk of a disorder in the population of interest.

Secondary prevention: refers to strategies used in those with an existing disease which prevent recurrence, or significant morbidity. For example, in someone who

has a heart attack cholesterol lowering drugs are used to lower the risk of subsequent heart attack and death.

Publication bias: A bias in a systematic review caused by incompleteness of the search, such as omitting non-English language sources, or unpublished trials (inconclusive trials are less likely to be published than conclusive ones, but are not necessarily less valid).

Randomized trial: An epidemiological experiment in which subjects in a population are randomly allocated into groups, usually called study and control groups, to receive or not receive an experimental preventive or therapeutic procedure, maneuver, or intervention. The results are assessed by rigorous comparison of rates of disease, death, recovery, or other appropriate outcome in the study and control groups.

Sensitivity: The proportion of people with disease who have a positive test.

Specificity: The proportion of people free of a disease who have a negative test.

Systematic review: The application of strategies that limit bias in the assembly, critical appraisal, and synthesis of all relevant studies on a specific topic. Systematic reviews focus on peer-reviewed publications about a specific health problem and use rigorous, standardized methods for selecting and assessing articles. A systematic review differs from a **meta-analysis** in not including a quantitative summary of the results.

Chapter 1 – Introduction

Depression following an acute cardiac event is associated with higher rates of mortality and poorer health outcomes (Beck, Joseph, Belisle, & Pilote, 2001; Meijer et al., 2011). This thesis describes the development of an instrument to detect patients 'at risk' of becoming depressed in the period following an acute coronary syndrome (ACS) event. Acute coronary syndrome is the umbrella term for the clinical signs and symptoms of myocardial ischaemia as seen in unstable angina (UA), non-ST segment elevation myocardial infarction (NSTEMI), and ST-segment elevation myocardial infarction (STEMI) (Overbaugh, 2009). To date initiatives have focussed on screening for depressive symptoms, rather than identifying future risk. Identifying patients who may be considered most 'at risk' of depression is a novel approach that provides an opportunity for early intervention.

This chapter provides a background to the problem of depression in patients with a diagnosis of ACS. It briefly discusses the prevalence and clinical significance of depression in patients with heart disease and argues the need for identifying patients who have depression on admission and those who are at risk of becoming depressed in the weeks following discharge. It also highlights the slow uptake of screening strategies in the acute setting and the barriers to effective screening. The aims and scope of the research are identified and finally the chapter concludes with an overview of the structure of the thesis.

Background

Coronary artery disease (CAD) prevalence rates of depression in patients with heart disease are influenced by a number of factors including the definition of depression and the type of measure used to detect depression or depressive symptoms. Clinically significant depressive symptoms have been found in between 31% to 45% of patients with ACS. In addition, 20% patients with CAD may have depression that fulfils the criteria for major depressive disorder (MDD) as defined within the American Psychiatric Association Diagnostic and Statistical Manual, 4th edition (APA DSM IV) (Carney & Freedland, 2008; Lesperance, Frasure-Smith, Juneau, & Theroux, 2000; Schrader, Cheok, Hordacre, & Guiver, 2004; Thombs et al., 2006).

Similar rates of depression have been identified with other chronic or life threatening disease such as cancer (Snyderman & Wynn, 2009). In comparison a total prevalence rate of 3.2% was found for MDD in a national community survey conducted in Australia (Wilhelm, Mitchell, Slade, Brownhill, & Andrews, 2003).

Depression is important to identify in patients with heart disease because it is a prevalent comorbid diagnosis that confers an increased risk of death and disability and affects a patient's quality of life (Beck et al., 2001). An independent causal relationship between depression and post acute myocardial infarction (AMI) mortality and morbidity has yet to be established. Recent meta-analyses have produced conflicting results, suggesting the issue of causality remains uncertain (Nicholson, Kuper, & Hemingway, 2006; van Melle et al., 2004). Although there is insufficient evidence for a causal link between the two diseases, a long standing, robust association exists between depression and poor prognosis following post-myocardial infarction (Meijer et al., 2011).

There is growing evidence that depression is not only associated with clinical CAD but also sub-clinical disease. Depression has been associated with the prospective development of carotid atherosclerosis, a marker of coronary atherosclerosis (Faramawi et al., 2007; Haas et al., 2005; Stewart, Janicki, Muldoon, Sutton-Tyrell, & Kamarck, 2007) and other markers of atherosclerosis (Seldenrijk et al., 2010).

Recent studies suggest that the relationship between depression and adverse events in patients with established ACS may depend upon whether the episode of depression is recurrent or an initial episode. Whilst one study found a prospective association between recurrent depression and increased risk of cardiac events (Lesperance, Frasure-Smith, & Talajic, 1996) other studies have reported that depression occurring for the first time is most strongly associated with future prognosis (de Jonge et al., 2006a; de Jonge, van den Brink, Spijkerman, & Ormel, 2006b; Dickens et al., 2008a; Grace et al., 2005). There is also convincing evidence to suggest that it is the timing of the depressive episode, directly after an acute cardiac event, that is the most significant factor determining prognosis (Parashar et al., 2006; Parker et al., 2008). Results from a meta-analyses have demonstrated that patients

developing depression in this period of unstable CAD have an increased risk of all-cause mortality (Odds Ratio, 1.76) even after adjusting for other cardiac risk factors related to poor prognosis (Barth, Schumacher, & Herrmann-Lingen, 2004).

Both biological and behavioural mechanisms may mediate the relationship between depression and prognosis following an ACS event. Research conducted on patients with heart disease and depression reveals a number of detrimental physiological changes, including increased platelet adhesion, increased inflammatory response and decreased heart rate variability. These physiological abnormalities are surrogate markers of increased cardiac risk (Carney et al., 2007; Kuijpers, Hamulyak, Strik, Wellens, & Honig, 2002; Lesperance, Frasure-Smith, Theroux, & Irwin, 2004). Furthermore, some studies suggest that depression in those already vulnerable to cardiac arrhythmia heightens the risk of resuscitated cardiac arrest or sudden cardiac death (Ahern et al., 1990; Frasure-Smith, Lesperance, & Talajic, 1995). Further research is required to clarify the relationship between, depression, ventricular arrhythmia, left ventricular function and mortality (Jiang, Glassman, Krishnan, O'Connor, & Califf, 2005).

In addition to their physiological vulnerability, patients who are depressed find it more difficult than non-depressed patients to modify their risk factors through lifestyle change (Meyers, Gerber, Benyamini, Goldbourt, & Drory, 2012). Of particular concern are the low smoking cessation and exercise rates (Glassman & Shapiro, 1998) and reduced adherence to low fat diets (Zieglestein et al., 2000). Depressed patients are more than twice as likely not to adhere to prescribed therapies (DiMatteo, Lepper, & Croghan, 2000). Depression is associated with poorer attendance at cardiac rehabilitation programmes (Glazer, Emery, Frid, & Banyasz, 2002) and lower adherence to medical treatment (Bane, Hughes, & McElnay, 2006). Recent studies have found behavioural mechanisms explained a substantial proportion of the excess risk of MI or cardiac death associated with depressive symptoms (Win et al., 2011; Ye et al., 2013).

Patients who develop depression following an acute admission for ACS are a disadvantaged group. They are likely to experience a lower quality of life (Beck et al., 2001) and poorer health outcomes (Meijer et al., 2011) and they are further

disadvantaged because they will feel less able to make lifestyle changes in order to actively promote health and manage their heart disease (Meyers et al., 2012).

Research has provided greater insight into the development of depression in cardiac patients. Dickens and colleagues (2004) found that 21% of the participants in their study were already depressed prior to admission for a first AMI. However, this may be an underestimation of the true figure in clinical practice. Prospective studies following the natural history of depression report an additional 10 to 20% of patients develop depression following discharge from hospital (Dickens et al., 2004; Lesperance et al., 1996; Travella, Forrester, Schultz, & Robinson, 1994). This evidence suggests a need to identify those patients who may already be depressed on admission and those patients at risk of becoming depressed following discharge from hospital.

Importance of Screening and Identifying Individuals at Risk

Identifying patients who are depressed is important so that they may receive appropriate treatment for their condition, however, depression is under diagnosed in a cardiac setting, with as little as 10% of depressed patients actually diagnosed and treated (Amin, Jones, Nugent, Rumsfeld, & Spertus, 2006; O'Connor, Gurbel, & Serebruany, 2000; Reddy et al., 2007; Ziegelstein et al., 2005). Research indicates a need for formalised screening for depression to be integrated into clinical practice. In Australia, ACS practice guidelines (Aroney, Aylward, Kelly, Chew, & Clune, 2006) and a consensus statement from the National Heart Foundation (Colquhoun et al., 2013) recommend evaluation of psychosocial risk factors, in particular the assessment of depression.

Several instruments have been found to have acceptable psychometric properties to detect depression in patients with heart disease: Hospital Anxiety and Depression Scale; (Bambauer, Locke, Aupont, Mullan, & McLaughlin, 2005) Patient Health Questionnaire – 9 (Stafford, Berk, & Jackson, 2007); 90-item Symptom Check List (SCL-90); Beck Depression Inventory (BDI); 17 – item Hamilton Depression Rating Scale (HAM-D) (Strik, Honig, Lousberg, & Denollet, 2001a). In

addition, the Cardiac Depression Scale (Hare & Davis, 1996) has been developed and validated specifically for cardiac patients.

Although validated screening instruments exist, in clinical practice patients are not routinely screened for depression (Herridge, Stimler, Southard, & King, 2005; Huffman et al., 2006a). This is particularly true of patients admitted to busy cardiac units with high medical acuity (Huffman et al., 2006b). Both internationally and in Australia, advances in medical care have decreased the length of hospital stay for patients following an acute myocardial infarction (Berger et al., 2008). Significantly, treatment options such as primary angioplasty increase the proportion of time patients are engaged in medical procedures and decrease time available for assessment of psychosocial needs.

Studies have identified barriers to screening and diagnosis of depression in acute cardiac settings. These include a lack of knowledge among medical and nursing staff regarding screening, diagnosis, and identification of risk factors for post ACS depression (Dobbels et al., 2002; Ziegelstein et al., 2005). Importantly, there is a reported lack of clinical psychology support in many cardiology units in Australia (Goldston & Baillie, 2008). Furthermore, whether a patient discloses symptoms can also be influenced by the health provider's communication skills, the patient's own understanding of the nature of their symptoms and the amount of time that is available for assessment (Hickie, Davenport, & Ricci, 2002; Savard, 2004).

The clinical importance of depression in patients with heart disease is well recognised. Clinical guidelines recommend screening for depression, however, there has been limited transfer of current evidence into practice (Lichtman et al., 2008). Strategies for facilitating the adoption of depression screening are not well described in the literature. As a consequence, screening for depression is not routinely undertaken and depression remains under diagnosed in patients with heart disease (Amin et al., 2006; O'Connor et al., 2000; Reddy et al., 2007; Ziegelstein et al., 2005).

Both structured clinical interviews and self-report questionnaires may be used to identify depression in cardiac patients (Thombs et al., 2006). These methods are designed to detect current depression or depressive symptoms but do not predict the

risk of future depression. Patients who may become depressed following discharge will not be identified using currently available tools.

It is not feasible to perform repeated screening of every ACS patient following discharge into the community as this may be a considerable drain upon the resources of cardiac rehabilitation services. Depressed patients are less likely to attend cardiac rehabilitation programmes and as a consequence there may be limited opportunities to screen for depression out of hospital (Glazer et al., 2002). Opportunities to screen for depression following discharge are further limited by the geographical location of patients. A significant proportion of patients treated for ACS at tertiary hospitals in Australia live in rural or remote locations with reduced access to medical services.

An alternative strategy would be the identification of the sub-group of patients at risk of developing depression, enabling resources to be focused more effectively and prompt intervention initiated for those with the greatest need. There is a relatively small and diverse body of research exploring risk factors for depression in cardiac patients. Reported risk factors include female sex; younger age (<55 years); previous history of depression, anxiety or stress; depressive symptoms in hospital; severe left ventricular dysfunction; pre-existing medical condition; and smoking (Dickens et al., 2004; Schrader et al., 2004; Spijkerman, van den Brink, Jansen, Crijns, & Ormel, 2005a; Strik, Lousberg, Cheriex, & Honig, 2004) Whilst a number of risk factors for developing depression have been identified, no definitive predictive model exists to inform screening protocols.

Defining the Population

ACS is the umbrella term used to describe any condition characterized by signs and symptoms of sudden myocardial ischaemia (Overbaugh, 2009). The term ACS has been adopted to reflect the evolving diagnostic definitions associated with this patient population and more clearly reflects common underlying biological processes of AMI and UA. The signs and symptoms of ACS constitute a continuum of intensity from UA to NSTEMI to STEMI. Partially or intermittently occluded coronary arteries normally result in UA or NSTEMI, whereas STEMI results from a fully occluded

coronary artery (Overbaugh, 2009). Depression is significantly associated with UA, NSTEMI and STEMI.

Problem Statement

Although there is strong evidence regarding the adverse impact of a diagnosis of depression in post ACS patients depression remains under diagnosed with screening programmes yet to be fully integrated into routine clinical practice. Patients may already be depressed prior to an admission for ACS and this could be detected by screening for current depressive symptoms using existing tools, such as the PHQ-9. These instruments identify current depressive symptoms, however, no screening tools exist to identify the significant proportion of patients who may be 'at risk' of developing depression following discharge from hospital.

A strategy of screening for depression symptoms following discharge misses an opportunity for early psychological support of patients at a critical phase in their recovery. Whilst there has been some research in the field, no theoretical framework describing the risk factors for depression in ACS patients exists to inform screening practice.

Research Aim

To develop a brief screening instrument designed to assess the risk of developing depression following a diagnosis of ACS that can be used by nursing staff in the acute clinical setting.

Objectives

1. To identify the risk factors for depression from the literature and critically evaluate the evidence base.

2. To define the concept of depression in patients with a diagnosis of ACS, and develop a theoretical framework illustrating potential risk factors for post ACS depression.

3. To determine the barriers and facilitators to the introduction of a screening intervention as perceived by the key members of a clinical team and to use this contextual data to aid the development of the questionnaire.

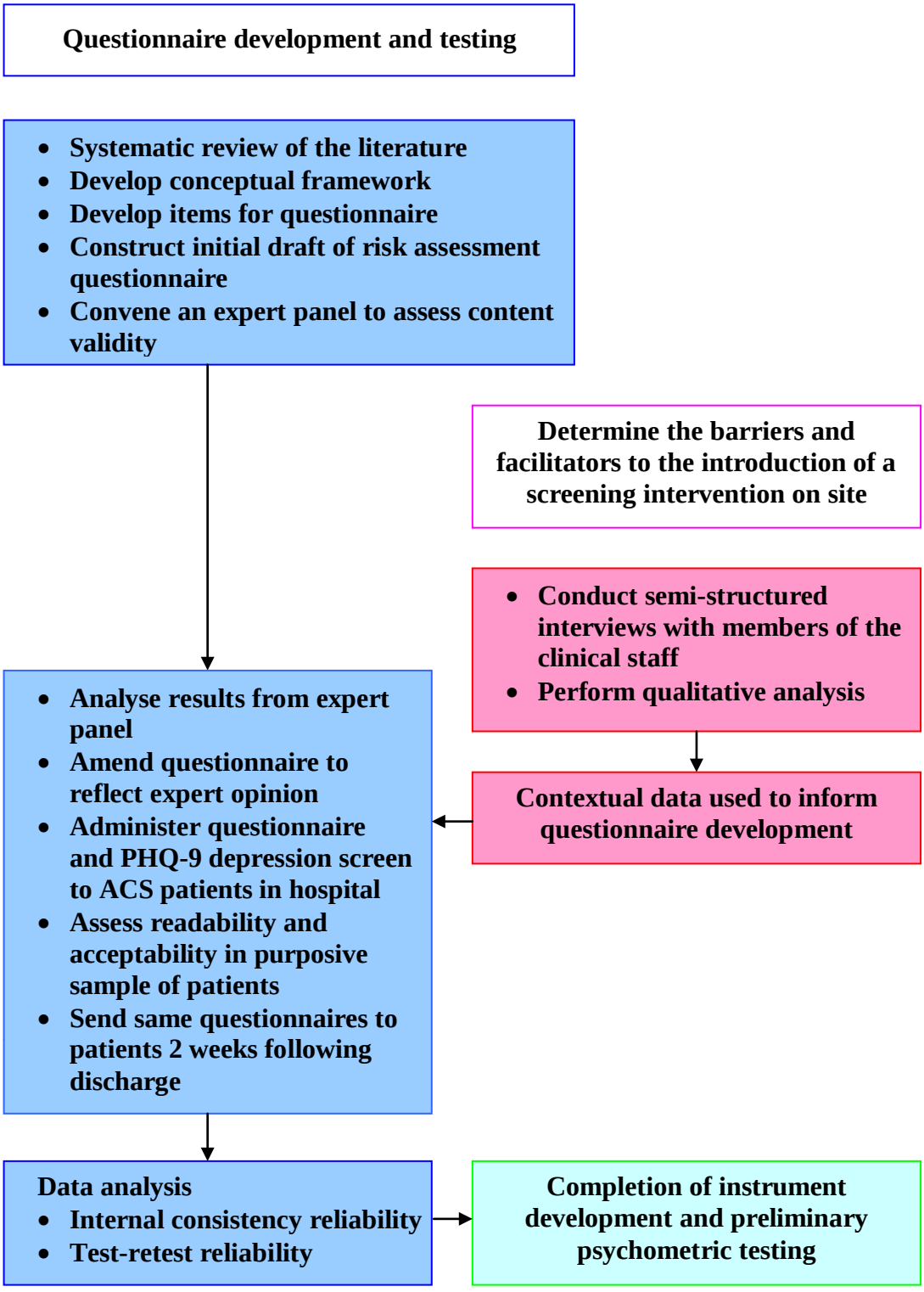
4. To develop a risk assessment instrument for post ACS depression with high clinical utility that can be used by nurses in hospital.

5. To perform preliminary assessment of the psychometric properties of the instrument following application in a sample of ACS patients.

6. To establish the extent to which patients find the questionnaire acceptable as part of clinical care.

A schematic diagram of the research design is included as figure 1.1.

Figure 1.1
Schematic diagram of the research design



Note. PHQ-9 = Patient Health Questionnaire-9; ACS = acute coronary syndrome.

Limitation of the Scope of Research

There are a number of existing questionnaires that have high clinical utility and validity that can detect current levels of depressive symptoms. The scope of this research is confined to understanding the epidemiological concept of increased risk of developing a disease in relation to the development of depression in ACS patients.

The focus of this project has been limited to identifying those risk factors for post ACS depression that can be readily confirmed in hospital by patients completing a self-report questionnaire. There are a number of risk factors for depression that may be difficult, costly, or inappropriate to assess in an acute clinical environment and this has guided the development of the risk assessment questionnaire.

Significance

This research adds to the body of knowledge about the nature of depression in ACS and specifically addresses the underlying knowledge deficit regarding identification of risk factors for the disease. The risk assessment instrument is unique to the field of cardiovascular nursing practice. The instrument is intended to form part of a novel systematic approach to screening that will combine both screening for current depression with risk assessment for future depression.

This study represents an initial step towards the identification of those patients with depression and those most at risk of developing depression once discharged back to the community. Recognition of patients who may require additional psychosocial support, or assistance with modifying cardiac risk factors, will enable existing cardiac rehabilitation services to direct appropriate interventions to individuals most in need. Screening for patients with an increased risk of depression can facilitate efficient utilization of available resources.

Overview of the Layout of the Thesis

Following the introduction, problem statement and research questions identified in Chapter 1, Chapter 2 explores the literature surrounding the

identification of depression in clinical populations and provides a detailed review of research studies examining risk factors for depression in ACS populations.

Chapter 3 describes the conceptual framework providing the theoretical underpinning of the risk factor questionnaire. Chapter 4 describes the research methods adopted for the study including the methods for the qualitative research component, questionnaire development and psychometric testing. The results of the qualitative analysis and a discussion on the psychometric qualities of the risk factor questionnaire are presented in Chapter 5. In Chapter 6 the principal findings are reviewed, implications for practice discussed, and recommendations offered.

Chapter 2 – Literature Review

Introduction

This chapter has been divided into two sections. Section One provides an introduction to the concept of risk, and the diagnosis and aetiology of depression. Section Two commences by describing the process undertaken to perform the systematic review of the literature, including a detailed account of the evidence evaluation process. The section continues with the review of the research related to significant individual risk factors for depression that have been identified in primarily ACS patients and discusses the supporting evidence found in the wider psychosocial literature.

Section 1

Concept of Risk, and the Diagnosis and Aetiology of Depression

Undertaking a review and critique of research studies addressing the 'risk' of developing depression raises a number of issues that relate to the epidemiological concepts of causation and risk. The term 'risk factor' is commonly used to describe factors that are positively associated with the risk of developing a disease but are not proven or are insufficient to cause the disease (Lawrence & Farmer, 2004).

Chance, bias and confounding need to be excluded before an association can be confirmed as causal (Lawrence & Farmer, 2004). Causal inference is further determined by the presence of the correct temporal relationship. Regarding the study of risk factors for depression, this refers to the presence of the risk factor prior to the development of depression. Significantly, this is difficult to determine in cross-sectional studies as they cannot provide evidence of the time sequence of events (Hulley et al., 2001). Studies that have a prospective, cohort design enable the predictive nature of risk factors to be analysed. The evidence for a causal relationship is further strengthened by plausibility, consistency and presence of a dose-relationship between the risk factor and the disease.

Previous research studies exploring the possible causes of depression in psychiatric and community populations have found multiple and diverse risk factors responsible for the development of the disease. At present, there is little evidence to suggest that the risk factors for post ACS depression are restricted to a single proximal cause (Davidson, Rieckmann, & Lesperance, 2004). With this in mind, a wide-ranging search of the nursing, medical and psychosocial literature was undertaken. Only a small number of prospective, cohort studies have been conducted in cardiac populations. To fully explore all the potential risk factors for depression in this population, cross-sectional studies have been included in the review. The evidence in support of these risk factors has been considered in light of the additional findings from prospective, cohort studies conducted in ACS samples and the wider literature.

Clarification of the Term 'Depression'

There are a number of psychiatric disorders, of which depression is one, in which pathological mood and related disturbances are major features of the clinical profile and are collectively referred to as 'mood disorders' (Sadock & Sadock, 2003). Mood Disorders are sustained emotional states considered as syndromes consisting of a cluster of signs and symptoms that occur over a period of time and which mark a distinct change in the person's normal functioning (Sadock & Sadock, 2003). The presence of depressive symptoms in ACS patients may be a transient response but it may also be a manifestation of a previous history of major depressive disorder, continuation of a first episode of depression with onset before the acute event, or onset of depression after the event (Shapiro, Fedoronko, Epstein, Mirasol, & Desai, 2008).

Within the reported cardiovascular literature, the term depression is often used to describe a number of differing psychiatric conditions making direct comparison between research studies complicated and sometimes impossible (Davidson, Rieckmann, & Rapp, 2005). Psychiatric clinical definitions were described within the American Psychiatric Association Diagnostic and Statistical Manual, 4th edition (APA DSM-IV). In the interests of clarity, a brief overview of the clinical definitions of depression and related disorders most relevant to ACS are provided.

Major Depressive Disorder (MDD).

An essential diagnostic feature of major depression is a period of two weeks duration in which there is either depressed mood or loss of pleasure in nearly all activities. In addition, the individual must experience at least four symptoms from a range including changes to appetite or weight, sleep, and psychomotor activity; decreased energy; feelings of guilt or worthlessness; poor concentration or difficulty making decisions; recurrent thoughts of death or suicidal ideation. Symptoms must be new or worse than previously experienced and the episode must be accompanied by significant impairment or distress leading to diminished functioning. MDD is defined by the occurrence of a major depressive episode that cannot be ascribed to another mental disorder or medical condition, and is not substance-induced (Shapiro et al., 2008).

Mood disorder due to a general medical condition.

This diagnosis is reserved for a significant mood disturbance considered to be a direct physiological consequence of a medical condition known to cause depression. Examples given in the DSM IV manual are hypothyroidism, stroke and multiple sclerosis. To date, the biological pathways between depression and acute coronary syndrome have yet to be identified and a direct physiological causal link has not been established (Belmaker & Agam, 2008).

Adjustment disorder with depressed mood.

This mood disturbance occurs in response to an identifiable psychological stressor, however, although clinically significant, the full criteria are not met for MDD. Mood and/or behavioural symptoms must develop within three months after the onset of the stressor and resolve with six months following resolution of the stressful event. An episode of ACS could be deemed such a stressor and therefore may trigger adjustment disorder with depressed mood in that population (Davidson et al., 2005).

Depression not otherwise specified (NOS).

This classification describes milder forms of depression not meeting the full diagnostic criteria for MDD. Symptoms may have been present for less time or they are fewer in number but still associated with significant impairment of function. 'Depressive symptomatology' is one such term frequently used to describe the presence of symptoms in the absence of core criteria (Dobbels et al., 2002).

There are a number of other terms associated with varying degrees of milder depression that do not meet the criteria recognized by the DSM-IV. These terms are minor depression, sub-syndromal depression, sub-threshold depression, and sub-clinical depression.

Diagnostic Issues

In recent years there has been a debate in the psychological literature regarding the issue of whether depression should be regarded as a categorical diagnostic entity (a 'case' of depression) or a continuous dimensional variable. Currently, there exists a general consensus that depression may be regarded as graduating from mild to severe disease along a graded path (Steptoe, 2007a). Historically, a categorical perspective developed in recognition of a critical threshold of intensity of disease that required treatment because of an increased risk of impaired daily function or self-harm (Creed & Dickens, 2007). However, diagnostic thresholds have been determined over a number of years in psychiatric populations and there is evidence to suggest that the significance of thresholds, as related to health outcomes, may differ in cardiac patients (Frasure-Smith et al., 1995; Ketterer et al., 2006). In particular, an association has been determined between mild symptoms of depression, not regarded as clinically significant, and mortality risk at four months post AMI (Bush et al., 2001).

The term sub-clinical depression has been used in the psychological literature to describe the presence of mild depressive symptoms not meeting the full diagnostic criteria for MDD (APA, 1994). Sub-clinical depression is important to identify in cardiac patients not only in relation to medical prognosis but also because it has been

established as a significant risk factor for the development of MDD in prospective studies conducted in community samples of women, adolescents and elderly adults (Angst & Merikangas, 1997; Brown, Bifulco, Harris, & Bridge, 1986a; Horwath, Johnson, Klerman, & Weissman, 1992; Kessler, Zhao, Blazer, & Swartz, 1997a; Lewinsohn, Solomon, Seeley, & Zeiss, 2000). Furthermore, whilst the studies are fewer in number, there is evidence that the presence of depressive symptoms in hospitalised cardiac patients has been found to predict future depressive episodes (Lesperance et al., 1996; Mayou et al., 2000; Schrader et al., 2004; van Melle et al., 2006).

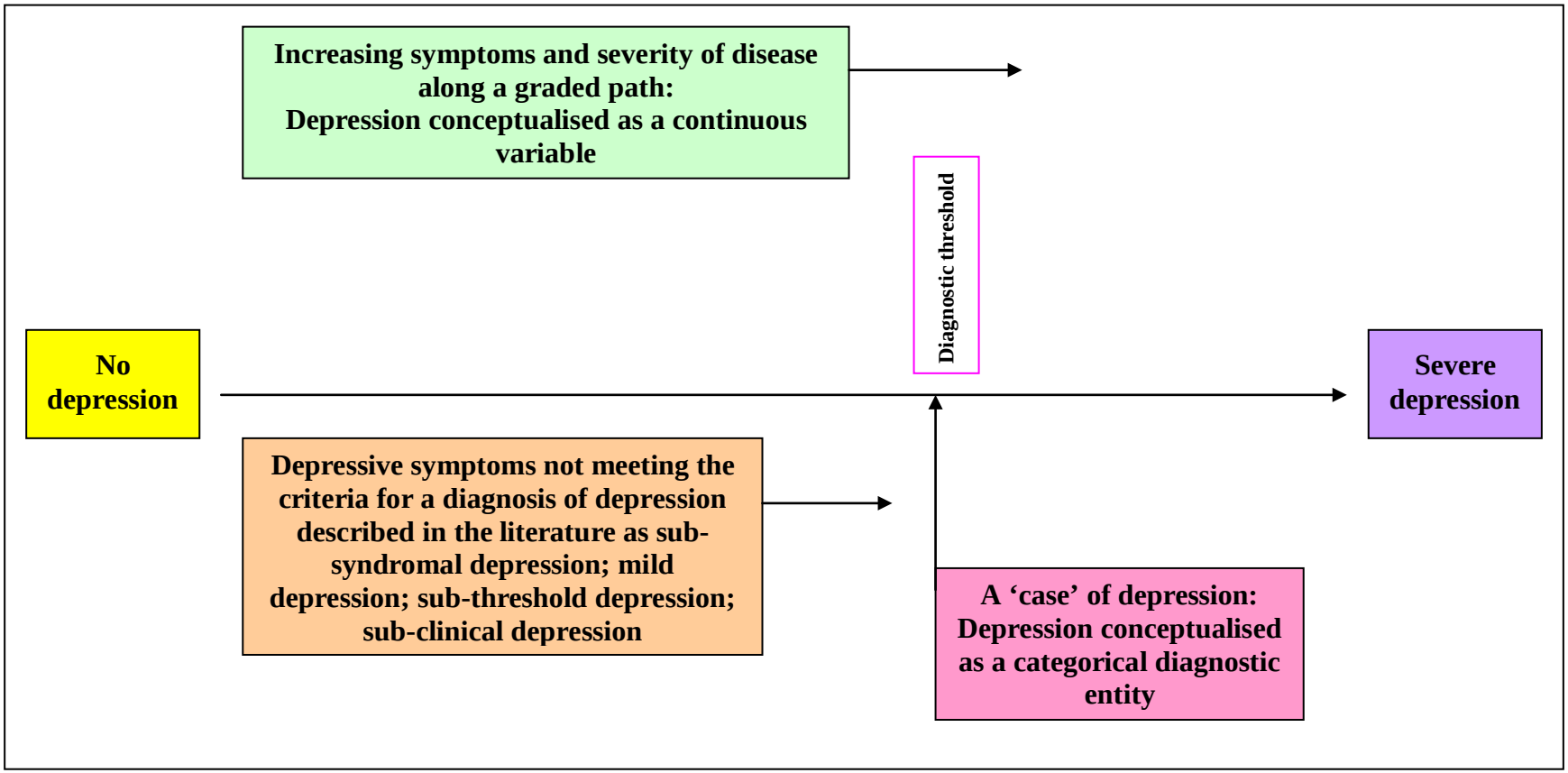
Identifying 'Depression' in Cardiac Populations

In clinical practice, the two differing conceptual definitions of depression co-exist. Depression regarded as a continuous variable has led to the development of questionnaires to measure the number of significant symptoms of the disease as an indication of the severity of depression. However, as previously discussed, depression can also be regarded as a 'case' of depression where distinct criteria must be present before a diagnosis can be made (figure 2.1). The latter has given rise to the development of lengthy structured clinical interviews in which a clinician decides whether specific criteria for a depressive disorder have been met and determines the severity of the case. It is essential to have a clear understanding of how depression has been defined and measured. For example, prevalence rates of depression in patients with CAD have a reported range between 20% and 45%, primarily influenced by the definition of 'depression' applied and the type of measure used to detect depression. (Carney & Freedland, 2008; Lesperance et al., 2000; Schrader et al., 2004; Thombs et al., 2006). Higher rates of clinically significant depressive symptoms have been found in patients with CAD (31% to 45%) compared to rates for diagnosed cases of MDD (20%). Clear definitions enable more accurate understanding of the relationship between depressive illness and cardiac disease and this is particularly important when undertaking a critique of the research literature in this field.

Self-Report Questionnaires

Self-report questionnaires play an important role in screening patients for a level of depressive symptoms that might indicate a diagnosable depressive illness requiring treatment. Clinical guidelines and the latest National Heart Foundation consensus statement (Colquhoun et al., 2013) recommend their use as part of a screening strategy for identifying depression in cardiac patients (Lichtman et al., 2008). The accuracy of a questionnaire to detect cases of depression, when compared to a full diagnostic interview, is reflected in the questionnaires sensitivity and specificity. Psychometric testing of the questionnaire enables the identification a 'cut-off' score above which MDD, or other depressive illness, might be diagnosed. However, patients may still be misclassified as having depressive illness that is not later confirmed by clinical interview (false positives) or not identified as having depressive illness when in fact their illness may meet diagnostic criteria (false negatives) (Creed & Dickens, 2007). Many self-report questionnaires have been developed and tested in community, psychiatric or non-cardiac medical samples and therefore further testing is required with cardiac patients in order to validate appropriate cut-off scores specifically for that population. This additional testing has been undertaken and several questionnaires have been found to have acceptable psychometric properties and valid cut-of points for use in a cardiac setting: Hospital Anxiety and Depression Scale; (Bambauer et al., 2005) Patient Health Questionnaire – 9 (Stafford et al., 2007); 90-item Symptom Check List (SCL-90); Beck Depression Inventory (BDI); 17 – item Hamilton Depression Rating Scale (HAM-D) (Strik et al., 2001a). In addition, the Cardiac Depression Scale (CDS) (Hare & Davis, 1996) has been developed and validated specifically for cardiac patients. The current consensus statement from the National Heart Foundation of Australia (Colquhoun et al., 2013) recommends routine screening of patients with CHD with a simple tool such as the Patient Health Questionnaire –2 (Kroenke, Spitzer, & Williams, 2003).

Figure 2.1
A diagram illustrating two conceptual definitions of depression



Depressive illness is characterised by a number of symptoms that may be described as either cognitive or somatic (physical). For example, low mood is a cognitive symptom, however, decreased appetite would be regarded as somatic. Identifying depression in cardiac patients using self-report measures can be further complicated by what has been termed 'criterion contamination' (Creed & Dickens, 2007) where symptoms of depression can overlap with the symptoms of cardiac disease itself as would be the case with 'fatigue'. Attempts to overcome this issue have resulted in the development of questionnaires that exclude many of the somatic symptoms e.g. the Hospital Anxiety and Depression Scale (HADS) (Zigmond & Snaith, 1983). However, it may be important to identify both cognitive and somatic symptoms of depression not just in relation to identifying depressive illness but also because recent research suggests specific symptoms may be important indicators of poor prognosis in both ACS and stable CAD patients (Davidson et al., 2010; Doyle, Conroy, McGee, & Delaney, 2010; Hoen, Whooley, Martens, Van Melle, & de Jonge, 2010; Leroy, Loas, & Perez-Dias, 2010; Roest et al., 2011).

Who is 'at Risk' of Developing Depression Following a Diagnosis of ACS?

Depressive symptoms can be identified in patients with heart disease using validated, self-report questionnaires as part of a screening strategy. Individuals experiencing depressive symptoms should have a diagnosis of depression confirmed by further clinical interview so that appropriate treatment or support may be provided. Whilst it is possible to identify patients who are experiencing current depressive illness, a 'snapshot' of their current mental health status, it is not possible to identify patients who may be at risk of developing depression in subsequent weeks or months. No known self-report questionnaire or screening protocol is available for this purpose. This raises important questions related to clinical practice. If it is only possible to identify patients with current disease, when should cardiac patients be screened for depression, during a hospital admission, 2 weeks following an acute event, or six months following admission?

To date, there exists a significant gap in the research literature to inform screening protocols. In addition to the timing of screening, other unanswered questions include: What is the most appropriate cardiac setting for screening? Who

should be responsible for identifying depression in cardiac patients? How can we ensure that screening for depression leads to improved health outcomes for cardiac patients?

The concept of 'risk' associated with the development of cardiac disease is well established. In clinical practice, health professionals routinely identify known risk factors for the development of cardiac disease. In comparison, the concept of 'risk' associated with the development of depression in patients with heart disease is not well described in the cardiac literature. In the wider psychosocial literature, multiple risk factors for depression have been identified and there exists a comprehensive body of knowledge describing these risk factors and their often complicated relationships with one another (Kendler, Gardner, & Prescott, 2002, 2006a).

Screening for Depression in the Cardiac Setting

At present, depression is under diagnosed in cardiac patients (Amin et al., 2006; O'Connor et al., 2000; Reddy et al., 2007; Ziegelstein et al., 2005). However, recent American Heart Association recommendations (Lichtman et al., 2008) have been criticised for 'premature' advice regarding the routine screening of depression in clinical practice. Detractors point to a paucity of evidence demonstrating that screening for depression improves outcomes in cardiovascular populations (Hasnain, Vieweg, Lesnefsky, & Pandurangi, 2011). Others concede that, whilst there is a lack of evidence regarding improved outcomes, cardiovascular patients should be at least as likely as primary care patients to benefit from depression screening in the context of similar collaborative care treatment programmes for depression established in the community (Whooley, 2009).

Collaborative care models often incorporate non-medical care managers to coordinate care between the patient, primary health care provider and psychiatrist. A meta-analysis of community-based collaborative care programmes found evidence of improved mental health outcomes at 6 months with further evidence of longer- term benefits up to five years (Gilbody, Bower, Fletcher, Richards, & Sutton, 2006). More recently, studies of collaborative care programmes adapted for cardiac patients have

been able to demonstrate significant improvements in mental health outcomes, adherence to medical treatments, reduced number and intensity of cardiac symptoms and improved health-related quality of life (Huffman et al., 2011; Rollman et al., 2009). This model of collaborative care has been shown to be particularly effective when a nurse care manager works with the primary care provider to improve treatment of both depression and cardiovascular risk factors (Katon et al., 2010).

A strategy of depression screening, in the absence of significant changes to current models of care, has been criticised as unlikely to provide the necessary benefits to patients (Thombs et al., 2008). The present practice of identifying depression in cardiac patients is based on a medical model of diagnosis and treatment of recognised disease. Self-report questionnaires used for screening purposes are designed to detect current depressive disease. This thesis argues the case for the adoption of a broader, integrated model that encompasses not only detection of depression requiring treatment but also addresses a primary aim of screening as practised in public health, to identify individuals 'at risk'. This broader model would incorporate the detection of current disease, using recognised screening methods, and the identification of individual patients at risk of developing depression using a risk assessment questionnaire designed for use in the acute setting. Crucially, this model should be set in a context of collaborative care partnerships between patients, primary health care providers and tertiary or community based cardiac rehabilitation and mental health services.

Aetiological Perspectives

Major depressive disorder may be regarded as a chronic illness with a clinical presentation that may alter in severity in any individual over time and may be characterised by periods of remission. In the field of psychiatric epidemiology, a substantial number of putative risk factors for MDD have been identified although it has not always been possible to discriminate association from causation (Fava & Kendler, 2000). The onset of MDD occurs at different times across a lifespan. MDD is found in young children and adolescents (Birmaher, Ryan, & Williamson, 1996; Lewinsohn, Clarke, Seeley, & Rohde, 1994a) as well as young, middle aged and elderly adults (Andrade et al., 2003; Beekman, Copeland, & Prince, 1999; Forsell &

Winblad, 1999). Factors associated with onset may differ in significance at various stages of life. Risk factors may be referred to as either being distal or proximal to the depressive episode, for example events occurring in childhood compared to recent severe life events.

Clinically, a familial risk for MDD has been well recognised as a feature of the disease (Farmer, 2001). Whether this is related to family experiences or genetic risk factors has been a focus of much past research. The majority of studies conducted on twins in community samples have found a modest degree of heritability. In a meta-analysis of family and twin studies the investigators concluded that genes contributed to approximately one third of the variance in liability to develop MDD (Sullivan, Neale, & Kendler, 2000). The remaining variance was accounted for by primarily environmental influences specific to individuals rather than shared family experience.

These results were confirmed in a more recent study of over fifteen thousand twin pairs from the National Swedish Twin Registry (Kendler, Gatz, Gardner, & Pedersen, 2006b). The investigators estimated the risk of inheriting lifetime major depression to be 38% in the overall sample. The familial risk of MDD has also been demonstrated in a number of family studies (Klein, Lewinsohn, Seeley, & Rohde, 2001; Weissman et al., 1987; Weissman, Warner, Wickramaratne, Moreau, & Olfson, 1997; Weissman et al., 2005). The children of parents with MDD have three times the risk of developing MDD themselves in childhood or adolescence (Williamson, Birmaher, Axelson, Ryan, & Dahl, 2004).

Over the last decade there have been attempts to model the developmental pathways through which numerous risk factors lead to depression in both men and women (Kendler et al., 2002, 2006a; Kendler, Kessler, Neale, Heath & Eaves, 1993). Kendler and colleagues (2002, 2006a) used structural equation modelling in samples of male and female twin pairs to identify pathways leading to major depression. Eighteen predictor variables were organised into five groups approximately reflecting developmental periods across the lifespan in order to model the relationships between individual risk factors for MDD. The resulting models included a large number of risk factors from multiple domains, however, these

models were only able to predict approximately 50% of MDD in twin pairs of both sexes. The results of this research serve to illustrate the aetiological complexity of MDD and the difficulty of capturing the nature of all potential risk factors over time.

The models were able to clearly demonstrate that there were high correlations between risk factors and that many distal risk factors were predictive of more proximal risk factors for depression. For example, childhood sexual abuse in women predicted adolescent conduct disorder. Conduct disorder symptoms increased the risk of lifetime traumas, low social support and strongly predicted substance abuse, all risk factors for depression. A history of conduct disorder was a direct and independent risk factor for the onset of major depression (Kendler et al., 2002). These interactions were seen across multiple risk factors and domains in both men and women.

This is an important finding in relation to identifying depression in ACS patients. Although there are multiple risk factors for depression, many of these risk factors may have been present from an early age and an increased 'risk' of depression may have been present over a period of many years and may subsequently have already resulted in an episode of MDD by the time that a patient has developed heart disease in adulthood. A questionnaire attempting to assess the risk factors for depression in an adult population would not necessarily need to include early risk factors because a past history of MDD itself is a very strong risk factor for a further episode.

In summary, depression can be viewed as graduating from mild to severe disease. Major depression should be regarded as a chronic disease that may alter in severity in any individual and is often characterised by periods of remission and relapse. In clinical practice, a patient admitted to a Coronary Care Unit may already be suffering from a first-onset episode of depression prior to their admission and therefore have depressive symptoms in hospital, or they may have a history of depression and the acute admission may trigger a relapse. Alternatively, an admission for ACS can been regarded as a significant stressor and subsequently a patient following discharge may be vulnerable to adjustment disorder with depressed mood or be at risk of developing MDD.

Approximately one third of MDD cases can be attributed to a genetic risk (Kendler et al., 2006b), however, primarily environmental influences affecting individuals are likely to be responsible for the remaining variance (Sullivan et al., 2000). Evidence from the extensive psychosocial literature indicates that depression has multiple, complex and diverse risk factors found across a number of domains and that these risk factors are highly correlated. Some of the patients that display depressive symptoms in hospital may have been vulnerable to depression over a number of years with distal risk factors, for example childhood adversity, leading to more proximal risk factors in adulthood. In such cases an episode of depression may have developed before an admission for ACS.

Depression can be identified in cardiac patients using established, validated self-report questionnaires and additional confirmation of diagnosis by further in-depth clinical interview. However, there is not a strong evidence base to inform screening protocols designed for clinical practice and it is unclear how and when to screen patients for depression once they are back in the community. Furthermore, there is criticism of recommendations to routinely screen for depression due to a lack of evidence indicating improved outcomes for cardiac patients (Thombs et al., 2008).

The present screening model for identifying depression is restricted to detecting current disease. Arguably, a broader model is required including the identification of current disease in hospital, using established methods, and identification of patients who may be at risk of developing depression in the future. Such a model could detect those patients who have developed depression prior to admission for ACS and ensure that patients were offered appropriate, optimal, treatment and support. In addition, patients who have significant risk factors for depression would be identified and could be offered vital psychosocial support at an early stage before depressive disease is established. This screening model would need to be set in the context of collaborative partnerships between patients, primary healthcare providers and cardiac and mental health services.

Patients are not routinely identified as being at risk of developing depression in the cardiac setting, therefore it is not known whether early intervention with patients at risk of depression can improve medical or mental health outcomes. However, an

integrated screening, treatment and collaborative care model may address many of the issues surrounding the detection and treatment of depression in cardiac patients. The relationship between depression and cardiac disease is highly complex and still poorly understood. Current evidence suggests that it is likely to require equally sophisticated, innovative models of care to ensure that patient health outcomes improve.

Section 2

Identifying Risk Factors for Depression in ACS: A Systematic Review of the Literature

A systematic review has been described as a review of a clearly formulated question that uses systematic and explicit methods to identify, select and critically appraise relevant research and to collect and analyse data from the studies that are included in the review (Glasziou, 2010). In recent years the standard of reporting of published systematic reviews has been criticised in the literature. In particular, key information has not been clearly reported making it difficult for the reader to fully appraise the review process and the usefulness of the review (Dixon, Hameed, Sutherland, Cook, & Doig, 2005). In response to such criticism the PRISMA statement for reporting systematic reviews has been developed (Liberati et al., 2009) and consists of a 27 – item checklist and flow diagram of information deemed essential for transparent reporting. Although the PRISMA statement refers primarily to the reporting of randomised controlled trials, the format and reporting guidelines have provided a useful framework for the reporting of this systematic review.

The review commences with a detailed description of the method undertaken in order to complete the literature search and provides a PRISMA diagram (figure 2.2). The quality assessment procedure and method of grading evidence is then outlined. The results are reported and discussed in light of findings from the wider psychosocial literature. Finally, the limitations of the review are acknowledged and conclusions discussed.

Purpose of the review.

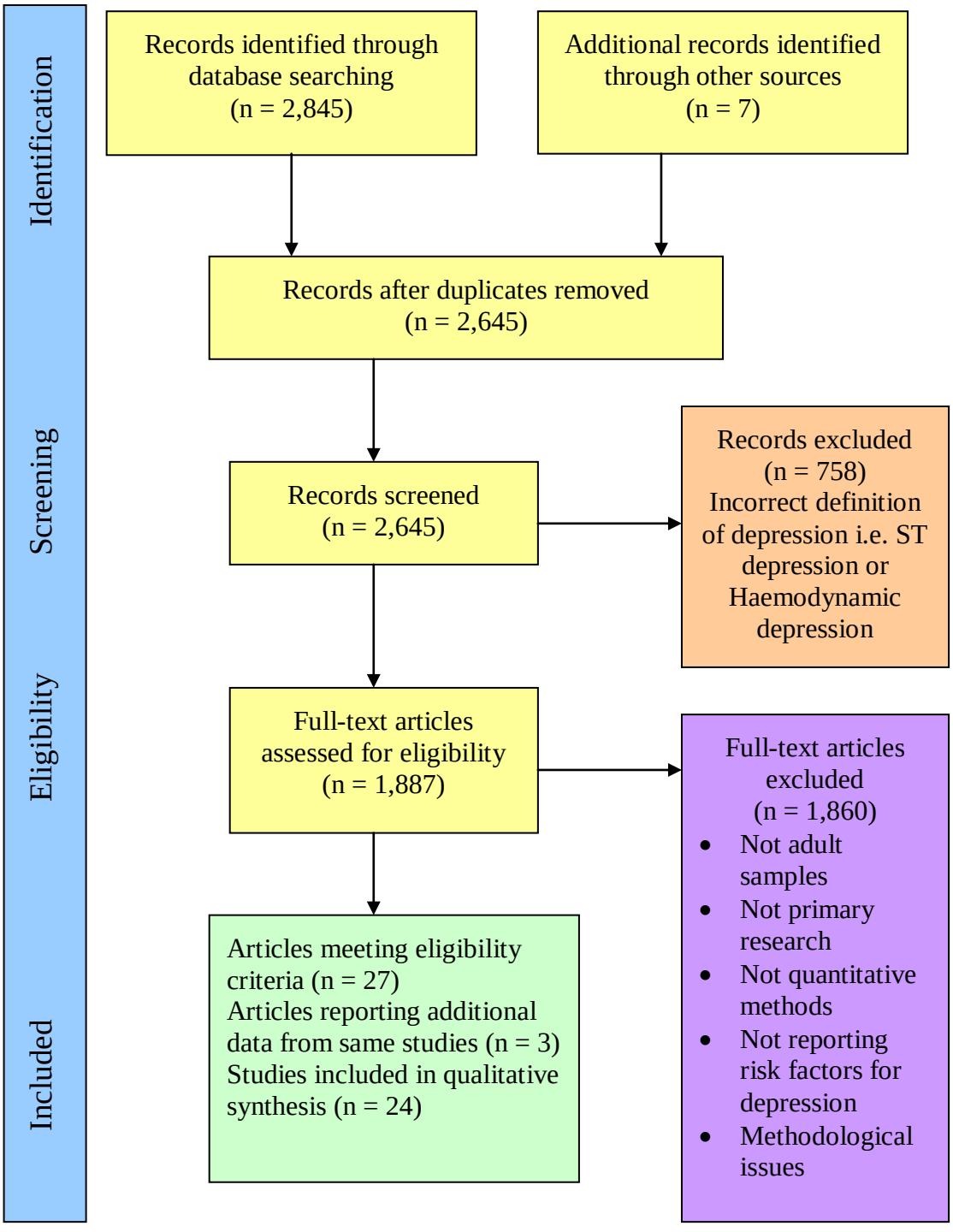
The risk factors for the development of depression in patients following an episode of ACS have not been fully described. The objective of this review was to identify risk factors for depression from the literature and critically evaluate the evidence base. This review was undertaken to address the question: What risk factors for depression have been identified in cross-sectional and prospective studies conducted in cardiac samples and what further supporting evidence can be found in the wider psychosocial literature?

The purpose of the review within the context of the entire research project has been to identify risk factors with a sound evidence base that may be included in a risk assessment questionnaire for use in an acute clinical setting. To this purpose, risk factors were further assessed for clinical appropriateness and relevance to an adult population.

Data sources.

A search of the literature was conducted dating from January 1990 through to January 2010. Medline R, CINAHL, PubMed, EMBASE, Science Direct, Web of Science and PsychINFO were searched using a combination of the following key words or phrases: “coronary artery disease”; “unstable angina”; “myocardial infarction”; “acute coronary syndrome”; “cardiac”; “depression”; “depressive symptoms”; “depressive disorder”; “major depression”; “psychosocial”; “risk”; “factors”; “predictors”; “predictive”. Manual searching of the reference section of research articles found was also performed.

Figure 2.2
Literature search strategy identifying risk factors for depression in ACS



Adapted from: Moher D, Liberati, A,Tetzlaff J, Altman DG, The PRISMA Group (2009). *Preferred Reporting Items for Systematic Reviews and Meta-Analyses:* The PRISMA Statement. PloS Med 6(6): e1000097.doi:10.1371/journal.pmed 1000097

Eligibility criteria.

To be included in the review articles had to be published in English, refer to research conducted with adult participants (≥ 18 years) of either sex, be a primary research article using a quantitative methodology, report results of risk factors for depression obtained from prospective data or correlations between factors obtained from cross-sectional data.

During the search, 758 papers were excluded because the subject of the article was not related to a psychiatric definition of 'depression' e.g. 'ST segment depression' as found on ECG readings. The 207 duplicates of articles were similarly discarded. In total 1,887 full-text papers were assessed and 1,860 papers were excluded on eligibility and methodological grounds. Twenty-seven articles met the necessary criteria and were included in the review (figure 2.2). One of these papers contained a summary of the study in English but the main article was written in Dutch. This article was translated fully into English.

To assist data synthesis, these papers were further divided into 3 groups: those that described cross-sectional studies designed to examine factors associated with depression in ACS; those that described research conducted to examine the prognostic effects of depression in cardiac disease but also reported cross-sectional findings regarding factors associated with depression and; those that described prospective studies reporting risk factors for the development of depression in cardiac samples. Although 27 papers have been included in the review, 3 papers have been written that describe the same research studies but refer to data at differing follow-up time points (e.g. Baseline, 3 months and 12 months post admission) or not previously described data. These studies are identified in appendix A.

Critical Evaluation Process

To effectively evaluate the evidence base it was necessary to find a method of grading that was well suited for the purpose. The Oxford Centre for Evidence-based Medicine Levels of Evidence (2009) offered a number of advantages in comparison with other grading methods (appendix B). This method provides a very detailed

hierarchy of grades from 1 down to 5 for studies conducted in relation to the aetiology of a disease and, importantly, offers a grading for the types of observational studies most likely to be undertaken to determine risk factors for depression i.e. prospective cohort and case-control studies (figure 2.3).

Using the Oxford approach the researcher is required to assess the quality of individual studies. A study found to be of poor quality would be allocated a lower grade, for example, an individual observational cohort study would usually be graded '2b' but this may be reduced to grade '4' following quality assessment. In addition to suggesting grades for individual studies, this system provides 4 overall Grades of Recommendation (A, B, C, D) to enable grading of a body of evidence based on a number of research studies.

Assessing the internal and external validity of observational cohort studies in a systematic way is essential, however, there is a reported lack of consensus about the most appropriate methods of assessing the quality of observational studies and the criteria on which to make judgements regarding quality (Mallen, Peat, & Croft, 2006; Shamliyan, Kane, & Dickinson, 2010). Although various checklists and scales exist for the purpose their use has been criticised on the grounds that observational studies vary too greatly in design to suit a single checklist (Groenwold & Rovers, 2010). This view is similarly endorsed by the authors of the PRISMA statement (Liberati et al., 2009) who recommend quality is assessed on an individual study basis and that particular attention be paid to the risk of study bias which may often be specific to the study design or research topic. In this review, the issue of study bias was addressed by careful critique of the study design, the processes of participant selection, methods of data collection and specifically the temporal relationship between the outcome of depression and the risk factors being studied.

Some further guidance to assessing quality may be found in the literature. In a critique of the quality assessments undertaken in 39 systematic reviews, Mallen et al., (2006) identified criteria commonly considered important and these include the use of accurate and appropriate outcome measures, adjustment for confounding, appropriate selection of controls where appropriate, assessment of loss to follow-up and relevant statistical analysis. In total, 30 criteria used to assess the quality of

observational studies were identified. In the absence of a recommended single checklist or scale, 19 of most relevant criteria have been used to guide the assessment of the quality of the individual studies in this review (table 2.1). Following assessment the studies were graded using the appropriate Oxford Centre for Evidence-based Medicine Levels of Evidence (2009) designated level 1 to 5. In total, seven of the included studies were found to have issues related to quality and therefore the grading for these studies was reduced. Details of the quality issues are outlined in table 2.2.

Having established the quality of research on an individual basis, the risk factors positively associated with depression were identified and grouped by domain. This enabled the body of evidence in favour of each risk factor to be further assessed based on the number and quality of the studies and the type of the study design, either prospective or cross-sectional. An overall *Grade of Recommendation* was assigned to each risk factor based on data from cardiac studies and supporting evidence from the broader psychosocial literature (appendix C).

Although the highest Oxford EMB grading category is 1a this is reserved for systematic reviews of randomised controlled trials. All observational studies are graded with a lower grade (2b) to reflect the potential for bias compared to randomised, controlled trials. Although randomised controlled trials are able to provide a high level of evidence, their design is primarily used to test an intervention and is not suited to the investigation of risk factors for depression on methodological grounds. Thus the most suitable studies (observational) with the highest level of evidence can only be given a 2b grade.

Figure 2.3
Oxford Centre for Evidence-based Medicine Levels of Evidence (2009): Recommended levels for health research studies related to therapy, prevention, aetiology or safety

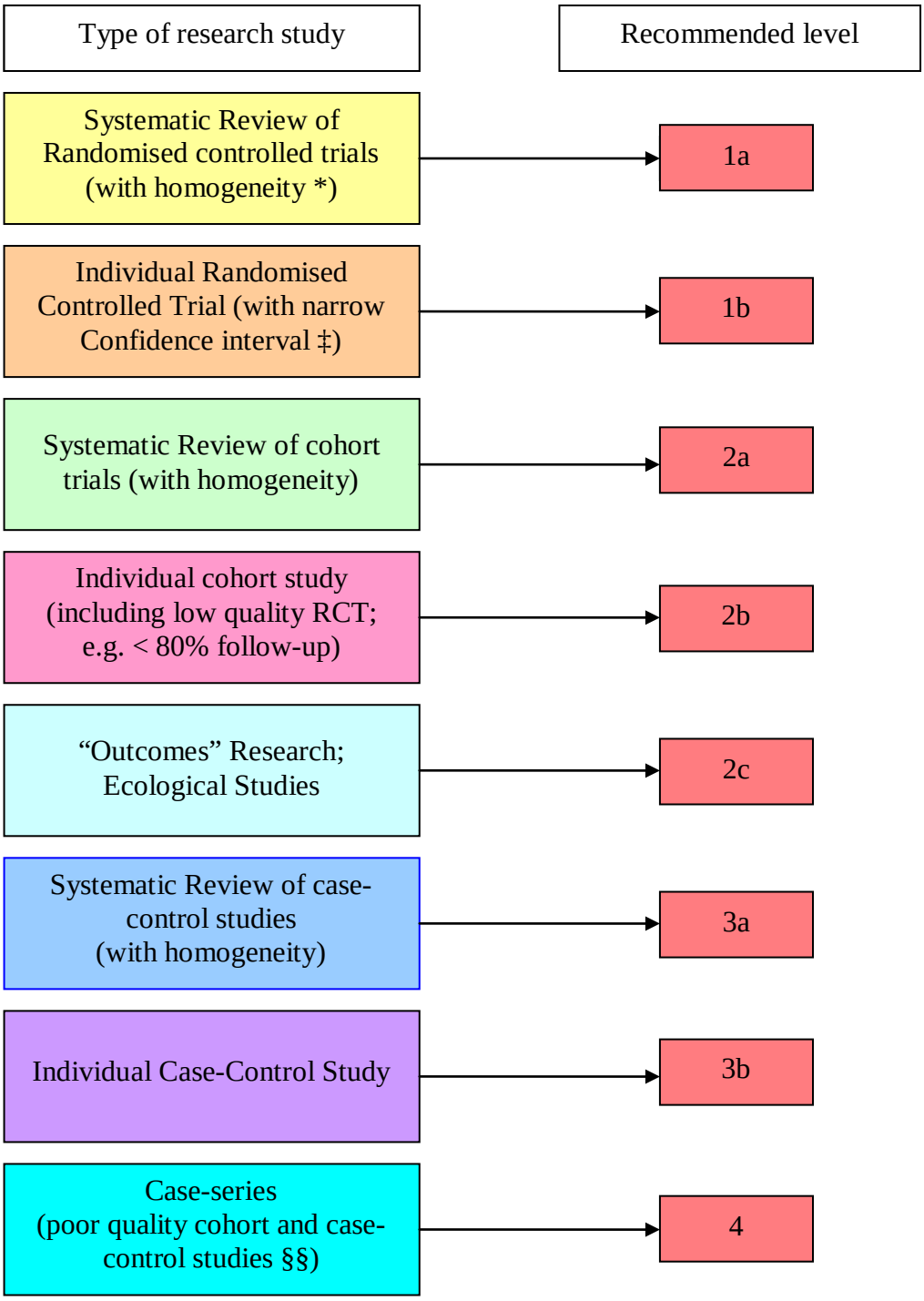


Figure based on Oxford Centre for Evidence-based Medicine Levels of Evidence (2009) table produced by B Phillips, C Ball, D Sackett, D Badenoch, S Strauss, B Haynes, M Dawes, November, 1998 and updated March 2009 by J Howick. Full table included as appendix B. Reproduced with permission.

*	By homogeneity we mean a systematic review that is free of worrisome variations (heterogeneity) in the directions and degrees of results between individual studies. Not all systematic reviews with statistically significant heterogeneity need be worrisome, and not all worrisome heterogeneity need be statistically significant. As noted above, studies displaying worrisome heterogeneity should be tagged with a "-" at the end of their designated level.
‡	See note above for advice on how to understand, rate and use trials or other studies with wide confidence intervals.
§§	By poor quality cohort study we mean one that failed to clearly define comparison groups and/or failed to measure exposures and outcomes in the same (preferably blinded), objective way in both exposed and non-exposed individuals and/or failed to identify or appropriately control known confounders and/or failed to carry out a sufficiently long and complete follow-up of patients. By poor quality case-control study we mean one that failed to clearly define comparison groups and/or failed to measure exposures and outcomes in the same (preferably blinded), objective way in both cases and controls and/or failed to identify or appropriately control known confounders.

Notes produced by B Phillips, C Ball, D Sackett, D Badenoch, S Strauss, B Haynes, M Dawes, November, 1998 and updated March 2009 by J Howick. Full table of notes included as appendix B.

Grades of Recommendation

A	consistent level 1 studies
B	consistent level 2 or 3 studies ***or*** extrapolations from level 1 studies
C	level 4 studies ***or*** extrapolations from level 2 or 3 studies
D	level 5 evidence ***or*** troublingly inconsistent or inconclusive studies of any level

Table 2.1
Criteria used to assess the quality of observational studies

Quality criteria
Accurate and appropriate outcome measures in all participants
Adjustment for confounding
Case/controls recruited from same population
Loss to follow-up (appropriate level)
Appropriate statistical tests
Participants representative of population
Potential confounders described
Recruitment of case/control over same time frame or point of disease
Participants characteristics described
Outcomes clearly described
Appropriate follow-up period
Response/non-response rate described
Clear case/control definition
Losses and completers described
Reliable assessment of disease state
Clear inclusion/exclusion criteria
Type of study stated
Main findings described
Conclusion supported by findings

Table based on quality criteria identified by Mallen, C., Peat, G., & Croft, P. (2006). Quality assessment of observational studies is not commonplace in systematic reviews. *Journal of Clinical Epidemiology, 59*, 765 - 769.

Table 2.2
Studies with identified quality issues

Authors	Study design	Quality issue	Grading post quality critique
Aktar et al., 2004	Observational study	• Failed to identify and control for known confounders	EBM level 4
Mendes de Leon et al., 2001	Observational study	• Reported small sub-set of another cohort. Not clear if the participants are representative of the cardiac population	EBM level 4
Bjerkeset et al., 2005	Prospective, population-based cohort	• Inadequate definition of depression at baseline (study specific composite index of anxiety and depression) • Depression assessed up to 5 years following MI, no contact between baseline and final assessment, no access to medical records. Episodes of depression may have occurred and remitted before final assessment.	EBM level 4
Dickens et al., 2008a	Prospective, observational cohort	• Questionnaire used to assess illness perceptions (IPQ) criticised in literature for limited internal consistency reliability	EBM level 4
Martens et al., 2008	Prospective, observational cohort	• Failed to report the baseline characteristics of the cohort • Unable to assess whether known confounders were appropriately controlled	EBM level 4
Mayou et al., 2000	Prospective, epidemiological survey	• Failed to clearly define the comparison groups • Reported the combined results of the HADS for the outcomes of anxiety and depression (reported as 'emotional distress') therefore failed to clearly describe the relationship between depression and possible risk factors	EBM level 4
Stafford et al., 2009	Prospective survey	• Only 37% of patients treated during the period recruited to study – participants may not have been representative of the population	EBM level 4

Note. EBM = Evidence Based Medicine.

Results.

In total 24 studies met the eligibility criteria (reported in 27 separately published articles) and were included in the final review. Of these studies, ten described cross-sectional findings of either studies designed specifically to examine factors associated or correlated with depression, or those that were designed to examine the prognostic effects of depression in cardiac disease but also reported factors associated with depression (Aktar, Mallik, & Ahmed, 2004; Cheok, Schrader, Banham, Marker, & Hordacre, 2003; Forrester, Lipsey, Teitelbaum, Depaulo, & Andrzejewski, 1992; Frasure-Smith, Lesperance, Juneau, Talajic, & Bourassa, 1999; Lesperance et al., 2000; Linfante, Allan, Smith, & Mosca, 2003; Mallik et al., 2006; Mendes de Leon et al., 2001; Naqvi et al., 2007; Watkins et al., 2003).

The remaining 14 studies reported the findings from prospectively conducted, observational studies (Bjerkeset, Nordahl, Mykletun, Holmen, & Dahl, 2005; Dickens et al., 2008b; Dickens et al., 2004; Hammond et al., 2008; Lesperance et al., 2000; Martens, Smith, Winter, Denollet, & Pederson, 2008; Mayou et al., 2000; Schrader et al., 2004; Schrader, Cheok, Hordacre, & Marker, 2006; Spijkerman et al., 2005b; Spijkerman et al., 2005a; Stafford, Berk, & Jackson, 2009; Strik et al., 2001b; Strik, van Praag, & Honig, 2003a; van Melle et al., 2006; van Melle et al., 2005; Whitehead, Strike, Perkins-Porras, & Steptoe, 2005).

The studies were conducted in samples of both male and female cardiac patients, with the exception of one study that recruited only females (Linfante et al., 2003). Only four studies included samples with mixed diagnoses of AMI, ACS, CABG, PTCA, arrhythmia, and CHF. The majority of studies (n = 20) were conducted in samples with myocardial infarction; ACS; or unstable angina as the primary diagnosis and inclusion criterion.

Most of the cross-sectional data were collected during hospital admission. Similarly, the majority of baseline data reported in the prospective studies were collected during acute cardiac admissions. The length of the follow-up period for prospective cohort studies ranged from three months to six years post admission, however, the majority of studies (n = 10) followed participants over a 12-month period.

Differing criteria were used to assess depression. Depressive symptoms were reported in 18 of the studies and a total of seven different self-report questionnaires were used for this purpose. In six further studies an initial screening for depressive symptoms was followed by a structured diagnostic interview in order to identify 'cases' of depression. However, the diagnostic criteria used have differed (DSM-III; DSM-III-R; DSM-IV; ICD-10) primarily reflecting the time span over which the studies have been conducted. In total, 50 risk factors have been associated with depression in cardiac patients in either cross-sectional or prospectively conducted studies (table 2.3).

Data evaluation issues.

The amount and quality of evidence for each risk factor varies greatly with some risk factors having been extensively researched whilst others rely on evidence from a single study as detailed in appendix C. There are a few risk factors for which there is good evidence to be found in the cardiac literature and extensive supporting evidence available from the psychosocial literature, for example a past history of depression. However, for a number of risk factors there exists an 'imbalance' between available cardiac evidence and psychosocial evidence. For example, only one cross-sectional study (graded 2b) has examined negative life events in cardiac patients yet there is extensive psychosocial literature providing strong predictive evidence in support of this risk factor. Evaluating the evidence base for such risk factors has been problematic. To overcome this issue is was necessary to take a broad view of the evidence available from both the cardiac and psychosocial literature.

The clinical context in which the risk factor has been studied has also raised important issues of how relevant the data is with regard to an acute cardiac setting in Australia today. This was an important issue for many of the medical risk factors identified. Due to the length of time lapsed between the study and the present day it was necessary to question whether the risk factor would be as significant in the context of current medical practice. For example, the prescription of sodium warfarin on discharge (Lesperance et al., 1996) may be less significant in light of current anti-thrombotic and anti-platelet therapy guidelines.

Table 2.3
Risk factors found to be associated with depression in ACS patients

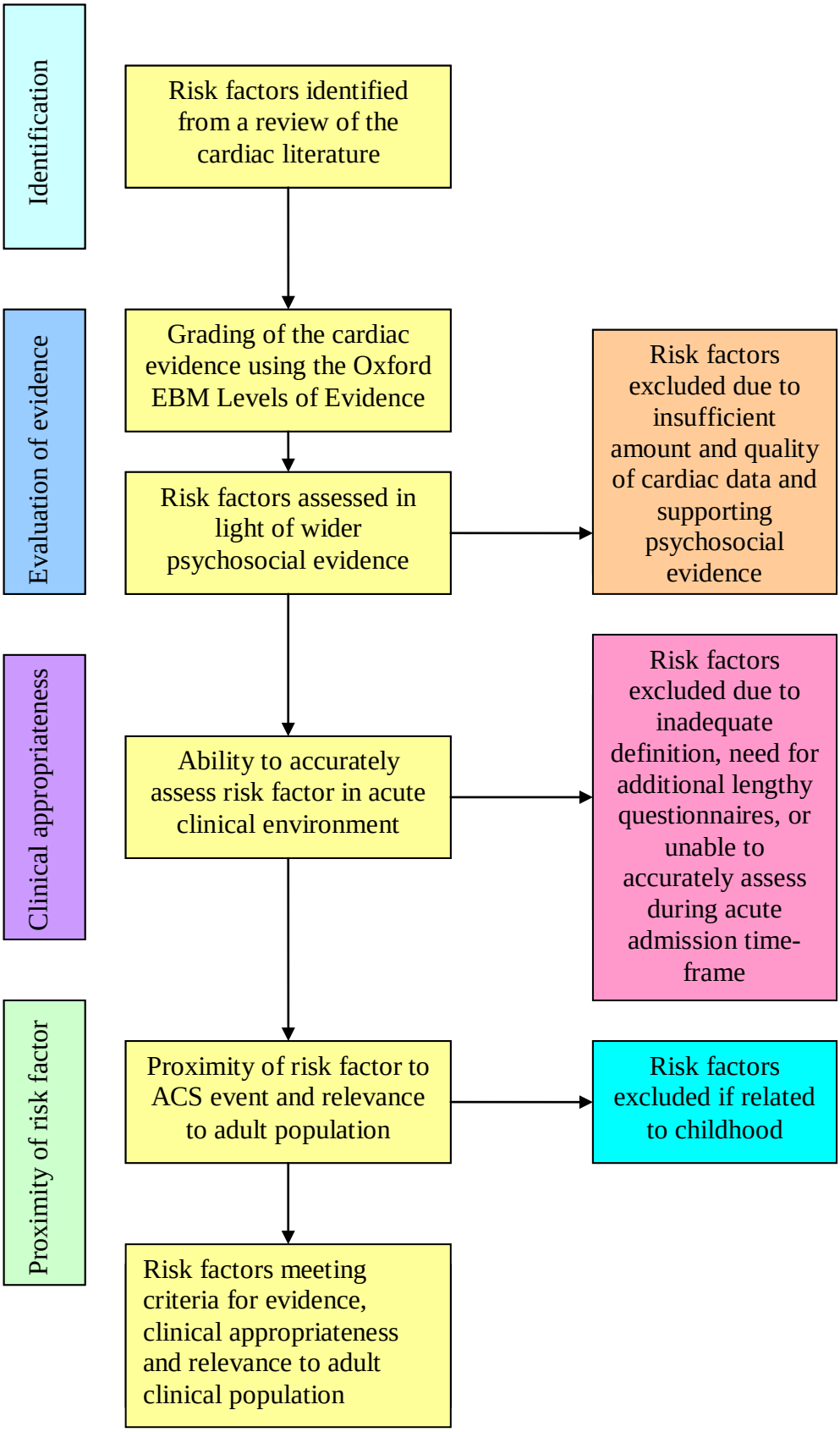
Psychological	Social	Demographic	Behavioural	Biomedical
Past history of depression	Socioeconomic status	Female gender	Smoking/unable to stop	Previous MI /size of MI
Symptoms of depression	Lower level of education	Younger age	↑Alcohol consumption	Previous cardiac condition
Anxiety	Unemployment	Older age	Reduced level of exercise	Comorbid conditions
Distress/fear of dying	Marital status	Ethnicity		Diabetes/ obesity
Negative life events	Having dependents (W)			Complications in hospital
Illness perceptions	Mother/child separation			Revascularization
Neuroticism	Living alone			Frequency of chest pain
Introversion	No close friends/confidant			Triple anti-ischaemic therapy
Type 'D' personality	Quality of relationships			Duration of hospital stay
Benzodiazepines use	Perceived social support			History of hypertension
Pre–MI vital exhaustion				Prescription of warfarin/ diuretics
Expressed anger				Hypercholesterolaemia
				Killip class/CHF/impaired LVEF
				Physical functional impairment
				Lower exercise capacity/HRQOL

Note. W = women; ↑ = increased; MI = myocardial infarction; Triple anti-ischaemic therapy = 3 types of medication prescribed for ischaemia; CHF = congestive heart failure; LVEF = left ventricular ejection fraction; HRQOL = health related quality of life.

Clinical appropriateness and relevance to an adult population.

The purpose of the review has been to identify risk factors with a sound evidence base that may be included in a risk assessment questionnaire for use in an acute clinical setting. Risk factors were therefore further assessed for clinical appropriateness. Risk factors were excluded if they had been poorly defined, needed to be identified using additional lengthy questionnaires, or could not be accurately assessed within the time-frame of a hospital admission for ACS. As previously discussed at the beginning of this chapter, risk factors for depression can be distal or proximal to the episode of depression. The risk factors were further excluded if they were more relevant to depression in children.

Figure 2.4
Schematic diagram illustrating exclusion of risk factors not meeting criteria for evidence, clinical appropriateness and relevance to an adult population



Note. EMB = Evidence Based Medicine; ACS = acute coronary syndrome.

Summary of Evidence.

The following is a summary of the main findings of the systematic review highlighting those risk factors that have met criteria based on evidence, clinical appropriateness and relevance to an adult population. The level of evidence is reported for these risk factors and discussed in light of supporting evidence from the broader psychosocial literature. A detailed table outlining the graded evidence for all of the risk factors is included as appendix C.

History of depression.

A past history of depression is a well-established risk factor for a further episode of depression. The results of six level 2b and one level 4 cross-sectional studies identified in the review showed a strong association between a past history of depression and depressive symptoms present during a hospital admission for a cardiac condition (Cheok et al., 2003; Dickens et al., 2004; Forrester et al., 1992; Lesperance et al., 1996; Mallik et al., 2006; Mayou et al., 2000; Spijkerman et al., 2005a; Strik et al., 2001b). Evidence for the predictive nature of a past history of depression, or self-reported past history of 'stress', was found in a further seven prospectively conducted studies, four graded 2b, one graded 3b and two graded level 4 (Bjerkeset et al., 2005; Lesperance et al., 1996; Martens et al., 2008; Schrader et al., 2004; Spijkerman et al., 2005a; Strik et al., 2001a; Strik et al., 2003a). Two of these studies using statistical models were able to demonstrate acceptable levels of predictive validity.

This finding is consistent with the evidence from the broader psychosocial literature. It has been demonstrated in prospective, longitudinal studies that a past history of depressive illness is a strong and consistent risk factor for MDD and that a past history of depression can affect the outcome of a current episode. (Kennedy, Abbot, & Paykel, 2003; Solomon et al., 1997) These studies were able to demonstrate that following a first episode of major depression the risk of further episodes increases greatly with subsequent episodes. After a first episode, the risk of recurrence may be 50%, however, in patients who have three or more previous episodes (indicating severe disease) there may be a 90% chance of recurrence.

Prospective studies of patients with less severe disease still report a relatively short period of time between relapse. In a prospective study of people with a diagnosis of MDD followed-up over six years, the authors reported that 65% of the sample had a relapse indicated by sub-threshold symptoms by the 5th year (Kanai et al., 2003). This is clinically important in cardiac patients because mild symptoms of depression in patients with a past history of MDD can be an sign of relapse or recurrence of disease (Paykel et al., 1995).

The presence of depressive symptoms in hospital.

Four prospective studies (three level 2b grade and one level 4 grade) identified in the review of the cardiac literature reported the presence of depressive symptoms in hospital as a significant risk factor for future depression (Lesperance et al., 1996; Mayou et al., 2000; Schrader et al., 2004; van Melle et al., 2006). Depression, as previously discussed, may be regarded as graduating from mild to severe disease (Judd, 2000; Steptoe, 2007b). In a large US survey investigating the lifetime prevalence and correlates associated with both minor and major depression, the investigators found sub-clinical depression (the presence of depressive symptoms not meeting the full diagnostic criteria) to be an important risk factor for the subsequent development of major depression (Kessler et al., 1997a). Other studies have replicated this finding. Sub-clinical depression has been established as a significant risk factor for the development of MDD in prospective studies conducted in community samples of women, adolescents and elderly adults (Angst & Merikangas, 1997; Brown et al., 1986a; Horwath et al., 1992; Kessler et al., 1997a; Lewinsohn et al., 2000).

Long standing research exploring the aetiology of depression has established the predominately chronic nature of MDD. In addition, depression is now regarded as developing from mild to severe disease. This body of evidence offers additional support for a past history of depression, and the presence of mild depressive symptoms during admission, as two of the most significant risk factors for depression in cardiac patients.

*In hospital anxiety***.**

A limited number of studies have been undertaken to examine a range of negative emotional responses experienced by patients during admission for a cardiac condition. Anxiety was positively correlated with depression in one cross-sectional study graded 2b (Frasure-Smith et al., 1999) and 'acute emotional distress', fear of dying, and a surrogate marker of 'anxiety' (prescription of benzodiazepines in hospital) were found to be risk factors for depression in three prospective studies graded 2/3b conducted in cardiac samples (Strik et al., 2001b; Strik et al., 2003; Whitehead et al., 2005). However, comparison between studies was difficult because of the inherent heterogeneity of the studies, differing psychological constructs being studied and the diverse methods of measuring the constructs. For example, Frasure-Smith, et al. (1999) used a well-validated questionnaire to measure anxiety (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983) but in two of the prospective studies (Strik et al., 2001b; Strik et al., 2003) a prescription of benzodiazepines whilst in hospital was considered a marker of anxiety. Benzodiazepines can be prescribed for a number of reasons other than 'anxiety' and it is not clear to what extent anxiety is being captured as a risk factor for depression. These studies reported in the cardiac literature are very limited in their ability to provide sufficient evidence to identify 'anxiety' in hospital as a risk factor for depression due partly to methodological flaws related to the definitions of the construct of anxiety and study design.

However, there exists extensive evidence for a strong relationship between anxiety and depression in the psychological literature. The association between anxiety disorders and major depression is well documented. In the general population, depression and anxiety are highly comorbid conditions, with almost 60% of individuals with major depression also meeting criteria for an anxiety disorder (Kessler, Berglund, & Demler, 2003).

Anxiety disorders have been associated with an increased risk for major depression. (Andrade, Eaton, & Chilcoat, 1996). In a prospective study conducted in Germany a number of anxiety disorders were found to be primary to the diagnosis of major depression and therefore able to demonstrate an appropriate temporal

relationship between anxiety and depression (Wittchen, Kessler, Pfister, & Lieb, 2000). The highest rates of comorbidity were seen in generalised anxiety disorder (GAD), separation anxiety disorder (SAD), and panic disorder with the rates for specific phobias only slightly less. Witchen and colleagues (2000) reported that in young adults with no history of an anxiety disorder the risk of developing major depression was relatively low, however, this risk increased considerably if they had developed a prior anxiety disorder. The risk of developing depression was greatest for GAD (OR 4.5).

Life events.

Very little research has been conducted to examine the association of serious negative life events and depression in cardiac patients. Only one study, graded 2b, (Dickens et al., 2004) provided cross-sectional evidence in support of a positive association between negative life events and depression and therefore there is insufficient evidence to determine whether it can be regarded as a risk factor from data obtained in cardiac samples.

Negative life events refer to psychologically significant events that occur in a person's life, for example death of a family member. Stressful negative life events have been established as a well-recognised risk factor for the on-set of depression in the general population (Kendler, Karkowski, & Prescott, 1999; Rijsdijk et al., 2001). Although a substantial proportion of the relationship between life-events and depression is thought to be causal, twin studies have demonstrated that part of this relationship is non-causal and mediated through a genetic liability for individuals to select themselves into high-risk environments (Kendler et al., 1999).

There is also strong evidence of a dose-response relationship (Kessler, 1997b). Life events confer the greatest risk for the onset of depression within one month of their occurrence, however, severely stressful events occurring for longer periods prior to an episode are still strongly predictive (Kendler, Karkowski, & Prescott, 1998). There is also evidence for an increased risk associated with the intensity of perceived threat and the number of events that occur within the same period (Kendler et al., 1998).

Such stressors have been associated with an initial increase in severity of depressive symptoms in adult community samples (Bebbington, Hurry, & Tennant, 1988) and in adolescent depression (Mghir, Freed, Raskin, & Katon, 1995; Olsson, Nordstroem, & Arinell, 1999). Antecedent life events have also been found to predict poorer outcome in treated depression during the first 6 - 12 months in medical and community - based samples (Mundt, Reck, Backenstrass, Kronmueller, & Fiedler, 2000; Spijker, Bijl, de Graft, & Nolen, 2001).

It has been suggested in the psychological literature that the onset of psychiatric disorders, including depression, may be increased by two factors. Firstly, the proportion of the person's usual activities in which uncontrollable negative change takes place following a major negative event. Secondly, how central the uncontrollable changes are to the individual's important goals and values (Dohrenwend, 2000). Major negative events involving 'loss' and disappointment, e.g. marital separation or illness, have been most strongly associated with depression.

Responses to negative events may differ between individuals and between genders. A study conducted in a sample of couples recently exposed to a negative life event found that women were at an increased risk for depression following events involving children, housing or reproductive problems but only if the couples did not share 'responsibility' equally for the event. It was suggested by the authors that by distancing themselves from the event, the men were able to reduce their risk of developing depression (Nazroo, Edwards, & Brown, 1997). However, there is evidence to suggest that men have an increased risk of depression following separation or divorce (Fuhrer, Stansfeld, Chemali, & Shipley, 1999; Kendler, Thornton, & Prescott, 2001).

Negative life events can be viewed as strongly associated with the prospective development of depression in non-cardiac populations and this evidence adds considerable weight to support their role as a risk factor for depression both pre and post ACS. Within a cardiac context, patients may have experienced a stressful life-event prior to admission for an episode of ACS and therefore may have some level of depressive illness on admission. Indeed, a stressful life-event may have precipitated an ACS event. Alternatively, an acute admission for ACS may be regarded as a

threatening life-event in itself. Furthermore, evidence from the literature would suggest that a stressful life-event occurring in close proximity to an acute hospital admission for ACS confers a heightened risk of depression in some individuals.

Social support.

Social support is a term encompassing a number of specific characteristics of an individual's social world that may promote well-being and /or increase resistance to health problems (Cohen, Gottlieb, & Underwood, 2000). The perceived quality of social support with regard to a vulnerability to develop depression has been described in six cross-sectional studies (graded 2b) and one prospective study (graded 2b), although various measures and aspects of social support have been examined.

In a study of patients admitted for a first myocardial infarction, Dickens et al. (2004) found an independent association with depressive symptoms and both social isolation and lack of a close confidant. Three further studies also demonstrated an association between a lack of close friends or confidants using cross-sectional data (Frasure-Smith et al., 1999; Lesperance et al., 2000; Lesperance et al., 1996). Frasure-Smith et al. (1999) were also able to demonstrate that perceived social support is strongly associated with depression. The remaining two studies found positive associations between depression and a reduced quality and satisfaction with personal relationships (Forrester et al., 1992), and living alone (Spijkerman et al., 2005a). In addition, two further studies examined marital status in relation to depression and found that being male and single (Mallik et al., 2006) or being divorced or separated of either gender was significantly related to depression in cross-sectional data (Cheok et al., 2003).

The only prospective data confirming a relationship between depression and social support was reported from a study conducted in a cardiac sample of patients aged $\geq$ 60 years of age. The study recruited patients at the time of an acute hospital admission for mixed cardiac diagnoses and examined the cohort a second time one month following discharge from hospital (Hammond et al., 2008). Impaired

subjective social support was identified as an independent predictor of depression at one month.

There are some methodological issues related to studying depression and reduced social support or social isolation. Depressive illness itself can lead people to withdraw socially and feel isolated so it is important to establish a temporal relationship between measures of social support and the onset of depression. A previous history of depression can also have a negative, on-going impact on an individual's social support network. Preliminary findings of a study of depression and individual social networks initially found that weak networks were significantly associated with depression, however, the strength of the relationship was greatly reduced when the researchers controlled for a past history of depression (Kessler & Magee, 1994).

Prospective studies examining social support and depression have reported mixed findings. In a sample of mothers from inner-city London the investigators found little evidence for a predictive relationship between a large array of social support markers and the onset of depression. However, unmarried mothers and women who had received poor levels of support at a time of crisis were found to have an increased risk of depression (Brown, Andrews, Harris, Adler, & Bridge, 1986b). In a study investigating the onset of post–natal depression, a lack of social support from family, particularly in relation to becoming pregnant, was found to be significantly predictive of depression following adjustment for personal and family psychiatric history, antenatal depression, and neuroticism (Brugha, Sharpe, & Cooper, 1998).

Studies undertaken in large community cohorts have reported conflicting results. A prospective study of adults conducted in the US interviewed participants at two time points eight months apart and measured three items of social support. Marital discord was the only significant predictive variable at T2, but this became non-significant following statistical control for life events and symptoms of depression at T1 (Lewinsohn, Hoberman, & Rosenbaum, 1988). A similar study conducted in adolescents found no significant relationship between low perceived support of family or friends and the onset of depression at T2 once depressive

symptoms and psychopathology had been statistically controlled at T1 (Lewinsohn, Roberts, Seeley, Rohde, & Gotlib, 1994b). A further prospective study conducted in a community sample of 1,900 women measured social support at two times over a 5 year period (Wade & Kendler, 2000). The level of social support available for each of the women was assessed by examining the extent to which spouse, family and friends expressed interest in the participant's well-being. In addition, the participants reported the presence of confidants and frequency of social contacts. Lower perceived support was associated with major depression at both time points in cross-sectional analysis, however, no prospective association with the on-set of depression could be found following the statistical control of depression at T1.

The evidence for a prospective relationship between various measures of social support and the onset of depression is inconsistent. Whilst cross-sectional evidence points to a strong relationship between depression and measures of social support, a predictive relationship has not been established in large community samples.

The relationship between social support and depression is highly complex. There is evidence that social support maybe more relevant in specific groups of the population, for example in old age when declining social support networks coincide with an increasing likelihood of disability and chronic medical illness (Bruce, 2002). A systematic review of the literature examining risk factors for depression in the elderly reported significant associations between depression and being unmarried, having a smaller social network and qualitative aspects of social support (Vink, Aartsen, & Schoevers, 2008).

Prospective studies conducted in the elderly have shown a more consistent relationship between measures of social support and depression. In one such study, late-life suicide was predicted by a lack of a relative or friend in whom the participant could confide (Turvey, Conwell, & Jones, 2002). In another study, poor social contact with friends was found to predict depression and modify the association between disability and depression (Prince, Harwood, Thomas, & Mann, 1998). Functional disability is a strong independent risk factor for depression in older adults (Geerlings, Beekman, Deeg, & van Tilburg, 2000). Other studies have demonstrated an important modifying relationship between measures of social

support and the impact of disability. Having a partner or good social support significantly reduced the impact of physical disability on depression in a sample of elderly Dutch people (Schoevers, Beekman, & Deeg, 2000).

The level of social support available may also be more relevant to lower socioeconomic groups. Research has demonstrated that social support is unequally distributed across social classes with the lower classes lacking both social support and material resources (Brummett, Barefoot, Vitaliano, & Siegler, 2003; Mickelson & Kubansky, 2003; Stansfield, Head, Fuhrer, Wardle, & Cattell, 2003). Some studies have suggested that perceived social support may be partially responsible for the differences in mental health between higher and lower socio-economic groups (Stansfield et al., 2003). In a sample of adults Brummett et al., (2003) found the inverse relationship between social support and depression was more significant in lower socioeconomic groups than in higher income groups, although this finding was not replicated in a study of adolescents (Geckova, Dijk, Stewart, Groothoff, & Post, 2003). A more recent longitudinal study following adolescents into adulthood found social support had a greater impact on depression in lower socio-economic groups but the relationship differed depending on the type of social support, life stage and gender (Huurree, Eerola, Rahkonen, & Aro, 2007).

Whilst there is inconsistent evidence in favour of a prospective relationship between measures of social support and the onset of depression, there is stronger evidence for the modifying effect of perceived social support on the remission of depression. Several studies found that varying measures of perceived social support predicted remission rates (Brugha et al., 1990; George, Blazer, Hughes, & Fowler, 1989; Hybels, Blazer, & Steffens, 2005; Lara, Leader, & Klein, 1997) although this relationship has not been replicated in all studies (Oldehinkel, Ormel, & Neeleman, 2000).

In summary, there is good evidence of a cross-sectional association between various measures of social support and depression in both cardiac and community samples. However, a strong predictive relationship between aspects of social support and the onset of depression has yet to be established. The evidence suggests that the strength of relationship between social support and depression may vary between

specific groups within the population and that social support may modify the impact of other risk factors for depression that may be significant for older cardiac patients. Lastly, there is some supporting evidence that higher levels of perceived social support may indicate a shorter duration of depressive episode. Evidence from the cardiac and psychosocial literature places social support as a risk factor of interest in cardiac depression, however, the evidence does not support a strong independent relationship with onset but is more suggestive of a mediating role.

Socioeconomic position.

The impact of various indicators of lower socioeconomic position in relation to cardiac depression has been examined in five cross-sectional studies (four graded 2b and one graded 4) and one prospective study (graded 2b). Socioeconomic position (SEP) has been described as a term that encompasses both social class, referring to ownership and control over productive assets, and socioeconomic status, referring to the ordering of people along a continuum of a valued socioeconomic attribute such as education or income (Muntaner, Eaton, Miech, & O'Campo, 2004). In cardiac samples, a lower level of education was found to be significantly associated in four cross-sectional studies (Cheok et al., 2003; Frasure-Smith et al., 1999; Mallik et al., 2006; Watkins et al., 2003). A lower level of education in cardiac patients with a past history of depression was also found to be predictive of depression prospectively (Spijkerman et al., 2005b). Employment status has been studied in two cross-sectional studies (Cheok et al., 2003; Mallik et al., 2006). Unemployment was significantly associated with depression in both studies. Perceived economic burden (Mallik et al., 2006) and lower SEP (Aktar et al., 2004) were also found to be significantly related to depression in cross-sectional data.

Although there has been little prospective study of these social indicators as risk factors in cardiac populations, there has been extensive research conducted and reported in the psychosocial literature. A comprehensive literature review and meta-analysis examining the relationship between socioeconomic status and depression found conclusive evidence of a strong relationship (Lorant et al., 2003). The results indicated that people of a low socioeconomic status had an increased risk of being depressed (odds ratio = 1.81, $p<0.001$) when compared to those with a higher status.

When the results where further analysed, the risk of persisting depression (odds ratio = 2.06, $p < 0.001$) was greater than the odds of a new episode (1.24, $p = 0.004$). A dose response was found for the individual indicators of education and income. Furthermore, the association of increased depression was not limited to the lowest socioeconomic groups but remained as a gradient throughout the social levels.

The association between depressive illness and lower SEP may be explained by two opposing theories, social causation and social selection. Social causation suggests that aspects of SEP, such as financial adversity and environmental factors, may exert a causal influence on depression. Alternatively, social selection theory proposes that depressive illness leads to downward mobility through social levels or impairs upward mobility. There is evidence in support of both theories operating to some extent (Skapinakis, 2007), however, results from longitudinal studies suggest that the social causation model may have more explanatory power (Johnson, Cohen, & Brook, 1999; Power, Stansfeld, & Mathews, 2002; Ritsher, Warner, & Johnson, 2001).

Some research has examined the relationship of SEP and depression over the life course. There is support for both long-term influences of lower SEP dating from childhood and more short-term adult-specific influences such as job insecurity and financial hardship (Gilman, Kawachi, & Fitzmaurice, 2002, 2003; Power et al., 2002; Stansfield et al., 2003). A recent Australian longitudinal study demonstrated a strong association between current financial hardship and depression. The association remained independent following control for demographic characteristics, prior depressive symptoms and other measures of SEP (Butterworth, Rodgers, & Windsor, 2009).

A significant aspect of the relationship between depression and SEP is the ‘clustering’ of other risk factors for depression that also occur in people of low SEP, for example interpersonal violence, humiliation, stressful life events and job insecurity (Muntaner et al., 2004). In addition, social support is unequally distributed across social classes resulting in less support in times of need for people from lower SEP (Brummett et al., 2003; Mickelson & Kubansky, 2003; Stansfield et al., 2003). Studies comparing the relationship of SEP, depression and gender have demonstrated

that women of low SEP have double the risk of developing depression compared to males of the same SEP (Kessler et al., 2003; Rutter, Caspi, & Moffatt, 2003). Women with less financial resources show higher rates of depression compared to women with higher incomes or women from community samples (Coiro, 2001; Danziger, Carlson, & Henley, 2001; Ritter, Hobfoll, & Lavin, 2000). Higher rates of debt and financial strain are also strongly related to depression in women of mixed socioeconomic backgrounds (O'Campo, Eaton, & Muntaner, 2004; Reading & Reynolds, 2001).

Within the Australian context, low SEP is also modified by geographical location and social isolation. Whilst there are pockets of social deprivation found within Australian cities, rural and remote areas of Australia have not experienced the same levels of economic and social development of urban areas (Cheng, Spittal, Yip, & Pirkis, 2012). There are fewer GPs per head of population in rural and remote Australia compared to urban locations and there is evidence demonstrating lower levels of mental health services available to these communities (Judd, Cooper, Fraser, & Davis, 2006). In recent years, drought and decline in water availability have led to extreme levels of financial hardship for rural farming communities (Alston & Kent, 2004). A lack of employment opportunities and down turn in agriculture has led to a further decline of population in these areas (Judd et al., 2006).

There have been devastating mental health consequences for rural and remote populations demonstrated most profoundly among males. Australian men are more than four times likely to die of suicide than women (ABS, 2005). Men in remote areas are three times more likely to suicide than males in urban locations (Page, Morrell, Taylor, Dudley, & Carter, 2007). Pockets with the highest rates of male suicide are found in communities with populations of under 4,000 people (Judd et al., 2006).

The evidence in support of lower SEP as a risk factor for cardiac related depression is limited, however, there exists strong supporting data from the wider psychosocial literature. Lower SEP is strongly associated with depression and certain aspects, such as current financial strain and financial hardship, have been shown to have a strong independent association with depression even after controlling for

other psychosocial variables. Low levels of SEP should be considered as a significant risk factor for depression in cardiac patients and an important indicator of the likely presence of concurrent risk factors for depression.

Negative illness perceptions.

Two prospective studies conducted in cardiac samples (both graded level 4) have found evidence in favour of an association between negative illness perceptions and depression (Dickens et al., 2008b; Stafford et al., 2009). Both studies were downgraded from a 2b grade because of methodological issues that may have caused bias, although to what extent the results may have been influenced was difficult to determine. One study (Dickens et al., 2008b) used the Illness Perception Questionnaire (Weinman, Petrie, & Moss-Morris, 1996) that was subsequently found to have psychometric problems with two subscales and required revising (Moss-Morris, Weinman, Petrie, Cameron, & Buick, 2008). Stafford et al. (2009) had experienced recruitment issues with less than 37% of the clinical population included in the final sample.

The proposed relationship between negative illness perceptions and the onset of depression is informed by the cognitive model of depression. This model suggests that personal negative beliefs or thoughts can lead to the development of depression (Kovacs & Beck, 1978). The cognitive model underpins cognitive therapy, a well-established psychological treatment for depression where patients are encouraged to consider any negative thoughts and replace them with less negative or more realistic thoughts.

Some additional relevant research has been conducted in cardiac samples with mixed results. The presence of negative beliefs about health and illness in patients undergoing coronary artery bypass graft surgery was associated with increased psychological stress (Hermele, Olivio, Namerow, & Oz, 2007). However, a prospective study examining the association between depressive symptoms and negative illness beliefs regarding angina was only able to demonstrate a trend towards significance. Negative illness beliefs have been associated with poorer health-related quality of life following myocardial infarction and in patients with CAD (Aalto et al., 2006; French, Lewin, Watson, & Thompson, 2005).

The evidence for the prospective association of negative illness perceptions and depression in cardiac patients is very limited. The two primary studies included in the review have both had methodological issues that have further reduced the quality of the evidence. However, cognitive theory underpinning the hypothesis that negative illness perceptions may predispose to depression is well-established and has led to the development of successful treatments for depression (Wampold, Miami, Baskin, & Callen, 2002). It has been difficult to determine whether this risk factor should be regarded as potentially significant. However, as this review represents an initial process in the development of a questionnaire, this risk factor was included for further review by an Expert Panel.

Although the aetiology of depression is multi-factorial, as previously discussed, there exist a high correlation between risk factors within and across domains (Kendler et al., 2002, 2006a). This is particularly true regarding psychological and social factors leading to depression. Indeed, these risk factors often exert a mediating influence on one another. A combination of 'psychosocial' factors in particular plays a more prominent role in the development of depression than most other medical conditions (Stansfeld & Rasul, 2006). This was clearly reflected within the cardiac literature as the risk factors identified from these domains were supported by some of the strongest, most consistent evidence.

Female gender.

Gender has been one of the most studied risk factors for depression within the cardiac literature. Female gender has been significantly associated with depression in cross-sectional analysis in eleven studies, nine graded level 2b (Cheok et al., 2003; Dickens et al., 2004; Forrester et al., 1992; Frasure-Smith et al., 1999; Lesperance et al., 2000; Lesperance et al., 1996; Mallik et al., 2006; Naqvi et al., 2007; Watkins et al., 2003) and two graded level 4 (Aktar et al., 2004; Mendes de Leon et al., 2001). A further four studies have demonstrated a significant prospective association between female gender and depression, three studies graded 2b (Spijkerman et al., 2005b; Spijkerman et al., 2005a; Strik et al., 2003a) and one study grade 4 (Bjerkeset et al., 2005).

Female gender can be considered a risk factor for depression. This finding is supported by a substantial body of evidence that has been reported in the wider psychological literature. Females are twice as likely to experience both major and minor depression when compared to males (Kuehner, 2003; Ustan, 2000). This disparity is evident during adolescence, middle age and into early old age (Kuehner, 2003; Mojtabai & Olfson, 2004). The reason for a greater risk of depression in women has been the focus of considerable research, however, the reason are still not fully understood.

In a study using the National Swedish Twin Registry, the researchers examined the risk of inheriting lifetime major depression and discovered a significant gender disparity between results with females displaying a higher genetic risk for major depression (42%) than males (29%) (Kendler et al., 2006b). Similar results in relation to gender have been found in other twin studies. A study using data from an Australian voluntary twin registry estimated the risk of lifetime major depression to be 44% in females and 24% in males (Beirut et al., 1999). This disparity has also been shown in elderly twin cohorts in two Scandinavian studies (Jansson et al., 2004; McGue & Christensen, 1997).

Some researchers believe that a substantial part of the difference can be explained by gender role related stressors to which women are more exposed than males, for example, low socioeconomic status, lack of power, role overload (Frone, 2000), and sexual abuse (Rodgers, 1994). Furthermore, women may be more psychologically vulnerable to depression with emotion-focused coping styles, more anxiety (Breslau, Schultz, & Peterson, 1995), and lower self-esteem (Moller-Leimkuhler, 2007; Piccinelli & Wilkinson, 2000). The disparity may also be a reflection of the differences found between endocrine stress reactions which may influence depression (Piccinelli & Wilkinson, 2000). In addition, although women do not suffer more serious negative life events than men they may experience more stress related to the event (Nazroo et al., 1997).

One important issue to be noted with gender-based research of depression is that men are often more reluctant than women to disclose symptoms of depression and seek treatment. Recent Australian research points to a tradition of ‘stoicism’ in

rural men fostering values of self-reliance, independence and a distrust of outside agencies leading to a reluctance to seek help for depression (Alston, 2012).

Females are at greater risk of developing depression than males and this has been demonstrated in the limited cardiac literature. There is extensive support for the presence of a significant gender disparity in relation to the risk of developing depression. The reasons for this have not been clearly established but are likely to be multi-dimensional. Female gender may be viewed as a significant risk factor for depression in cardiac patients, however, there still exist a significant proportion of males at risk of depression who may not find it easy to disclose symptoms or seek appropriate help.

Age.

Younger age has been identified as a risk factor for depression following analysis of cross-sectional data from eight studies, five graded 2b (Cheok et al., 2003; Dickens et al., 2004; Linfante et al., 2003; Mallik et al., 2006; Watkins et al., 2003) and 3 level 4 studies (Aktar et al., 2004; Mayou et al., 2000; Mendes de Leon et al., 2001). Evidence of younger age as a risk factor was also found in prospectively collected data from four studies all graded 2b (Lesperance et al., 1996; Schrader et al., 2004; Spijkerman et al., 2005b; van Melle et al., 2006). The definitions of 'younger age' have ranged from less than 54 years of age to 65 years of age or below. Only one study graded 4 alternatively described 'old age' (not defined in years) as a risk factor (Bjerkeset et al., 2005).

Depressive illness may occur at different times across a lifespan. MDD is found in young, middle aged and elderly adults (Andrade et al., 2003; Beekman et al., 1999; Forsell & Winblad, 1999). Epidemiological evidence points to a reduced level of depression among people aged in their 50's and 60's (Henderson, Korten, & Jacomb, 1997) but a higher incidence in older age that is strongly correlated to physical illness and disability (Cuijpers, Beekman, & Smit, 2006; Smit, Ederveen, & Cuipers, 2006; Smit et al., 2008).

The development of depression in younger people has been associated with psychological risk factors, life stressors and genetic factors (Karel, 1997). The

cardiac studies demonstrating a strong association with younger age have been conducted primarily in samples of ACS patients. Risk within this group may be a reflection of family role strain, financial concerns due to disrupted work patterns, and psychological stress associated with early morbidity or increased mortality risk. In addition, it is suggested that psychological vulnerability to depression may decrease with passing years whereas physical disease and low social support may become more relevant risk factors in the elderly (Karel, 1997; Schoevers et al., 2000).

Smoking.

Both current smoking and difficulty in stopping smoking have been identified as risk factors for depression. Current smoking, defined as tobacco smoking daily or on admission to hospital, was identified as a risk factor for depression in four cross-sectional studies graded 2b (Cheok et al., 2003; Lesperance & Frasure-Smith, 2000; Mallik et al., 2006; Naqvi et al., 2007) and one study graded 4 (Mayou et al., 2000). Current smoking at baseline was also shown to be prospectively associated with depression in two level 2b studies (Schrader et al., 2004; Spijkerman et al., 2005b) and in one level 4 study (Bjerkeset et al., 2005).

Difficulty stopping smoking, defined as not being able to cease smoking after a MI, was a significant factor in cross-sectional analysis of the finding of a level 3b study (Strik, Honig, & Maes, 2001c) and in a prospectively conducted 2b study (Strik et al., 2003a).

There is good evidence for a strong and consistent association between tobacco smoking and depression. Individuals with depressive illness have higher rates of smoking in comparison to those who are not depressed (Chang & Chiang, 2009; Fucito & Juliano, 2009). This association has been confirmed in a large, longitudinal cohort study conducted over a time span of 21 years (Fergusson, Goodwin, & Horwood, 2003). Importantly, in prospectively conducted studies this association has been found to be bi-directional. People with major depression at baseline increased their smoking and a history of daily smoking increased the risk of major depression (Breslau, Novak, & Kessler, 2004; Breslau, Peterson, Schultz, Chilcoat, & Andreski, 1998). The results of a recently reported longitudinal cohort conducted over a 26-

year period provided further evidence of a risk of depression in those who smoked and that the risk increased with greater tobacco use (Flensborg-Madsen et al., 2011). The underlying mechanisms explaining the strong positive association between smoking and depression have still to be fully understood. Possible explanations include a causal link between nicotine use and vulnerability to depression due to nicotine's influence on neurochemical pathways (Carmody, Vieten, & Austin, 2007) and a common genetic vulnerability affecting the neurotransmitter systems that may increase the probability of both depression and smoking (Malhi & Berk, 2007).

There is consistent evidence identifying smoking as a risk factor for depression in non-cardiac samples and this adds considerable weight to the cardiac evidence. Smoking may be regarded as an important factor in the development of depression, however, smoking is also a strong risk factor for the development of cardiovascular disease and it is likely that a highly complex relationship, yet to be fully elucidated, exists between smoking and these two diseases.

The majority of risk factors identified and discussed thus far have been from the psychological, social, behavioural and demographic domains. These risk factors have been the primary focus of research in this field and there is evidence from both the cardiac literature and the wider literature to support an argument for their inclusion as risk factors for depression in cardiac patients. Indeed, the inclusion of these risk factors as 'variables of interest' in cardiac research projects may reflect the strength of known evidence gathered from research in non-cardiac samples. To some extent, research projects examining these risk factors have attempted to confirm whether these factors are as relevant in cardiac depression as in non-cardiac related depression.

The evidence related to biomedical variables is more problematic to assess because of limited data. Although there have been twenty medical risk factors identified from the literature search, there is considerably less evidence to assess. Research examining medical risk factors for depression attempts to address the underlying question to what extent does poorer medical health increase the risk of depression?

Heart failure.

Heart failure develops when the heart fails to adequately function as a pump. Systolic heart failure is the inability of the heart to squeeze enough blood from the ventricles to supply the body's needs. Diastolic heart failure results from the inability of the heart muscle to relax in between heartbeats causing a backup of blood in the ventricles and blood vessels (Torpy, 2011).

The relationship between left ventricular ejection fraction (LVEF), a marker of heart failure, and depression has been studied in four cross-sectional studies graded 2b (Frasure-Smith et al., 1999; Lesperance & Frasure-Smith, 2000; Mallik et al., 2006; Watkins et al., 2003) and two prospective studies graded 2b (Spijkerman et al., 2005b; van Melle et al., 2005). An impaired LVEF has been found to be a significant risk factor for depression in all of the studies, however, the definitions of impairment have differed and range from less than 30% to less than 45% LVEF. Advanced Killip class ($\geq$ 2) was also found to be significant in two cross-sectional studies (Frasure-Smith et al., 1999; Mallik et al., 2006). Finally, Watkins et al., (2003) found that a diagnosis of congestive heart failure (CHF) documented in patient medical records was also significantly related to depression in a cross-sectional study.

The prevalence rate for depression in CHF patients is similar to that found in post ACS patients, however, rates increase considerably in subgroups with greater levels of heart failure (NYHA Class III or IV) or worse physical symptoms (Freedland et al., 2003; Friedman & Griffin, 2001; Rutledge, Reis, Linke, Greenberg, & Mills, 2006). The relationship between heart failure class may also be mediated by age with younger patients ($\leq$ 60 years) more at risk of depression (Freedland et al., 2003). Depression is also more common in women with heart failure than men (Angermann et al., 2011; Freedland et al., 2003; Jiang et al., 2001).

Within the psychosocial literature, disability and physical impairment are known risk factors for depression in community samples (Geerlings et al., 2000). However, there is also prospective evidence that the presence of depressive symptoms is an independent predictor of severe functional limitations in CHF patients following discharge from hospital (Shimizu, Yamada, Miyake, & Izumi,

2011). A bi-directional association between depression and function in heart failure further complicates the assessment of the limited cardiac evidence that relies on primarily cross-sectional data. Furthermore, it has been postulated that shared pathophysiologic pathways may be responsive for the association between depression and heart failure (Joynt, Whellan, & O'Connor, 2004).

Studies suggest a bi-directional association between depression and heart failure but there is insufficient evidence to suggest a direct causal link between measures of heart failure and depression in ACS patients. In view of this complicated relationship, this risk factor was included for further review by an Expert panel as detailed in Chapter 4 (Methods) of this thesis.

Past cardiac history.

A past history of an AMI (or other cardiac condition) has been significantly associated with depression in four cross-sectional studies graded 2b (Cheok et al., 2003; Lesperance et al., 2000; Mallik et al., 2006; Naqvi et al., 2007) and two prospectively conducted studies graded 2b (Schrader et al., 2004) and level 4 (Martens et al., 2008) respectively. The limited available evidence is consistent with epidemiological data showing higher levels of depression in patients following cardiac illness than in those people without cardiac disease. Clinically significant depressive symptoms have been found in between 31% to 45% of patients with ACS. In addition, 20% of CAD patients may have depression that fulfils the criteria for MDD (Carney & Freedland, 2008; Thombs et al., 2006), a rate consistently higher than national community based surveys conducted in Australia (Wilhelm et al., 2003).

Ethnicity.

The relationship between ethnicity and cardiac related depression has not been well researched. Only one study (graded 2b) conducted in the US (Mallik et al., 2006) was found in the literature search. Mallik and colleagues (2006) demonstrated a cross-sectional relationship between African American ethnicity and depression in a large sample of over two thousand post-AMI patients.

Ethnicity has been recognised as an important contributing factor in relation to variation in levels of mental health in differing communities within the same country (Stansfeld & Rasul, 2006). In Australia, there is a well-documented difference in levels of mental health between Aboriginal and Torres Strait Islander peoples and non-indigenous Australians. Indigenous Australians are twice as likely to report high or very high levels of psychological distress when compared to non-Indigenous Australians (AIHW, 2009). Mental health disorders are a leading cause of disease burden among Indigenous people, second only to cardiovascular disease, and make a of 16% contribution to total disability adjusted life years (ABS, 2008). Hospital admission data also reflects this disparity with Indigenous Australians presenting 1.8 times more with a principle diagnosis of a mental or behavioural disorder (ABS, 2008). Many reasons have been cited for high levels of psychological distress among Indigenous communities. The numerous contributing factors reported include family violence, lack of employment, past government policies of removing family members, poverty, and substance abuse (Emden, Kowanko, De Crespigny, & Murray, 2005; O'brien, 2005).

Although Indigenous Australians have a well-documented high burden of cardiovascular disease and mental health disorders (ABS, 2008), there has been no research conducted in ACS samples in order to examine ethnicity as a risk factor for depression. In particular, it is not known whether 'ethnicity' itself should be regarded as an independent risk factor for depression in cardiac patients or as a risk marker indicating the likelihood of a clustering of multiple risk factors related to SEP and other social factors. In spite of the paucity of data in this area, Indigenous Australians should be regarded as at greater risk of depression than non-Indigenous Australians.

Limitations of the Review.

The literature search has been primarily confined to studies published in English and therefore may be at risk of publication bias. Where key information likely to affect the quality assessment was absent, the Oxford EMB Grade was reduced. The authors of the paper were not contacted to clarify methods or supply missing data. The literature search, data extraction, quality critique and evidence grading were undertaken by one individual and therefore did not benefit from

additional independent assessment prior to review by an expert panel during questionnaire development. However, these processes were conducted with guidance from a supervisory team with extensive methodological and content knowledge.

The 24 studies reviewed have been conducted over a 17 year period from 1992 (Forrester et al., 1992) to 2009 (Stafford et al., 2009). During this time the diagnostic criteria for both depression and ACS have evolved and this represents a significant barrier to comparison of the studies across time. A high level of heterogeneity between studies is further illustrated by the differing study designs, the measures used to assess depression, the temporal relationship of the risk factor to depression (cross-sectional or prospective associations), the wide array of risk factors studied and the varying definitions of each risk factor. A high level of heterogeneity has precluded the use of meta-analysis and has not allowed meaningful comparisons of the strengths of associations between risk factors and depression across multiple studies.

The design of the prospective studies has enabled the identification of risk factors for depression in ACS, however, only the main effects of these risk factors have been examined. There is insufficient evidence to determine from the current cardiac literature whether the simultaneous presence of multiple risk factors results in a cumulative increase in the risk of depression in cardiac patients.

Finally, this review may be further limited because it is based on findings from prior studies that have primarily examined risk factors that have been identified and studied extensively in psychiatric or community populations. A number of risk factors for depression in patients with heart disease may not yet be identified. The paucity of data regarding biomedical risk factors identified has further reduced the scope of this review to comment on their relationship with cardiac depression.

Conclusions.

This review was undertaken to address the question: What risk factors for depression have been identified in cross-sectional and prospective studies conducted in cardiac samples and what further supporting evidence can be found in the wider psychosocial literature? The purpose of the review within the context of the research project was to identify risk factors with a sound evidence base that may be included in a risk assessment questionnaire for use in an acute clinical setting. The risk factors were further assessed for clinical appropriateness and relevance to an adult population.

The literature review identified 50 risk factors found to be associated with depression in cardiac patients. From this a further 13 risk factors were identified as likely to be highly relevant in regard to the risk of developing depression following a diagnosis of ACS.

The strength of evidence has varied considerably between risk factors due to limited cardiac research. Some of the risk factors, for example a past history of depression, have an extensive research base and are strong, independent risk factors for the onset of depression. Other risk factors rely more on the psychosocial evidence and are relevant to cardiac depression because they are likely to play a mediating role or be more relevant to sub groups of cardiac patients, for example social support.

In conclusion, the review has successfully identified relevant risk factors for cardiac related depression. This review has represented an important initial stage in the development of a risk assessment questionnaire.

Chapter 3 – A Conceptual Framework

Introduction

This chapter proposes a conceptual framework in order to describe the complex relationship between depression and ACS (figure 3.1). This framework has guided the instrument development for this study. The framework presents two interrelated pathways leading to an increased risk of both depression and acute coronary syndrome. This broad approach has been taken with the purpose of clearly acknowledging the significant relationship between two discrete pathophysiological processes whereby depression is a risk factor for ACS and ACS increases the risk of depression. Within this framework, a narrower conceptual pathway of risk for individual ACS patients is described (figure 3.2).

The conceptual framework is based on current knowledge of the relationship existing between the two diseases. It is limited by our insufficient understanding of the biological, behavioural and psychosocial pathways thought to connect the depression and ACS. As noted in the preceding review of the literature, much of the research undertaken in this field to date has been correlational and therefore unable to provide the necessary strong evidence to establish causal links.

Risk Factors

The distal and proximal risk factors for depression are symbolised by the blue circle on the left hand side of the diagram. Evidence from the medical and psychosocial literature indicates that depression has multiple, complex and diverse risk factors and that these risk factors are highly correlated. It is generally acknowledged that depression may not have a single cause but is more likely to have a “causal chain” or multiple causal chains that include biological, psychological, environmental and social risk factors (Kraemer, Stice, Kazdin, Offord, & Kupfer, 2001).

The risk factors for cardiovascular disease have been symbolised by the yellow circle beneath the blue circle in the diagram. The majority of risk factors for

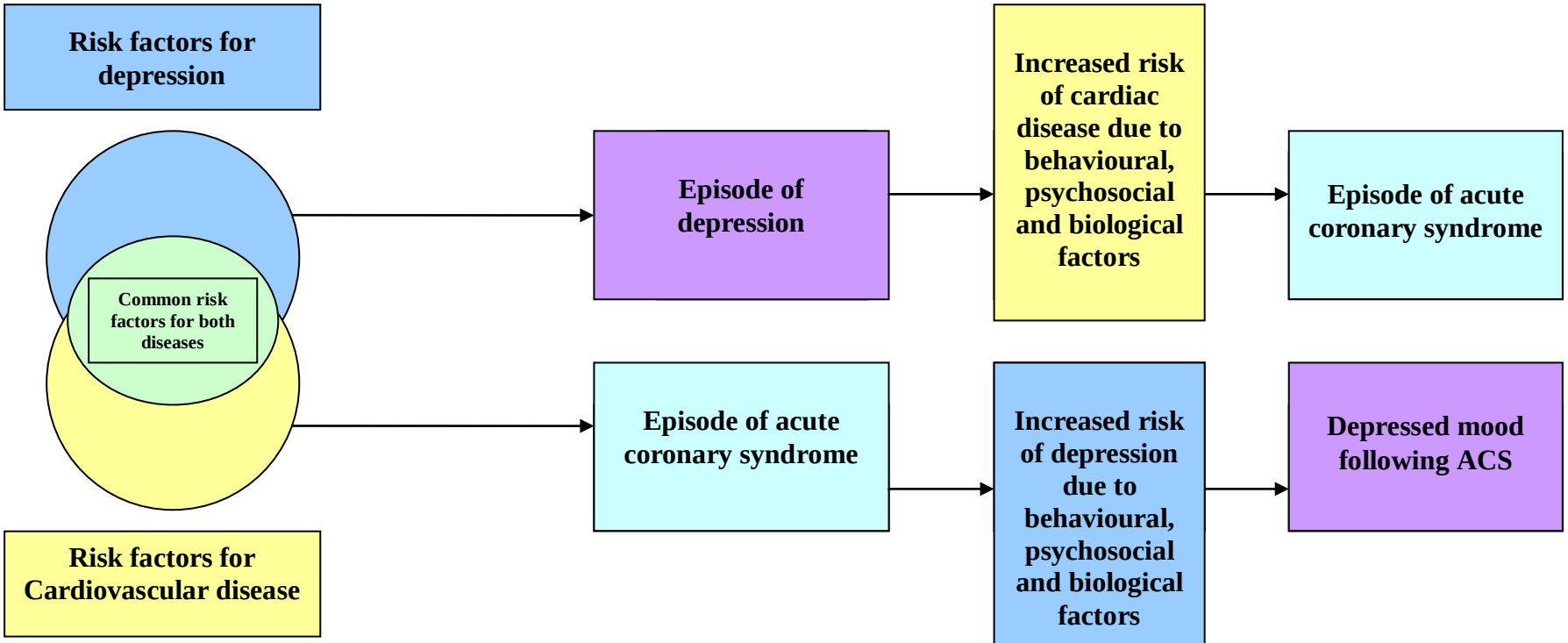
cardiovascular disease have been well described in the literature and include biological, social and behavioural factors. Significantly, many of the risk factors for depression are also risk factors for cardiac disease. This phenomenon has recently been described as "an intriguing and complex, bi-directional association" whereby psychological factors act as risk factors for cardiac disease and vice versa (de Jonge et al., 2010). Common risk factors are not confined to the psychological domain but can be observed across social, behavioural and biological domains (McCaffery et al., 2006; Smith & Blumenthal, 2011; Steptoe et al., 2003). The concept of common risk factors has been illustrated in the diagram by the green area indicating overlapping of the two risk factor circles.

An Antecedent Pathway – Depression Prior to acute coronary syndrome

There is extensive evidence that depression is strongly associated with the subsequent development of CAD (Hippisley-Cox, Fielding, & Pringle, 1998; Rozanski, Blumenthal, & Davidson, 2005). Results from meta-analyses have found similar rates of increased risk for the development of ischaemic disease in depressed but otherwise healthy people (Rugulies, 2002; Van der Kooy et al., 2007; Wulsin & Singal, 2003). Increasing data suggests that depression is not only associated with clinical CAD but also sub-clinical disease. Depression has been associated with the prospective development of carotid atherosclerosis, a marker of coronary atherosclerosis (Faramawi et al., 2007); (Haas et al., 2005; Stewart et al., 2007) and other biological markers indicating increased cardiac risk (Seldenrijk et al., 2010).

The diagram illustrates this pathway with a horizontal arrow pointing from the depression risk factor circle towards a purple box labelled 'depressed mood'. Subsequent arrows in the same direction point to a yellow box representing the presence of behavioural, psychosocial, and biological factors known to increase the risk of cardiovascular disease and finally to a box labelled 'episode of acute coronary syndrome'.

Figure 3.1
A diagram illustrating the theoretical relationship between depression and acute coronary syndrome



Note. ACS = acute coronary syndrome.

In clinical practice, the antecedent pathway may be demonstrated by the documented high levels of current cases of depression, symptoms of depression, or past history of depression found in patients admitted with ACS (Carney & Freedland, 2008; Lesperance et al., 2000; Thombs et al., 2006). Admission to hospital for ACS therefore presents a significant opportunity to screen for depression. As previously discussed, a prior history of depression or the presence of depressive symptoms in hospital are not only common but both are strong risk factors for future depression in ACS patients.

Consequence Pathway – Depression following acute coronary syndrome

Prospective studies observing the natural course of depression following ACS report an additional 10 to 20% of patients develop depression following discharge from hospital (Dickens et al., 2004; Lesperance et al., 1996; Travella et al., 1994).

This pathway is illustrated in the diagram by a horizontal arrow from the cardiac risk factor circle to a box labelled ‘acute coronary syndrome’. An arrow (left to right) points to a blue box representing the presence of psychosocial, behavioural, and biological factors thought to increase the risk of depression following ACS. It is these factors that have been identified through the systematic review and discussed in length in the previous chapter. A further arrow connects this box to a purple box labelled ‘depressed mood following ACS’.

This pathway is perhaps the most easily recognised in clinical practice. There is substantial evidence that patients following admission for ACS are at increased risk of developing sub-clinical depression, adjustment disorder with depressed mood, or major depression. Identifying the risk factors for developing depression following ACS is important because of the detrimental affect of depression on a patient’s quality of life and ability to modify cardiac risk factors in order to prevent further events. Furthermore, although there is insufficient evidence for a causal link, a strong, consistent association exists between depression and poor prognosis following a myocardial infarction (Meijer et al., 2011). Evidence suggests that a depressive episode, directly after an acute cardiac event, is the most significant factor in relation to cardiac prognosis (Parashar et al., 2006; Parker et al., 2008).

Common Underlying Determinants of Disease?

Whilst there is good evidence for the two pathways described in the conceptual framework, there is another explanation for the relationship between depression and ischaemic heart disease. Recent research focusing on the complex biological connections between the two diseases has lead researchers to propose a hypothesis that common underlying biological determinants are responsible for both diseases (Mosovich et al., 2008). In such a model the two diseases are two possible outcomes that result from a 'prior stress related insult to the body' and therefore a correlational association may exist between the diseases but no causal relationship. To date, there remains insufficient evidence to support this theory and therefore this possible pathway has not been included in the conceptual framework other than to note the common risk factors for both diseases.

A Pathway Illustrating the Concept of Risk of Depression for individual ACS patients

This section of the chapter narrows the focus from the broad framework, illustrating the relationship between depression and ACS, to the concept of risk related to depression at an individual level. The proposed conceptual pathway acknowledges that individuals may be vulnerable to depressive illness throughout their lives but that exposure to certain risk factors can precipitate depression in cardiac patients.

It is proposed that patients can be stratified into high or low risk groups by identifying their current level of depressive symptoms, past history of depressive illness, and other key risk factors for depression. This thesis argues the need for such risk assessment due to the well-documented deleterious effects of depression in post ACS patients (Meijer et al., 2011). Risk stratification provides an opportunity to intervene early with psychosocial support or treatment for patients in need that could lead to improved health related quality of life and mental health outcomes.

An individual admitted to hospital with an episode of ACS may have had recent exposure to risk factors for depression, such as a negative life event, or they may have been at risk of depression for many years due to psychosocial, behavioural

or genetic factors (Birmaher et al., 1996; Farmer, 2001; Lewinsohn et al., 1994a). This is illustrated in the diagram (figure 3.2) by the group of five blue figures on the left hand side of the page and the arrow pointing downwards from a blue box entitled ‘exposure to risk factors for depression’.

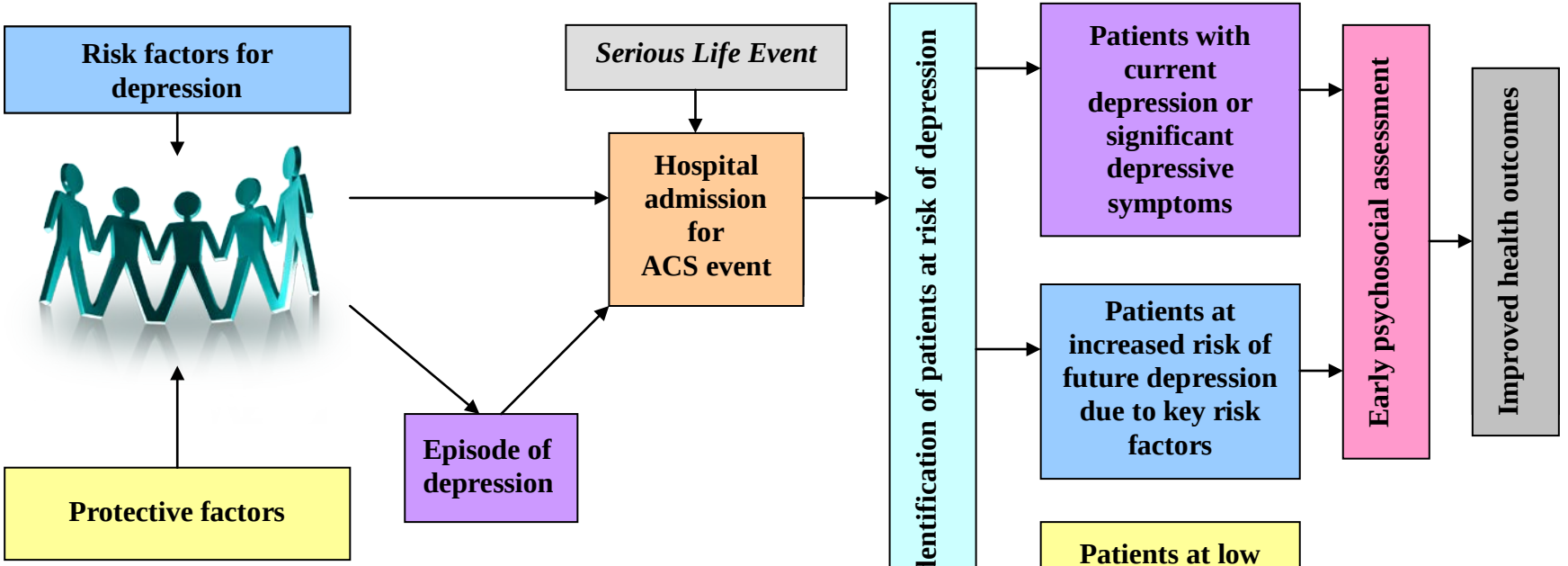
For some people exposure to risk factors will not necessarily lead to depressive illness due to other factors thought to protect the individual by mediating the risk of developing disease. This is illustrated by the arrow pointing from the yellow box with the title ‘protective factors’. However, some individuals will develop depression and may already have experienced a depressive episode prior to their admission or during their admission to hospital for ACS (Dickens et al., 2004). In order to convey this in the diagram, an arrow from the group points to a purple box with the title ‘episode of depression’.

An admission to hospital with a diagnosis of ACS can be viewed by individuals as a serious negative life event and is therefore a risk factor for depression in some cardiac patients (Kendler et al., 1998). This is illustrated in the middle of the diagram by an arrow from an orange box labelled ‘serious life event’ pointing to a box with the title ‘hospital admission for ACS event’.

An admission to hospital can be regarded as a crucial opportunity to assess an individual’s psychological health. Although hospitalization represents a stressful period for patients, an accurate assessment of past psychological health, level of current depressive illness, recent history of life events and other social factors can provide valuable insight into a patient’s future psychological well-being. Such knowledge can help nurses identify those patients most at risk of depression following discharge into the community.

Risk assessment is represented in the diagram (figure 3.2) by a vertical box coloured aqua blue and labelled ‘screening/identification of patients at risk of depression’. The stratification of patients into high or low risk groups is illustrated by three boxes, a purple box represented patients with current symptoms of depression, a blue box representing those patients with an increased risk of future depression, and a yellow box representing patients thought to be at low risk of depression.

Figure 3.2
A conceptual pathway illustrating the concept of risk for individual ACS patients



Note. ACS = acute coronary syndrome.

A key element of the proposed pathway is the opportunity for psychosocial assessment and intervention, not only for those with recognised depressive illness, but crucially for patients at risk of illness. This is a significant move away from a model of disease recognition and treatment by adopting a broader approach to psychological health for cardiac patients. Patients are not routinely identified as being at risk of developing depression in the cardiac setting, therefore it is not yet known whether early intervention with patients at risk of depression can improve medical or mental health outcomes. In the diagram, the psychosocial assessment is represented by arrows leading from the purple and blue boxes to a vertical box pink box labelled ‘early psychosocial assessment’. A further arrow points to a green box labelled ‘improved health outcomes’.

This chapter has presented an overarching conceptual framework to illustrate the interrelationship between depression and an ACS event. The presence of both antecedent and consequence pathways provide an explanatory theory to underpin depression screening and risk assessment in the acute cardiac setting.

Chapter 4 – Methods

Introduction

In this study both quantitative and qualitative research methods have been employed. Quantitative methods were used to develop and test the psychometric properties of the questionnaire and qualitative methods were adopted to explore contextual aspects related to depression screening in an acute cardiac setting. This chapter provides a detailed outline of the methods undertaken following the various stages of instrument development illustrated in figure 4.1.

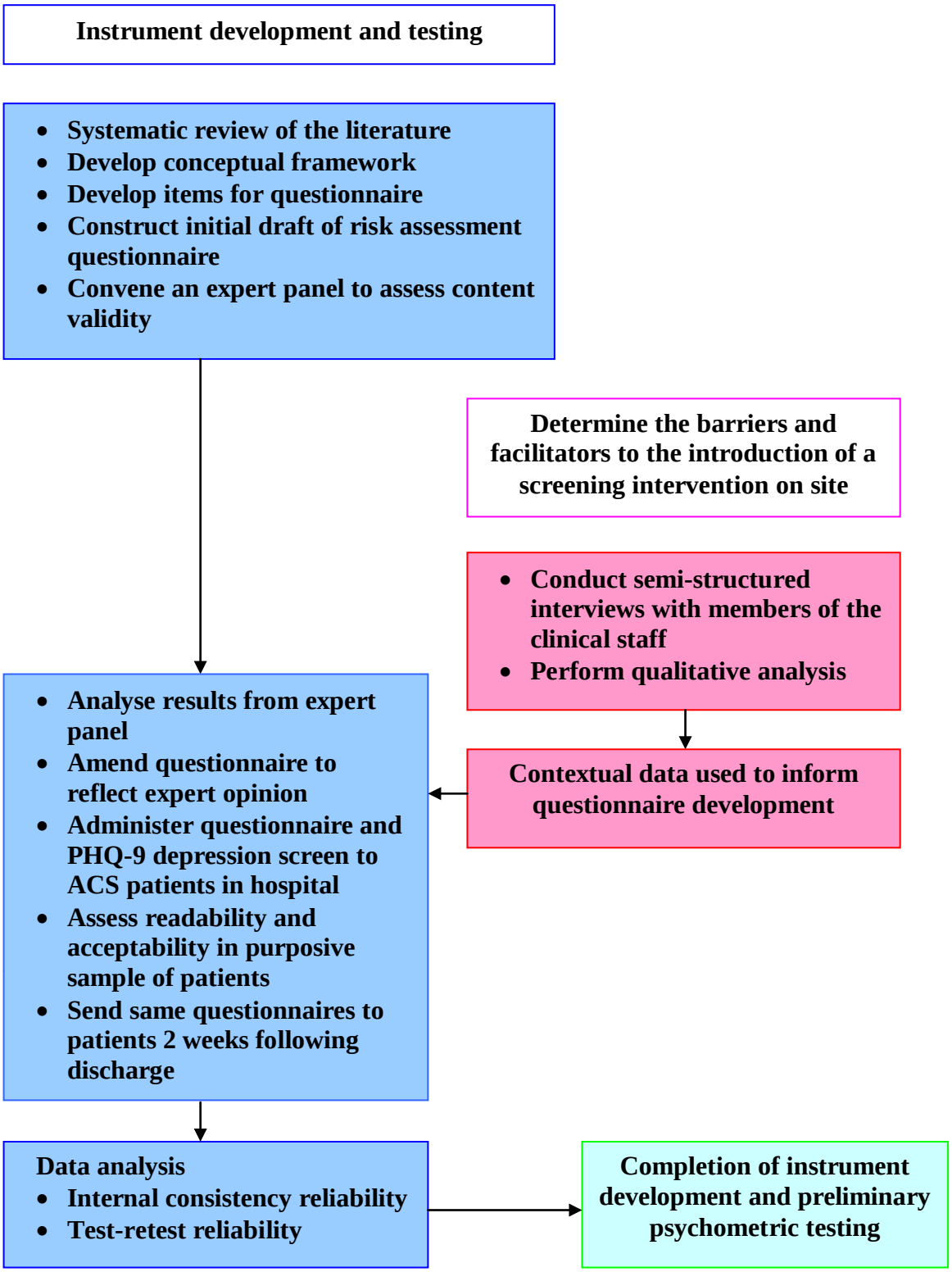
Rationale

A mixed method approach is a validated research method to explain phenomenon that are complex and multifaceted (Tashakkori & Teddie, 2003). According to Morse, (2003) different methods are best designed for, and used to answer, particular types of question. Combining and increasing the number of research strategies used within a particular project enables the dimensions and scope of the project to be broadened (Morse, 2003). This study is based on a multi-method design described by Morse (2003) as a combination of qualitative and quantitative projects that are relatively complete, but are used together to form essential components of one research program (Morse, 2003). This research project has incorporated a systematic review, qualitative interviews and data analysis, and questionnaire design methods.

There are a number of features specific to a multi-method design:

1. Each study is planned and conducted to answer a particular research question.
2. Data are not usually combined within projects.
3. The results of each method inform the overall research question.
4. The underlying methodological assumptions of each paradigm are recognised and adhered to.
5. The studies conducted may have an inductive or deductive drive depending upon the research question.

Figure 4.1
Schematic diagram of the research design



Note. PHQ-9 = Patient Health Questionnaire-9; ACS = acute coronary syndrome.

Instrument Development

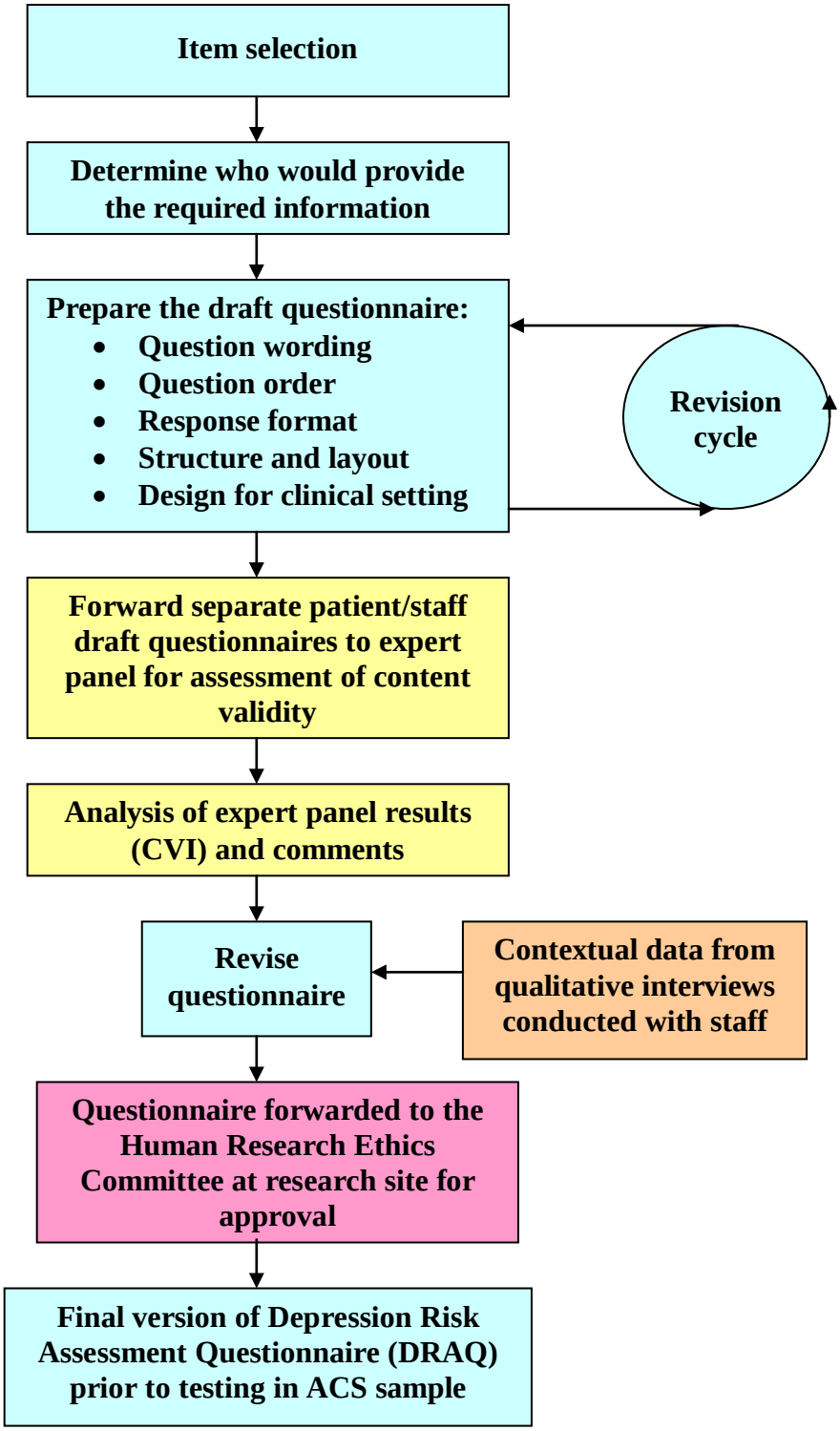
Content validity is recognised as a key factor in instrument development (Grant & Davis, 1997). Content validity concerns the degree to which a sample of items contained in a questionnaire constitute an adequate operational definition of the construct and is representative of the domain of content (Grant & Davis, 1997; Polit & Beck, 2006a). According to Polit and Beck (2006a) content validity is largely a matter of judgement, involving two phases: *a priori* efforts by the instrument developer to enhance content validity through careful conceptualisation and domain analysis prior to item generation, and *a posteriori* efforts to evaluate the relevance of the scale's content through expert assessment.

The methods undertaken in the development of this instrument have reflected the need to establish a high level of content validity. This instrument has been developed following a systematic review of the literature and critique of the evidence base as discussed in Chapter 2. The concept of depression related to ACS has been explored and a detailed conceptual framework has been outlined in Chapter 3. The following section describes the methods undertaken to create a draft questionnaire for expert panel review. The design process followed is illustrated in figure 4.2.

Design Process

The items considered for inclusion in the draft risk assessment questionnaire were based on the 13 risk factors identified following the systematic review and critique. Item generation is an iterative process requiring considerable refinement to wording and content (Rattray & Jones, 2007). During a period of several weeks draft versions of the tool were created, reviewed by clinical colleagues and amended in order to improve clarity of wording, structure and to assess Face validity. This process is illustrated in figure 4.2 as the 'revision cycle'.

Figure 4.2
Instrument design process



Note. CVI = Content Validity Index; DRAQ = Depression Risk Assessment Questionnaire; ACS = acute coronary syndrome.

First the items were divided into those that would be best answered by the patients themselves and those that would require clinical staff to source information from medical records. For example, an item regarding life events was identified as a 'patient' question whereas confirmation of a clinical diagnosis was regarded as more appropriately answered by members of staff. Initially all of these questions were contained within the same questionnaire but as separate components. During the revision cycle, the patient and staff questions were divided into separate questionnaires.

The type of question, language used and order of items may bias question response (Rattray & Jones, 2007) and this was taken into consideration during the design process. A closed question design was used for all of the items and sentences were worded to gain a 'yes' or 'no' response. An affirmative response indicated the presence of the risk factor. To allow patients to clarify their responses, a section for 'free text' was included at the end of the questionnaire.

Four questions regarding past history of mental health problems also requested more details if known by the patient. The sentences were kept as short as possible and used plain language for clarity. The order of questions was considered and the most important and least sensitive items were place at the start of the questionnaire.

In total 15 questions were included in the final draft of the patient questionnaire and seven questions in the staff questionnaire. The structure, layout and choice of question type were influenced by the need to consider a high level of clinical utility. All of the questions were included on a single A4 page for ease of administration for staff and to reduce the perceived response burden for patients.The final drafts of both questionnaires were forwarded to the expert panel for content review.

Expert Review.

Review of an instrument by a panel of experts is an important measure to enhance content validity (Polit & Beck, 2006a). The literature suggests that various criteria may be used to determine the 'expertise' of panel members including

relevant training, clinical or research experience related to the phenomenon of interest, and familiarity with the theoretical basis for the instrument (Davis, 1992; Grant & Davis, 1997; Grant & Kinney, 1992). The recommended number of panel members varies considerably in the literature and can be influenced by the level and range of expertise required (Grant & Davis, 1997), however, a minimum of three panel members is advised (Lynn, 1986).

The panel members invited to review the questionnaires were selected because of their clinical expertise and active research profiles. All had extensive clinical experience with cardiac patients and held professional qualifications related to mental health or cardiology. Four of the panel members also held academic appointments in universities in Australia or the United Kingdom. A further two members worked with The National Heart Foundation in Australia. Initially 11 people were invited to participate with eight agreeing to be members of the panel. The final panel consisted of two psychiatrists, two psychologists, one cardiologist, and three Registered Nurses with expertise in Cardiac Rehabilitation.

The eight panellists were sent an invitation to participate by email. A cover letter explained the purpose of the research, how the final questionnaire might be used in clinical practice and briefly outlined what would be required for participation (appendix D). To address the issue of consent, panel members were advised that by completing and returning the attached documentation the researcher would assume they had consented to participate. Participants were informed that they may be identified as panel members in the PhD thesis but that no specific data would be linked to them personally and they would not be identified in any subsequent publication. In addition to the cover letter, the panel members were sent a review document (appendix E) and the two draft questionnaires as email attachments (appendix F and appendix G).

To establish item content validity the panel of experts were asked to rate each item in terms of its relevance as a risk factor for depression in cardiac patients using a 4-point scale ranging from 1 (not relevant) to 4 (very relevant). Panel members were asked to provide recommendations for individual item revision in a ‘free text’ box under each listed item. To assess comprehensiveness the panellists were asked if any

significant risk factors were not represented in the questionnaires. The experts were also asked if they considered any of the questions to be redundant. In recognition of a paucity of data regarding ethnicity, experts were asked if they considered any particular ethnic group at increased risk of depression following ACS.

The content validity index (CVI) (Martuza, 1977) was computed for individual items (I-CVI). The I-CVI is calculated as the number of experts giving a score of 3 (relevant but may need minor alteration) or 4 (very relevant) divided by the total number of experts (Polit & Beck, 2006a). For a panel of at least 6 experts, 0.78 is considered acceptable (Lynn, 1986). Items were modified in response to the expert advice and removed if the I-CVI was not satisfactory. The content validity of the total instrument was assessed by calculating the scale-level content validity index (S-CVI). This was calculated by summing the individual I-CVI totals and dividing by the number of items in the instrument (Polit & Beck, 2006a). Thus far this chapter has described the research methods undertaken by the researcher whilst based at the university. The remainder of the chapter describes the research methods undertaken at a separate clinical site.

Research Setting.

The following research has been conducted in the Cardiovascular Medicine Department (CVMD) of a large tertiary referral hospital within the public health system of Western Australia (WA). The state of WA has a land mass of 2.5 million km^2 (ABS, 2007) and a population of approximately 2.3 million people (ABS, 2012). The hospital admits patients from the North Metropolitan Health Area in Perth and accepts transfers from regional hospitals throughout the state. Approximately 20% of patients admitted to the department reside in rural or remote areas of WA.

The CVMD provides advanced management of acute and chronic heart conditions. The cardiovascular invasive laboratory supports angioplasty, electrophysiology studies, pacing device implants and provides a 24-hour primary angioplasty service. In the 12-month period from 1st July 2010 to 30th June 2011, 928 ACS patients were admitted to the department. Of these patients 34% had a diagnosis

of USA, 46% NSTEMI and 20% STEMI. Percutaneous coronary intervention (PCI) was performed for 780 patients, 27% of these patients received primary PCI. Recent advances in medical therapy have reduced the average length of hospital stay for patients admitted with ACS to 72 hours, patients without complications could be discharged into the community after 48 hours of care.

Patients admitted to the department also receive support through the nurse-led, multidisciplinary Cardiac Rehabilitation and Heart Failure Services. The teams offer assessment, education, and counselling to patients during admission and following discharge into the community.

Ethical Approval.

The research described in this thesis has been submitted for ethical review and gained approval from the Human Research Ethics Committees (HREC) at both Curtin University (appendix H) and the hospital research site. The entire project was deemed too large to be reviewed for ethics approval at the site and the researcher subsequently obtained HREC approval for the project divided into two separate studies, the qualitative contextual data component (appendix I) and the questionnaire testing component (appendix J). Specific details regarding the ethical considerations for each individual research component are described separately.

Contextual Data - Determining the Barriers and Facilitators to Depression Screening at the Research Site.

Qualitative data was collected in order to gain insight into factors that may have influenced the assessment of patients for their risk of depression at the research site. This component of the study was conducted to address the following research objective:

> To determine the barriers and facilitators to the introduction of a screening intervention.

Sample.

Clinical personnel from the CVMD were approached to participate in the study. A purposive sampling strategy was adopted to allow the researcher to recruit participants that were able to contribute to the informational needs of the study (Polit & Beck, 2006b). This non-random method is often used to sample a group of people based on a particular characteristic or predetermined criterion (Bowling, 1999). For this study participants were selected because they were involved in the care of patients with a diagnosis of ACS. The sample included staff of varying experience and clinical role. Participants from the acute clinical area included two Consultant Cardiologists, two Senior Medical Registrars, and two Senior Registered Nurses. The remaining participants worked primarily with patients following discharge and included experienced Registered Nurses from the Cardiac Rehabilitation and Heart Failure Services.

The size of the sample (n = 10) was guided by data saturation, the point at which no new information was obtained and redundancy was achieved (Polit & Beck, 2006b). Redundancy may be achieved with a relatively small number of informants in studies where the scope of the research question is narrow and participants are able to reflect on their experiences and communicate effectively (Morse, 2000). The clinical staff were able to clearly define major barriers to depression screening in the department and identify various strategies that would facilitate depression screening. Recurrent major themes were identified in the interview transcripts indicating a high level of concordance of opinion amongst the members of staff. No new themes were identified from the tenth interview and therefore recruitment stopped at that point.

Ethical considerations.

A Participant Information Sheet and Consent Form were provided to the participants of the qualitative study (appendix K) and informed consent obtained. The information sheet advised the staff of the purpose of the study, why they were being asked to participate, and what their participation would involve. Confidentiality was a particular ethical issue given the relatively small number of

clinical staff working in the department. All personal data collected was kept confidential, and individual study documents, transcripts, and digital audio files were de-identified and coded with a study number. Study related information was stored on a password-protected computer accessible by the researcher alone. The Master Study Participation Log containing the names of participants and their allocated study numbers was kept separately in a locked cabinet within a private research office.

After completion of the data analysis, all study related material was archived within a secure archive room in the Heart Research Institute of WA located at the research site. This material will be archived on site for a minimum of five years and then archived in a secure archive facility off site in accordance with the Department of Health (WA) Retention and Disposal Schedule.

Data collection.

Staff members were recruited to the study over a 5 month period between 4th March and 27th August 2010. Following informed consent, a small amount of demographic and job related information was collected from participants. Interviews were conducted in a private office at the research site in an area separate from the CVMD. Qualitative data was generated by semi-structured interviews with individual participants. Semi-structured interviews are considered most suitable when a researcher knows enough about a topic to develop questions in advance of the interview, but not enough to be able to anticipate the answers (Morse & Richards, 2002). The researcher asked pre-determined, open-ended questions as indicated by an interview guide (appendix L). This technique of interviewing allowed the researcher to explore different aspects of the topic by using verbal probes such as what, where, when and how. The interviews were digitally recorded, saved as audio files, and subsequently transcribed verbatim by the researcher prior to analysis. Transcripts were saved as Microsoft Word documents.

Qualitative data analysis.

The interview transcripts were analysed using Framework Analysis (Ritchie & Spencer, 1994). This method of analysis has been specifically designed for applied

policy research where the aim of the research is to gather specific information with a potential to create actionable outcomes. Framework analysis is well suited to research that has specific questions, a limited time frame, a pre-designed sample, and *a priori* issues. Although Framework Analysis may generate theories, its prime objective is to describe and interpret what is happening in a particular setting.

The Framework Analysis technique is divided into five key stages:

- Familiarization
- Identifying a thematic framework
- Indexing
- Charting
- Mapping and interpretation

(Ritchie & Spencer, 1994)

During the initial stage of analysis the researcher became familiar with the data whilst listening to the audio recordings during the transcription process and through reading the final interview transcripts. At this point notes were taken when apparent themes were identified from the data. The second stage of analysis required the researcher to place the identified themes and issues into a thematic framework. According to Richie and Spencer (1994) this involves making judgements about the meaning, relevance and importance of issues and being aware of implicit connections between ideas. The identified themes were listed in a table in a Microsoft Word document. Specialised computer software was not used for this purpose because the data was relatively easy to manage using basic computer files and programs.

Indexing refers to the third stage of analysis where portions of data that correspond to individual themes in the framework are identified. Themes within the framework were given reference codes and individual transcripts were read again and codes attached to the relevant segments of data.

The fourth stage of analysis involved rearranging the coded data according to the relevant theme in the framework. This was achieved by creating charts for each key theme, for example all data related to the ‘barriers to depression identification’

was contained in a chart. During this stage data synthesis occurred and verbatim text data was summarised within the chart. The final stage, mapping and interpretation, involved analysing the data in order to define the core concepts related to the perceived barriers and facilitators to depression screening at the research site.

Issues of trustworthiness.

The concept of trustworthiness refers to the extent to which the findings are a true reflection of the personal or lived experiences of the phenomenon under investigation (Barbour, 1998). A number of strategies were employed within the study to address this issue:

- Transcripts were compared with the digital audio files and checked for accuracy.
- Notes of the data collection and analysis process were kept to provide a clear and transparent description of the methods used.
- Following analysis of the data, the results were presented to the staff that participated in the research in order to confirm the interpretation.

Instrument Modification and Psychometric Testing in a Clinical Population

The Expert Panel findings and the contextual data were reviewed and guided the creation of a single risk assessment questionnaire for patients. Items that failed to achieve a satisfactory CVI rating were removed leaving a total of nine questions. This questionnaire was then given the title Depression Risk Assessment Questionnaire (DRAQ) (appendix M). This version of the questionnaire was then submitted for HREC approval at the research site.

Following analysis of the contextual data it became apparent that it would be difficult to involve the staff further in the testing of a staff specific questionnaire due to clinical time constraints. Limited time available to perform depression screening was perceived as a significant barrier by clinical staff. This instrument was not developed further in this project but formed the basis of a separate research project

that has been commenced at the research site. Those items that had been included in the staff questionnaire involved confirming data from the patient's medical records. This data was subsequently collected by the researcher herself during the testing of the DRAQ in a sample of ACS patients.

Psychometric Testing of the DRAQ in a Clinical Population.

This section describe the methods undertaken in order address the following research aims and objectives:

To perform preliminary assessment of the psychometric properties of the instrument following application in a sample of ACS patients.

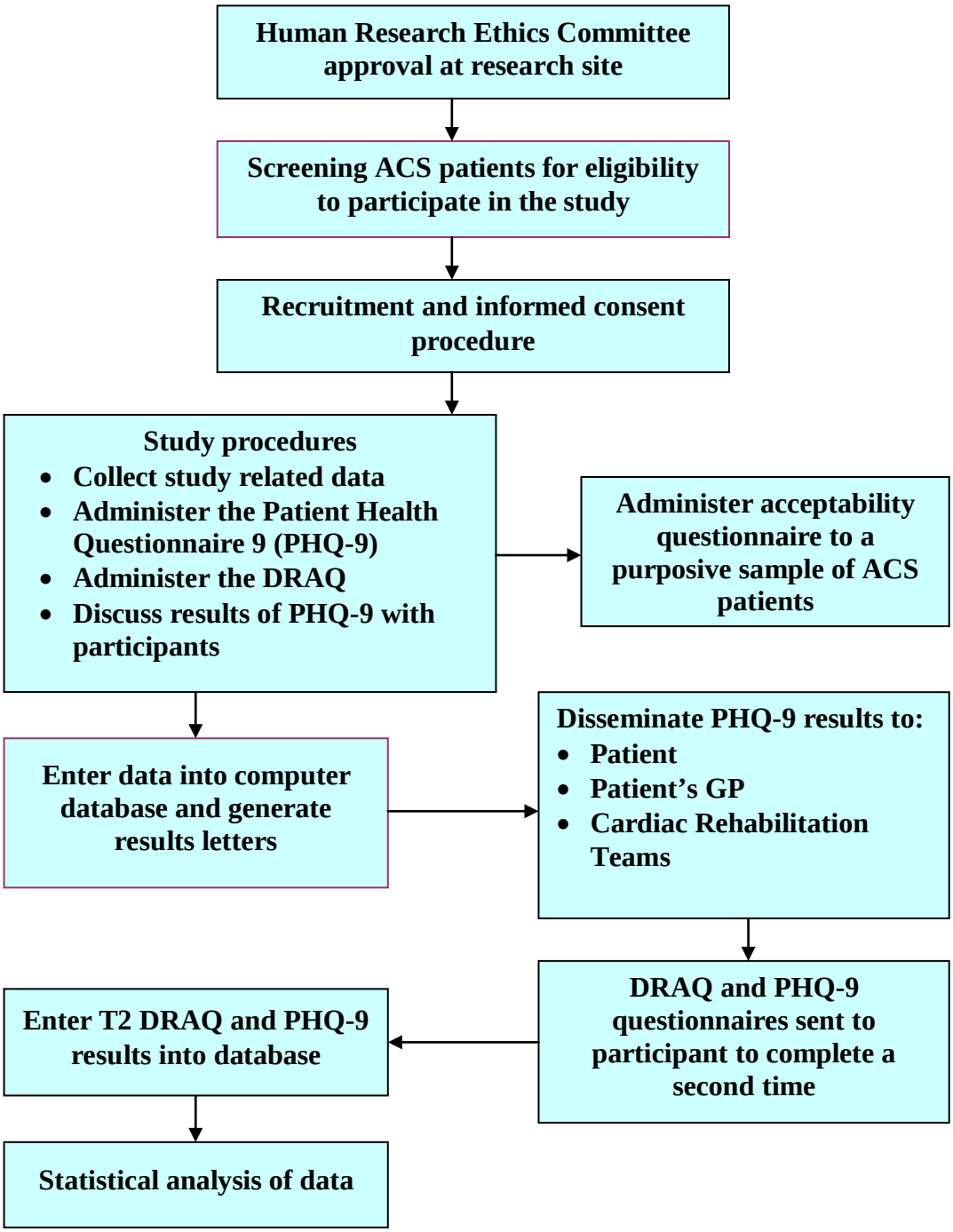
- To test the DRAQ for internal consistency reliability, test-retest reliability and structural validity.

To establish the extent to which patients find the questionnaire acceptable as part of clinical care.

- To establish the acceptability and readability of the DRAQ as perceived by a sample of ACS patients.

The study methods are illustrated in figure 4.3.

Figure 4.3
Schematic diagram of study methods



Note. ACS = acute coronary syndrome; PHQ-9 = Patient Health Questionnaire-9; T2 = time 2; DRAQ = Depression Risk Assessment Questionnaire; GP = General Practitioner.

Participant recruitment.

Consecutive patients admitted to the CVMD were screened for eligibility to participate in the study. Patients were eligible if they were admitted with a diagnosis of unstable angina, NSTEMI or STEMI, of either gender, aged 18 years or above and were able to provide informed consent. Patients were excluded if they were non-English speaking, unable to communicate or to read the questionnaire due to physical limitation. Patients with a head injury or suspected impaired cognitive function likely to affect informed consent or compliance were also excluded.

The researcher approached patients following confirmation of their diagnosis by clinical staff. The details of patients approached were recorded in the study screening log. If the patient was ineligible the reasons was noted in the log. During the recruitment period, 31st October 2010 to 21st July 2011, 348 patients were screened for the study.

A predetermined sample size of 220 participants was proposed and subsequently recruited to the study. It was anticipated that the sample size would be sufficient to enable statistical methods based on correlation to be used for psychometric testing of the questionnaire. Data from a minimum of 100 participants was required to enable a test-retest coefficient to be calculated.

Ethical issues.

The cardiac patients admitted to the CVMD were not routinely screened for depression either during hospitalisation or following discharge. In consultation with the Psychiatric Department and the Cardiac Rehabilitation Service, a plan for the clinical management of patients found to have depressive symptoms was developed and the details provided as part of the HREC application at the research site. Patients, their GPs and the Cardiac Rehabilitation Team were all advised of the results of the depression screening.

Participants were provided with both verbal and written information regarding the study. The Participant Information Sheet specifically included details regarding

the potential risks and any benefits of taking part, how data would be collected and stored, and clearly defined the patient's right to withdraw from the study without prejudice (appendix N). Patients were approached to participate during their admission to the coronary care unit (CCU), in the last days before discharge when their medical condition had stabilized. Patients were given verbal information about the study and then allowed to read the Participant Information Sheet themselves. The researcher returned later to answer any study related questions prior to obtaining written consent.

Permission to conduct the research within the CVMD was obtained as part of the Institutional and HREC approval process. Prior to recruitment the researcher presented the study protocol at a departmental meeting.

Study procedures.

Following the informed consent procedure, patients were asked to answer the questions contained in the DRAQ and The Patient Health Questionnaire - 9 (PHQ-9) (appendix O). The PHQ-9 is an established, brief, self-administered questionnaire that has been shown to have acceptable properties for detecting depression in hospitalized cardiac patients (McManus, Pipkin, & Whooley, 2005) and has been recommended for depression screening by the American Heart Association (Lichtman et al., 2008). This questionnaire was included because it was necessary to identify patients that had current symptoms of depression. The researcher marked and discussed the results of the PHQ-9 questionnaire with the patient. No results were given to the patient regarding the DRAQ because it has not been fully validated.

Demographic details and data regarding the patients past medical history, current smoking status and LVEF were retrieved from the patient's medical notes by the researcher using standardized data extraction methods. A purposive sample (N = 11) of participants were also asked to review the DRAQ in detail and complete a questionnaire to determine appropriateness. The participants were asked to complete the following questions regarding the nine individual DRAQ questions:

1. What is the meaning of the question?
2. How clear is the question?
3. How applicable is the question?
4. Are the possible responses appropriate?
5. Is this question embarrassing to answer?

Data were entered into a Microsoft Access Database in order to manage the data for study purposes. Data relating to the PHQ-9 were entered and used to generate results letters in order to inform patients, their GPs and Cardiac Rehabilitation staff of the results. Other data were entered into tables and later converted into spreadsheets for statistical analyses.

Test-retest procedure.

Test-retest reliability is used to establish that a questionnaire is capable of measuring a variable with consistency (Portney & Watkins, 2000, p. 67). The DRAQ and PHQ-9 were sent to the participant's home address two weeks following their discharge from hospital. The participants were asked to complete the questionnaires and return them in the stamped, addressed envelope provided. Returned questionnaires were reviewed and the data entered into the database for subsequent analysis.

Data analysis.

Following completion of the study, the database was examined for missing or inaccurate data by performing a 100% comparison between hardcopy study records and the electronic data. The data stored in Microsoft Access database tables were converted into Microsoft Excel spreadsheets for statistical analysis.

Raw data from 220 participants was analysed using the Statistical Analysis Software program, version 12.1. Standard demographics of the sample were calculated at T1 and T2 for both the DRAQ and the PHQ-9 questionnaires. Data from the PHQ-9 were analysed according to the level of depressive symptoms and counts and percentages obtained for mild, moderate, moderately severe, and severe

scores. These data were further analysed in relation to sex and past history of depression.

Internal consistency reliability, the extent to which all items measure a similar construct, was determined by calculating Cronbach's alpha for both the DRAQ and PHQ-9 questionnaires. Test-retest reliability, a measure of an instrument's precision over time, was calculated for the DRAQ using the kappa statistic, a *chance-corrected* measure of agreement.

Chapter 5 – Results

Introduction

The chapter is divided into three sections. The first section described the findings from the Expert Panel convened to assess the content validity, comprehensiveness and face value of the DRAQ. The second section describes the themes generated from qualitative analysis of contextual data. The final section describes the results of preliminary psychometric testing of the DRAQ to assess internal consistency reliability, test-retest reliability and readability.

Expert Panel Findings

An eight-member expert panel reviewed 22 items for content validity. Items were divided into two categories, those items for inclusion in a questionnaire designed for patients to complete (n = 15) and those items for inclusion in an instrument designed to confirm medical information to be completed by staff (n = 7).

Items were given a rating between 1 - 4 by the experts and the content validity assessed by calculating an I-CVI score (appendix E). This was achieved by calculating the number of experts rating an item 3 or 4 (relevant; very relevant) divided by the total number of experts (Polit & Beck, 2006a). Items that scored below 0.75 were considered to have failed to reach a satisfactory level of content validity. A total of seven unsatisfactory items were discarded from the patient questionnaire leaving a total of 8 items (table 5.1) and two items were discarded from the staff instrument leaving a total of 5 items (table 5.2). Minor word revision was undertaken for six items. No further items were removed due to redundancy.

One item, “Are you an Aboriginal or Torres Strait Islander person?” failed to reach a satisfactory level of content validity (I-CVI = 0.66) but was not discarded from the patient questionnaire (item 11, table 5.1). The item was retained because two of the international exert panellists stated that they were not familiar enough with the literature to fully comment on the item and did not give a rating for the item at all. In total, four of the remaining six experts scored the item as relevant or very relevant.

Table 5.1
Content validity index scores per item (Patient questions)

Question number	Number of experts in each response category				Content Validity Index
	not relevant	unable to assess without item revision	relevant but may need minor revision	very relevant	
1.	0	1	3	3	0.86∗
2.	0	2	4	2	0.75
3.	0	0	2	6	1.00
4.	1	0	5	2	0.88
5.	1	3	4	0	0.50
6.	0	3	3	1	0.57∗
7.	2	1	0	4	0.57∗
8.	2	2	2	2	0.50
9.	0	4	3	1	0.50
10.	1	2	4	0	0.57
11.	1	1	1	3	0.66∗
12.	1	6	0	1	0.14
13.	1	1	2	4	0.75
14.	0	1	3	4	0.88
15.	0	1	5	2	0.88

Note.∗ = CVI calculated with fewer than eight expert panellist's responses.

Table 5.2
Content validity index scores per item (Staff questions)

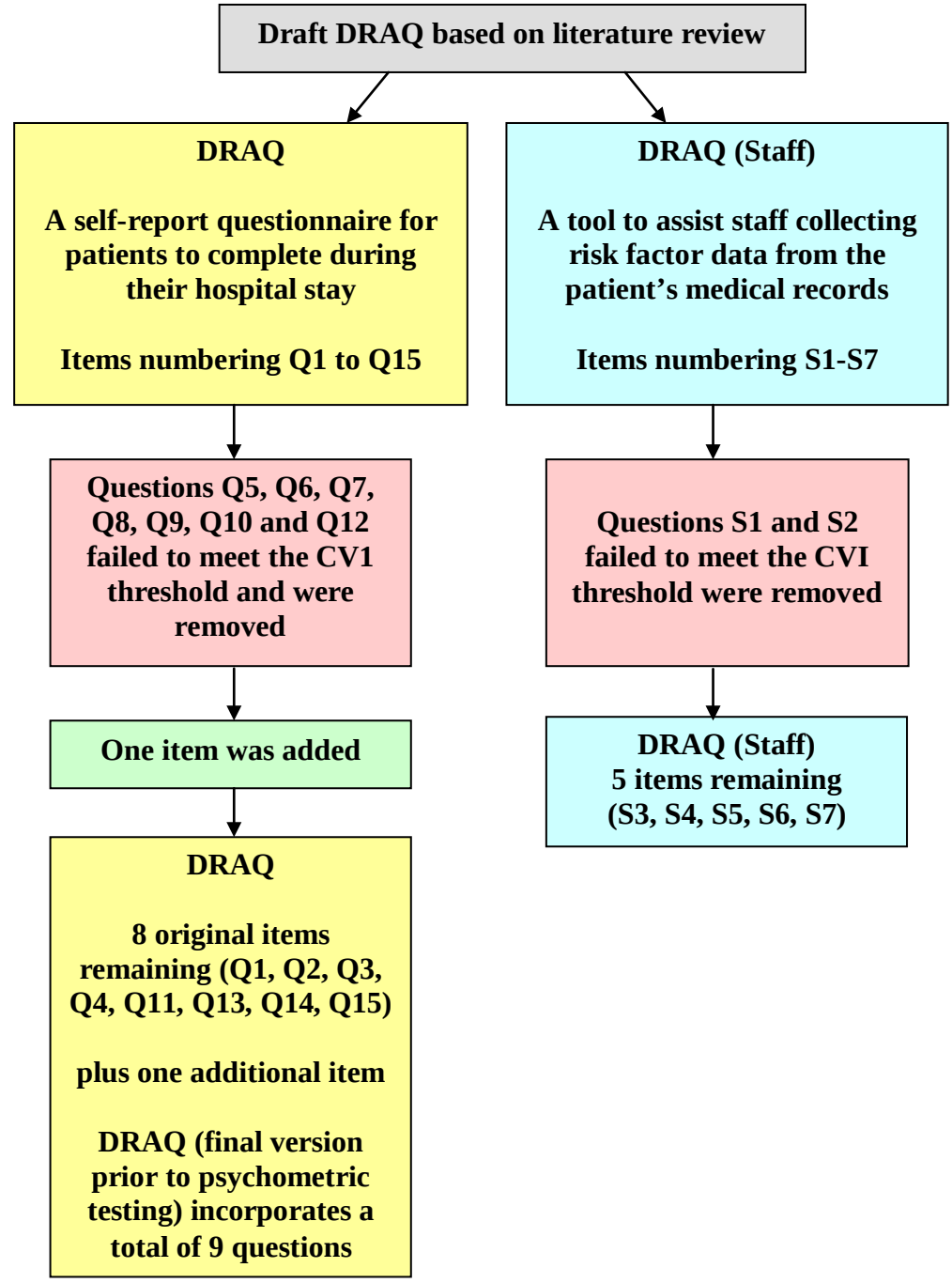
Question number	Number of experts in each response category				Content Validity Index
	not relevant	unable to assess without item revision	relevant but may need minor revision	very relevant	
1.	1	2	3	2	0.63
2.	1	1	3	3	0.63
3.	0	1	4	3	0.88
4.	0	2	4	2	0.75
5.	0	1	3	3	0.86∗
6.	0	0	0	8	1.00
7.	0	0	1	5	1.00∗

Note.∗ = CVI calculated with fewer than eight expert panellist's responses.

Following the removal of items that failed to meet the CVI threshold, the content validity of each instrument was assessed by calculating the S-CVI. This was calculated by summing the individual I-CVI totals and dividing by the number of items in each instrument (Polit & Beck, 2006a). The S-CVI for the eight-item patient questionnaire was 0.83 and the S-CVI for the five-item staff instrument was 0.90. A S-CVI of 0.80 or higher is considered an acceptable level of content validity for a total instrument (Davis, 1992; Grant & Davis, 1997).

In order to assess comprehensiveness, experts were asked to comment on whether any significant risk factors for depression in people with heart disease were not represented. Seven of the eight panellist suggested risk factors that might be included, however, there was no consensus between the experts on any of these items. One item asking the patient whether they had been prescribed antidepressant medication was added to the DRAQ making a final total of nine questions. The other suggestions were carefully reviewed, however, further items were not included because assessing the risk factor would be difficult in the acute clinical environment or the risk factor was not supported by sufficient evidence relevant to an acute coronary syndrome population. Following the item amendments, two related instruments were created, a nine-item instrument for patients (appendix M) and a five-item instrument for staff. This process of item selection lead to the formation of a provisional DRAQ as is illustrated in Figure 5.1.

Figure 5.1
A figure illustrating item selection included in DRAQ following expert panel review



Note. DRAQ = Depression Risk Assessment Questionnaire;
CVI = Content Validity Index.

Findings from Contextual Data Analysis – Barriers and Facilitators to Depression Screening

The aim of this research has been to develop a brief screening instrument designed to assess the risk of developing depression that can be used by clinical staff in the acute healthcare setting. To address the need for a high level of clinical utility it was considered important to develop an understanding of the clinical context in which the instrument would be used. This section describes the findings from a qualitative review undertaken to define current practice and perceived barriers or facilitators to depression screening.

Study Participants.

Ten members of clinical staff with varying professional roles and length of service were recruited. Participant's characteristics are listed in Table 5.3. Data were obtained from ten semi-structured, individual interviews. The interview question guide is shown in appendix L. Participants were asked to respond to the interview questions based on their own professional experience gained whilst working in the Cardiovascular Medicine Department at the research site.

Thematic Framework.

Analysis identified themes related to three core categories; current clinical practice, perceived barriers to identifying depression, and perceived facilitators to identifying depression through screening. The categories, themes and subthemes identified from the data are illustrated in figure 5.2. In total 12 main issues related to current practice and barriers or facilitators to the implementation of depression screening were identified. The findings of the analysis indicated strong associations between the lack of a systematic depression screening process and perceived time constraints, poor access to psychiatric support services, and lack of mental health related skills and knowledge. The lack of knowledge about depression and research related to patients with CAD was also reflected in the staff identifying education and strong evidence as a prerequisite for the successful implementation of a screening programme.

Table 5.3
Participant characteristics

Participant Number	Age (years)	Gender	Professional role	Length of service (years)	
				CVMD	Total cardiac experience
1.	33	M	Senior Registrar	2	6
2.	34	M	Consultant Cardiologist	5	8
3.	48	F	Cardiac Rehabilitation Nurse	7	12
4.	53	F	Cardiac Rehabilitation Nurse	1	1
5.	43	F	Cardiac Rehabilitation Nurse	1.5	6
6.	27	F	Cardiac Rehabilitation Nurse	2	6
7.	43	F	Clinical Nurse	18	18
8.	32	M	Senior Medical Registrar	1.5	5.5
9.	35	F	Clinical Nurse	11	12
10.	61	M	Consultant Cardiologist	23	36

Note. CVMD = Cardiovascular Medicine Department (Research Site)

Figure 5.2
Development of categories using Framework Analysis

<table>
<tr><td colspan="3">Initial analysis:
Immersion in the raw data in order to become familiar with the range and diversity of data.</td></tr>
<tr><td>Setting up a thematic framework:
23 themes and subthemes identified and sorted into 3 core categories
• Issues related to current clinical practice
• Perceived barriers to depression screening
• Perceived facilitators to depression screening</td><td>Themes
• Lack of systematic identification of depression
• Lack of psychiatric liaison support
• Reliance on GPs for depression management
• Time constraints
• Limited human resources
• Stigma
• Change management issues
• Perceived lack of mental health related skills
• Staff support for depression screening
• Strong nursing leadership
• Programme development issues</td><td>Subthemes
Patients not identified as depressed
No appropriate tools used
Short length of stay in hospital
Access to patient for screening
Medical care is regarded as priority
Society’s role
Role of patient denial
Need for staff education
Need for strong evidence base for screening
Requires a clear clinical management plan
Screening must lead to improved outcomes
A person is required to drive change</td></tr>
</table>

Indexing:
Systematic application of the thematic framework to portions of textual data. Individual transcripts were read again and codes attached to segments of data.

Charting:
Data synthesis occurred and verbatim text data was summarised within individual charts.

Mapping and interpretation of the data:
Finding patterns, associations, assessing the salience and dynamics of issues to provide explanations for the findings.

12 major issues were identified with numerous associations between issues evident.

Practice related issues
Lack of a systematic approach to identifying depression

Lack of access to specialised psychiatric support services

Barriers to screening
Perceived time constraints and workload issues for nurses

Unknown impact of stigma related to screening for depression

Staff's perceived lack of mental health related skills

Perceived lack of knowledge related to depression in cardiac patients

Facilitators to screening
Strong support for screening from all staff

Strong nursing leadership

Staff identified requirements for change:

Screening must lead to improved outcomes and a management plan

Staff education needed

A strong evidence base required to change practice

Change facilitator needed

The themes and subthemes are described in the following section, including text quotations identified by the appropriate participant code.

Current clinical practice.

Lack of systematic identification of current depression.

Participants reported differing methods of determining whether a patient was depressed on admission to the department and how successful the strategy was in identifying depressed patients. Clinical nurses referred to their admission procedures:

> "On our initial assessment questionnaire and risk factor questionnaire we ask the patients if they have a history of depression or anxiety and I think confronting people with that question often gives you the answer" (P9).

The senior medical staff reported a less formal approach:

> "It would not be very often that you would formally assess it (depression) so it would really be the very obvious patient that's clearly apparently depressed or the family tell us that they think that they are depressed and that would be the only assessment of it at that stage" (P8).

> "With regards to picking up depression in the patients as they arrive, we usually just pick it up from what they describe as their history and from what medicines they are on… which is probably not enough but that's the way we do it" (P2).

The cardiac rehabilitation nurses voiced their concerns that depressed patients were not being identified:

> "Patients 'slipping through the net'. A lot of these patients … the reason why they have the risk factors they have…so they're smoking, they are overweight…may be down to the fact that they are depressed …on a

general basis, these patients are… as the process is, the patients are not being picked up" (P3).

Cardiac rehabilitation staff pointed to the lack of an assessment tool to aid identification of depressed patients:

"It would be good to have some sort of questionnaire to ask…when the patients go to their GP, the GP has an assessment tool…we don't have that and we don't use anything…just go on anecdotal. … it's very difficult to ask every single patient that comes through the door because there is a high turnover of patients but I think it would be good to have some sort of assessment tool" (P3).

Lack of psychiatric liaison support.

Both senior medical staff and cardiac rehabilitation staff described difficulty accessing specialised psychiatric support services for patients during admission and following discharge:

"…unless they are so depressed they are a threat to themselves…they're going to abscond…we probably wouldn't get psych (psychiatric liaison services) involved…we certainly don't have ready access to an inpatient psychologist… not in that time frame so basically it gets ignored" (P2).

"I can't do anything, my hands are tied…I can't refer them anywhere independently so now the only thing I can actually do is direct them back to their GP… I have not got any other avenues to refer the patients to. I guess we used to have a clinical psych (psychologist) that we could refer them to but we haven't got that avenue now" (P5).

Reliance on GPs for depression management.

There was a general concern reported that, whilst there was a reliance on GPs for the management of depression in the community setting, not all GP's were interested in the on-going care of depressed patients:

> "I suppose you can always leave them (the patient) with their GP but that depends on whether the GP is interested in following up and managing depression.., you know, some are and some aren't, that would be a shortfall I would think" (P1).

Perceived barriers to identifying depression.

Time constraints.

A lack of available time was cited as a major barrier to formally identifying depressed patients both in hospital and following discharge. Time constraints were thought to impact in a number of ways. Firstly, patients would not develop depression during their short stay in hospital but were more likely to become depressed following discharge:

> "Part of the problem is their short stay… our turnover is pretty quick, it's three days so someone is likely to get depressed after they are discharged from hospital… it's likely they are going to get depressed after they leave hospital or become depressed when they lose the support of being in hospital" (P1).

The short length of stay in hospital also reduced the time available for all staff to complete patient education, perform nursing care or medical procedures. This was thought to impact on both the time available for staff themselves to talk to patients but also time available when a patient was 'free' to talk:

> "I think staff time is what I'm thinking but also sometimes access to be able to interview the patients. There might be a procedure or they are

speaking to someone else… relatives or….just like with any screening that you do for patients" (P6).

The participants reported the need to prioritise patient care because of time constraints:

"To be honest we don't concentrate on it at all. We don't do any work on depression as inpatients… the length of stay now is so short and we concentrate so much on getting the medical stuff sorted out and some education that we …I don't think that we make any effort at all into it" (P2).

"I think it's 'level of priority' …I don't know that I've ever heard a doctor on an assessment ask a patient specifically (about depression) and the only time most nurses would bring it up would be on the assessment (when completing the cardiac risk factor assessment form) so it's certainly not a daily thing" (P9).

"Even my work load… I… touch on it (depression) and I talk to people about it but I'm trying to get through a phone call (to a patient in the cardiac rehabilitation programme) so I can phone the next one. I don't spend ages discussing the 'touchy, feely things'. I've got a big list of things I've got to go through" (P5).

Limited human resources.

Both medical staff and nursing management participants' raised the issue of nursing workload as a potential barrier:

"…workload for the nurses is one issue…obviously, every unit is different but I think you would be able to do it … you would miss a few people based on the fact that the nurses get busy" (P1).

The high percentage of nursing staff working part-time was also reported as a barrier to the delivery of education and likely to impact on the introduction of new procedures:

> "…the need for education… the big challenge…you know there's 55 nurses in CCU now because there's 80% part-time work force…so it takes you time to get around all those nurse" (P7).

Stigma.

Participants described the stigma associated with mental illness as a significant barrier to the recognition of depression:

> "We live in a society where it's still frowned upon to have a mental health condition and we need to knock down those barriers first and make it wide open in the community to say that if people have got this it's ok, that there's treatment, that there is help out there, support out there" (P4).

Participants also reported that some patients experienced difficulty acknowledging a diagnosis of depression:

> "To admit depression is like admitting that they're weak or something and they think this is all an acute thing (admission for ACS) and the practitioners (GPs) who should be dealing with that…picking it up…are probably not skilled and I always feel if you mention a psychiatrist to them (the patient) it's like a red flag and they think they've been 'pigeon holed' with the diagnosis and they really don't like that" (P10).

Change management issues.

Staff described a lack of knowledge about depression in relation to ACS and the need for a strong evidence base in order to support a change of practice in the department:

> "…part of the barriers I think is education as to why you are doing it, what the importance is. Probably we don't learn enough about depression and its relation to ACS so we don't think about it and we don't probably perceive it as important as it is… the 'clinical importance', getting the education out there is an important thing" (P2).

> "I think for clear cut evidence, medical evidence, like published in major journals that kind of thing then it's (new clinical practice) very quickly taken up. …you'd want to see the evidence… especially in cardiology… if there's evidence for it you do it…if there's no evidence for it you don't do it. That's very important" (P8).

Perceived lack of mental health related skills.

Consultants, clinical nurses and cardiac rehabilitation staff expressed concern that they lacked appropriate skills:

> "I previously had a patient on the telephone that was threatening to do harm and I have no ability to cope with that…. I certainly don't have the skills, I think, to deal with that sort of reaction" (P3).

> "I don't think personally most of us Consultants are actually skilled to delve more into it so at the moment I think probably the best way would be to apply questionnaires to patients… the biggest problem that I have with it is that you've got to then do something about it" (P10).

> "I think a lot of staff aren't comfortable discussing depression (with a patient)" (P9).

Perceived facilitators to identifying depression through screening.

Support for screening from staff.

Staff indicated that there would be support for the introduction of depression screening in the department:

> "I don't think you'd get any negative feedback from the staff. I think the nurses would be quite open to it …and the doctors would as well" (P1).

> "I don't see it as a major barrier to adding a depression screening tool into the admission. You may get a little bit of resistance from the nurses but as long as it's streamlined and it's not a major inconvenience to them… then I think that wouldn't be an issue" (P2).

Strong nurse leadership.

Senior clinical nurses were viewed as strong advocates for change in the department:

> "I think locally, certainly the CNS (Clinical Nurse Specialists) are good change advocates" (P9).

> "I think strong leadership from the nursing side of things. The nurse managers, they have a pretty tight reign on how things are run" (P1).

Programme development issues.

Participants suggested three important issues related to the development of a depression screening intervention in the department; the need for a clear depression management plan, the need to demonstrate to staff the link between depression and improved patient outcomes, and the need to have a dedicated person to 'drive' the change in practice:

> "…you need the doctors on side because the nurse is going to come with a score…whatever the scoring system is… so there needs to be a plan in place, everyone needs to have a clear idea of the algorithm …if you get this result, this is what you need to do".

> "…if you just ask people (staff) to instigate something they are often resistant to change but if you actually 'sell it' as …this is going to make a change to patient's quality of life and reduce the risks of them returning to hospital …then usually, if you work with the staff you will get the positive results" (P3).

> "I think if you wanted to do depression screening in the department you would have to have a dedicated person who's going to take that responsibility for getting the ball rolling… you have to give education sessions to the nurses …and somebody's got to evaluate it in 3 months… if there's somebody 'policing' it…facilitating, it is probably a better word …'driving it' then once it becomes a norm, we'll do it" (P5).

Psychometric Properties of the DRAQ

This final section of the chapter describes the results of preliminary psychometric testing of the DRAQ to assess readability, internal consistency reliability, and test-retest reliability. The data were obtained from 220 ACS participants admitted to the CVMD with a diagnosis of ACS. Test-retest reliability was based on data obtained from 136 participants who completed the DRAQ at two time points; during admission and two weeks following discharge. In addition, eleven participants were invited to respond to a questionnaire designed to assess readability and acceptability of the DRAQ.

Participant Characteristics.

Participant characteristics data derived from the DRAQ at time 1 and time 2 are shown in Table 5.4. Data collected from the medical records of participants by the researcher during admission are shown in Table 5.5. The sample of 220

participants had a mean age of 61 years at time of consent (minimum 21.5; maximum 87.6; SD 11.4). Gender was unequally distributed with females representing 22.7% of the sample. The majority of participants lived within the metropolitan boundaries of Perth (69%) and approximately one quarter of the participants reported living alone (26.3%). All participants were recruited during a hospital admission for ACS. Only a small number of the participants had a diagnosis of UA (6.36%), the remaining participants had a diagnosis of AMI (NSTEMI = 56.82%; STEMI = 36.82%). LVEF was measured during echocardiogram and was routinely recorded in the clinical report. Not all participants required an echocardiogram for clinical reasons therefore the data for LVEF in not available for the entire sample.

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Table 5.4
Participant characteristics (self-report, DRAQ) at time 1 and time 2 data collection points)

Characteristic	Time 1 (*n* = 220) Count	Time 1 (*n* = 220) Percentage	Time 2 (*n* =136) Count	Time 2 (*n* =136) Percentage
Living alone	58	26.36	31	23.31
ATSI	10	4.55	3	2.26
Self-report history of depression	59	26.82	31	23.31
Self-report history of antidepressants	52	23.64	33	24.81

Note. ATSI = Aboriginal or Torres Strait Islander person.

Table 5.5
Participant data collected from medical records at time 1 and time 2 data collection points

Characteristic	Time 1 (*n* = 220) Count	Time 1 (*n* = 220) Percentage	Time 2 (*n* =136) Count	Time 2 (*n* =136) Percentage
Female gender	50	22.73	29	21.32
Current smoking	68	30.91	32	23.53
Lives in Perth	152	69.09	94	69.12
NSTEMI	125	56.82	75	55.15
STEMI	81	36.82	52	38.24
UA	14	6.36	9	6.62
History of MI	38	17.27	22	16.18
History of CABG	17	7.73	9	6.62
CHF on admission	17	7.73	8	5.88

Note. NSTEMI = Non ST elevated myocardial infarction; STEMI = ST elevated myocardial infarction;
UA = unstable angina; MI = myocardial infarction; CABG = coronary artery bypass graft; CHF = congestive heart failure.

Assessment of depressive symptoms.

The PHQ-9 was completed by all 220 participants during admission in order to define the current level of depressive symptoms in those participants. The presence of current depressive symptoms is a strong risk factor for future depression.

In the PHQ-9 questions one to nine relate to depressive symptoms or 'problems' experienced during the previous two weeks. The severity of depressive symptoms was determined by the length of time a participant reported experiencing the 'problem'. Each question received a possible score ranging from 0, not experiencing the problem at all, to 3, experiencing the problem nearly every day (Table 5.6). The total scores were interpreted as recommended by the questionnaire authors (Kroenke, Spitzer, & Williams, 2001) (Table 5.7).

Table 5.6
PHQ-9 scoring method for severity determination

Length of time 'problem' experienced	Score
Not at all	0
Several days	1
More than half of the days	2
Nearly every day	3

Table 5.7
PHQ-9 interpretation of total score

Total questionnaire score	Depression severity
0 – 4	Minimal depression
5 – 9	Mild depression
10 – 14	Moderate depression
15 – 19	Moderately severe depression
20 – 27	Severe depression

Depression severity scores for the entire sample during hospital admission (T1) are reported in Table 5.8.

Table 5.8
PHQ-9 Depression severity scores

Level of depressive symptoms	Time 1 (*n* = 220) Count	Percentage
No significant level	107	48.64
Mild level	55	25.00
Moderate level	25	11.36
Moderately severe level	19	8.64
Severe level	14	6.36

Over half of the participants recorded scores indicating at least mild levels of depressive symptoms. Of this group, 25% scored between 5 - 9 points indicating a mild level and the remaining 26% scored 10 or above indicating moderate to severe levels of depressive symptoms (Table 5.7). A quarter of the sample reported having previously been told by a doctor that they had depression and 23% of the sample had been prescribed antidepressants by a doctor in the past. Depressive symptoms were unequally distributed between genders (Table 5.9). The sample is representative of a broad range of depressive symptoms. The clinical management of participants identified as possibly suffering depression based on the PHQ-9 was managed as described in the Ethics section of Chapter 4.

Table 5.9
PHQ-9 Depression severity scores by gender

	Time 1 (*n* = 220)			
	Male		Female	
Depressive symptoms	**Count**	**%***	**Count**	**%****
No significant level	90	52.94	17	34
Mild level	42	24.70	13	26
Moderate level	18	10.58	7	14
Moderately severe level	11	6.47	8	16
Severe level	9	5.29	5	10

Note: * = percentage of all males in the sample; ** = percentage of all females in the sample.

Psychosocial variables.

Data about psychosocial variables of the sample were obtained from the DRAQ during admission (T1). Nearly half of the sample reported recent events that had caused them to feel depressed prior to their admission for ACS. An equally high level of participants reported often feeling anxious. Approximately one quarter of the participants reported living alone (26.3%) but a relatively few participants reported a lack of emotional support from friends or family (Table 5.10).

Table 5.10
Psychosocial variables (self-report, DRAQ)

	Time 1 (*n* = 220)	
Psychosocial variable	**Count**	**Percentage**
Self/family life event in past 12 months	105	47.73
Reported often feeling anxious	106	48.18
Other mental health problems	7	3.18
Lack of friend/family for emotional support	13	5.91
Living alone most of the time	58	26.36
Reported heart condition would negatively impact their financial situation	54	24.55

Internal Consistency Reliability.

Internal consistency reliability of the DRAQ was determined by calculating the Cronbach's alpha for the instrument based on both raw and standardised variables (Table 5.11). This statistic evaluates the items in a scale to determine whether they are measuring the same construct (Portney & Watkins, 2000). The value of Cronbach's alpha is affected by the number of the items in a scale. The longer the scale, the more homogenous it will appear due to the larger number of items (Portney & Watkins, 2000). The value of alpha will be reduced in an instrument with fewer items (Cortina, 1993; Nunnally & Bernstein, 1994).

Reported alpha values indicating acceptable levels of internal consistency reliability range from 0.70 to 0.95 (Bland & Altman, 1997; De Vellis, 2003; Nunnally & Bernstein, 1994). The Cronbach's coefficient alpha for the DRAQ was calculated as 0.71 based on raw variables and 0.68 based on standardized variables and can be considered to have an acceptable level of internal consistency reliability (De Vellis, 2003).

Temporal Stability.

Test-retest reliability was assessed by calculating the kappa statistic. Kappa has been defined as the agreement beyond chance divided by the amount of possible agreement beyond chance (Dawson & Trapp, 2001). The level of agreement between nine individual items on two separate occasions was calculated and is shown in Table 5.12. The test-retest reliability varied across individual items. Question 5 had the lowest calculated kappa of 0.28. This result is thought to be as a result of very few participants from the total sample (n = 5) answering yes to the question at T1 and T2. Kappa is affected by the prevalence of the finding under consideration. For a small number of observations or rare findings very low values of kappa may not necessarily reflect low rates of overall agreement (Viera & Garrett, 2005). The remaining questions had kappa scores ranging from 0.47 to 1.00.

Table 5.11
Cronbach's coefficient alpha for the DRAQ

	Cronbach's coefficient alpha with deleted variable			
	Raw Variables		Standardized Variables	
Deleted variable	**Correlation with total**	**alpha**	**Correlation with total**	**alpha**
Question 1	0.519766	0.650651	0.476123	0.632582
Question 2	0.406996	0.679897	0.377694	0653494
Question 3	0.705347	0.608446	0.663459	0.590423
Question 4	0.641596	0.622757	0.618798	0.600760
Question 5	0.291030	0.703021	0.314936	0.666396
Question 6	0.198424	0.719852	0.228764	0.683577
Question 7	0.220216	0.706222	0.190822	0.690948
Question 8	0.359880	0.686673	0.327880	0.663762
Question 9	0.040139	0.720244	0.080139	0.711796

Note: Cronbach's coefficient alpha for the DRAQ = 0.71 (raw variables = 0.707158; standardized variables = 0.683790)

Table 5.12
Kappa statistic agreement DRAQ T1 and T2

DRAQ	kappa	95% CI	
		Lower Limit	Upper limit
Question 1	0.572615	0.432141	0.713090
Question 2	0.472362	0.322555	0.622168
Question 3	0.836588	0.727234	0.945942
Question 4	0.836588	0.727234	0.945942
Question 5	0.228571	-0.173523	0.630665
Question 6	0.936607	0.865722	1.000000
Question 7	0.647303	0.359959	0.934647
Question 8	0.630555	0.470546	0.790564
Question 9	1.00000	1.000000	1.000000

Note: CI = confidence interval

The following guidelines have been used to aid interpretation of the kappa results (Byrt, 1996) and are illustrated in Table 5.13.

Table 5.13
Guidelines for interpretation of kappa score

Range of kappa result	Proposed level of agreement
0.93 – 1.00	Excellent agreement
0.81 – 0.92	Very good agreement
0.61 – 0.80	Good agreement
0.41 – 0.60	Fair agreement
0.21 – 0.40	Slight agreement
0.01 – 0.20	Poor agreement
<0.00	No agreement

The kappa scores for individual questions were interpreted as follows: questions 6 and 9 showed 'excellent agreement', questions 3 and 4 showed 'very good agreement', questions 7 and 8 showed 'good agreement' and questions 1 and 2 showed 'fair agreement'.

Assessment of Readability, Clarity and Appropriateness.

Purposeful sampling was used to recruit participants to review the DRAQ for readability, clarity and appropriateness of individual questions. The sample (n = 11) was asked to participate following informed consent to the main study. The sample included six men and five women thought to broadly represent differing levels of education, and socio-economic status found in the community. Only one member of the Aboriginal and Torres Strait Islander community participated due in part to the overall low participation rate in the main study (10 participants). The exclusion criteria of the main study precluded patients who were non-English speaking. The participant's ages ranged from 45 years to 67 years. Nine participants lived within the metropolitan boundaries of Perth, one lived in a rural farming community and the remaining participant lived in a remote mining location.

There was an overall very high level of agreement between the responses of the participants regarding clarity, relevance and appropriateness of possible responses to each DRAQ question. Two of the 11 participants stated that they found questions about their mental health and financial situation embarrassing. Question 9 “Are you an Aboriginal or Torres Strait Islander person” was thought not relevant to depression by four of the 11 participants. All of the participants agreed when asked if they felt it was appropriate to be asked questions about mental health and social situation whilst in hospital for heart problems. No changes were made to the structure or wording of the DRAQ based on the results of the qualitative assessment.

This chapter has described the results of validation and preliminary psychometric testing of the DRAQ. Building on the initial findings of the systematic literature review, the content validity of the DRAQ was further assessed by an expert panel. Results from psychometric testing have shown that the DRAQ has an acceptable level of internal consistency reliability and, with the exception of question 5, the DRAQ showed an overall good level of temporal stability over two time points. Assessment of the DRAQ by study participants revealed a high level of positive agreement regarding the clarity, relevance and appropriateness of the DRAQ.

Chapter 6 – Discussion and Conclusions

The aim of this research was to develop a brief screening instrument designed to assess the risk of developing depression following a diagnosis of ACS for use in the acute clinical setting using a three stage approach based on current literature, expert opinion and initial research validation. The DRAQ has been designed to achieve this aim. The development process was guided by the following objectives:

1. To identify the risk factors for depression related to ACS from the literature and critically evaluate the evidence base.

Chapter Two of this thesis describes a systematic review of the literature and critical appraisal of the evidence for individual risk factors. Initially, 50 psychological, social, demographic and behavioural risk factors associated with depression were identified from 24 research studies. Following a critical evaluation process, 13 risk factors meeting criteria for quality of evidence, clinical appropriateness and relevance to an adult clinical population were identified as being highly relevant.

2. To define the concept of depression in patients with a diagnosis of ACS, and develop a theoretical framework illustrating potential risk factors for post ACS depression.

Chapter Three outlines an explanatory conceptual framework in order to describe the complex relationship between depression and ACS. Within that framework, a conceptual pathway (figure 3.2) illustrates risk associated with developing depression and indicates the potential role of a previous episode of depression and a recent life event. Whilst it is not possible to comment on the predictive nature of these risk factors, some support for their inclusion in the pathway can been seen from this study's findings. In the subsequent study sample from this research of 220 ACS patients, over 25% reported having previously been told by a doctor that they had depression and 23% had been prescribed antidepressants in the past. In addition, nearly 48% of participants reported experiencing a life event in the past 12 months that had made them feel depressed.

These findings are consistent with the literature documenting high levels of depressive symptoms, past history of depression, and recent life events found in patients admitted to hospital with ACS (Carney & Freedland, 2008; Dickens et al., 2004; Lesperance et al., 2000; Thombs et al., 2006). Not surprisingly, given this background of pre-existing depression and recent depressive events, over 20% of study participants reported moderate to severe levels of depressive symptoms during hospital admission.

3. To determine the barriers and facilitators to the introduction of a screening intervention as perceived by the key members of a clinical team and to use this contextual data to aid the development of the questionnaire.

This objective was addressed using qualitative research methods and analysis described in Chapters Four and Five. Data was generated by semi-structured interviews with ten members of a cardiology clinical team and analysed using Framework Analysis. Interpretation of the data revealed 12 major interrelated issues. Staff reported a lack of a systematic approach to identifying depression, in particular the need to introduce appropriate depression screening tools, and a lack of access to specialised psychiatric support services for both inpatients and patients discharged into the community. These important issues have been raised in the literature and appear to interfere with the identification of depression in cardiac patients within Australia and other countries where there has been a reported limited transfer of current evidence into practice and poor levels of psychiatric support (Goldston & Baillie, 2008; Lichtman et al., 2008; Ziegelstein et al., 2005).

Other key barriers to the introduction of a screening intervention were perceived time constraints, stigma, lack of mental health related skills and knowledge related to depression in cardiac patients. These issues have also been recognised and reported as potentially significant barriers within the Australian healthcare system (Hickie et al., 2002; Savard, 2004).

Although the staff described a number of barriers to screening, there was also strong support for depression screening from all levels of staff. Strong nursing leadership was reported as a significant advantage to changing practice in the

department. Staff identified education, the requirement for strong evidence related to screening, demonstrated improved patient outcomes and an integrated management plan as specific needs that, once addressed, would facilitate change.

4. To develop a risk assessment instrument for post ACS depression with high clinical utility that can be used by nurses in hospital.

Chapters Two, Four and Five have detailed the methods and results of the instrument development process. Early in the design process, risk factors were assessed by the researcher for clinical appropriateness. Risk factors were excluded if they had been poorly defined, needed to be identified using additional lengthy questionnaires, or could not be accurately assessed within the time-frame of a hospital admission for ACS. Based on the 13 identified risk factors for depression, 22 items were developed and reviewed for content validity by an eight-member expert panel. Following this process a nine-question draft version of the DRAQ was created for further testing. This version of the DRAQ has a simple layout and has been designed as a self-report instrument that can be completed by patients within a few minutes by answering 'yes' or 'no' to individual questions.

5. To perform preliminary assessment of the psychometric properties of the instrument following application in a sample of ACS patients.

Preliminary psychometric testing of the DRAQ to assess validity was completed in a sample of ACS patients and has been described in Chapters Four and Five. Internal consistency reliability was determined by calculating the Cronbach's coefficient alpha based on raw (0.71) and standardized (0.68) variables. The DRAQ is a unique risk assessment instrument in the early stages of development and therefore direct comparison between other instruments designed for the same purpose is not possible. However, literature regarding instrument development suggests that it may be considered to have an acceptable level of internal consistency reliability (De Vellis, 2003).

Temporal stability of the DRAQ was assessed by calculating the kappa statistic based on data collected at two time points. The level of agreement was shown to vary

across individual items. The kappa result for Question 5 was a negative value indicating no agreement. This question asked participants "Have you ever been told by a doctor that you had any other mental health problems?" Only 7 of 220 participants answered 'yes' to this question. This result is difficult to interpret because the very low numbers of patients answering 'yes' to the question may have affected the kappa value (Viera & Garrett, 2005).

Questions 3, 4, 6, 7, 8 and 9 showed 'good' to 'excellent agreement' indicating that these questions may be considered to have demonstrated good temporal stability. Questions 1 and 2 showed 'fair agreement'. This may be interpreted as showing a lower level of stability, however, as these questions ask patients about recent life events and their level of anxiety, these results could also indicate a sensitivity to change in the patient's emotional state or circumstances and not necessarily indicate measurement error (De Vellis, 2003).

6. To establish the extent to which patients find the questionnaire acceptable as part of clinical care.

The method and results of this stage of questionnaire validation are described in Chapters Four and Five. This objective was achieved by asking 11 participants to review the DRAQ in detail. The results indicated a very high level of agreement between the responses of the participants regarding clarity, relevance and appropriateness of possible responses to questions. Significantly, all of the participants felt that it was appropriate to be asked questions about mental health and their social situation whilst in hospital for heart problems. This finding is important and can give some insight into the perceived issue of stigma as a barrier to identifying depression in the acute setting as reported as a potential issue in the contextual survey.

Discussion

This thesis supports the case for an integrated approach to identifying depression in ACS patients that includes screening for current depressive symptoms, a past history of depression and identifying patients at risk of future depression. The

DRAQ has specifically been developed to address the need to identify patients at risk of becoming depressed so that early, appropriate support may be provided to those most in need.

Whilst it has not been possible to fully validate an integrated screening system within the scope of this research, there is evidence from the research conducted to support the need for such an approach. Over 20% of the study participants reported moderate to severe levels of depressive symptoms experienced during the two weeks prior to admission as measured by the PHQ-9. This finding is consistent with other research demonstrating depressive disorders may be present before an ACS event. Dickens and colleagues (2004) found 20% of participants experiencing a MI for the first time had depressive disorders that had been present for at least one month before admission. Significantly, nearly 48% of participants reported experiencing a life event in the past 12 months (not including their current admission) that had made them feel depressed and 25% reported a prior history of depression. Current symptoms of depression, recent life events and a past history of depression are significant risk factors for future depression and serve to illustrate a burden of risk not only of mental ill health but also poorer medical outcomes (Meijer et al., 2011).

These findings also provide support for the conceptual pathway proposed in Chapter Three of this thesis (Figure 3.2). This pathway indicates the presence of risk factors for depression prior to an admission for ACS. A large proportion of study participants reported both recent exposure to risk factors for depression, such as a negative life event affecting their mood, or they reported a past history of depression indicating that they may have been at risk of depression for many years due to psychosocial, behavioural or genetic factors (Birmaher et al., 1996; Farmer, 2001; Lewinsohn et al., 1994a). The findings also demonstrated key risk factors for depression were reported by significant proportions of the sample, for example, 48% of participants reported ‘often feeling anxious’ and 24% reported that their heart condition would impact negatively on their financial situation. Figure 6.1 illustrates where the conceptual pathway has been supported by study data.

Depression is important to identify following an ACS event because it is a prevalent comorbid diagnosis that affects a patient’s quality of life (Beck et al., 2001)

and is strongly associated with a poor prognosis following a myocardial infarction (Meijer et al., 2011; Parashar et al., 2006; Parker et al., 2008). Making behavioural change to modify cardiac risk factors is particularly challenging for depressed patients (Meyers et al., 2012). Recent studies have suggested that a significant proportion of the excess risk of mortality associated with depressive symptoms can be explained by behavioural mechanisms such as smoking and physical inactivity (Win et al., 2011; Ye et al., 2013).

Critics of depression screening in cardiac populations point to a lack of evidence demonstrating that screening for depression improves outcomes in cardiovascular populations (Hasnain et al., 2011). However, some promising studies of collaborative care programmes adapted for cardiac patients have demonstrated significant improvements in mental health outcomes, adherence to medical treatments, reduced number and intensity of cardiac symptoms and improved health-related quality of life (Huffman et al., 2011; Rollman et al., 2009). Collaborative care can be particularly effective when a nurse care manager works with the primary care provider to improve treatment of both depression and cardiovascular risk factors (Katon et al., 2010). Whilst it is still not known whether such programmes can reduce the high mortality risk, early detection and support of vulnerable patients can improve important outcomes related to quality of life and adherence to treatments.

Figure 6.1
Conceptual pathway supported by study findings

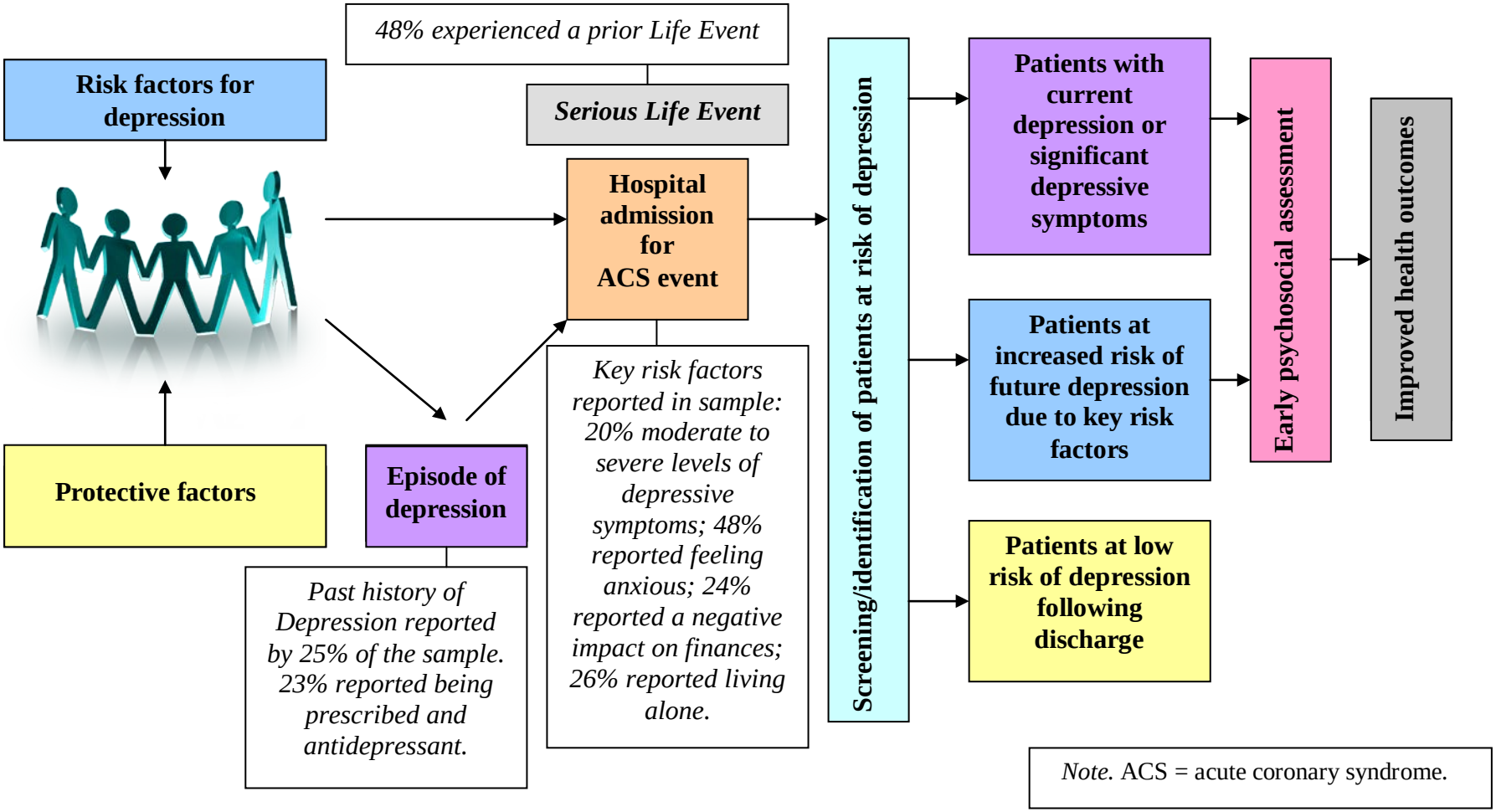
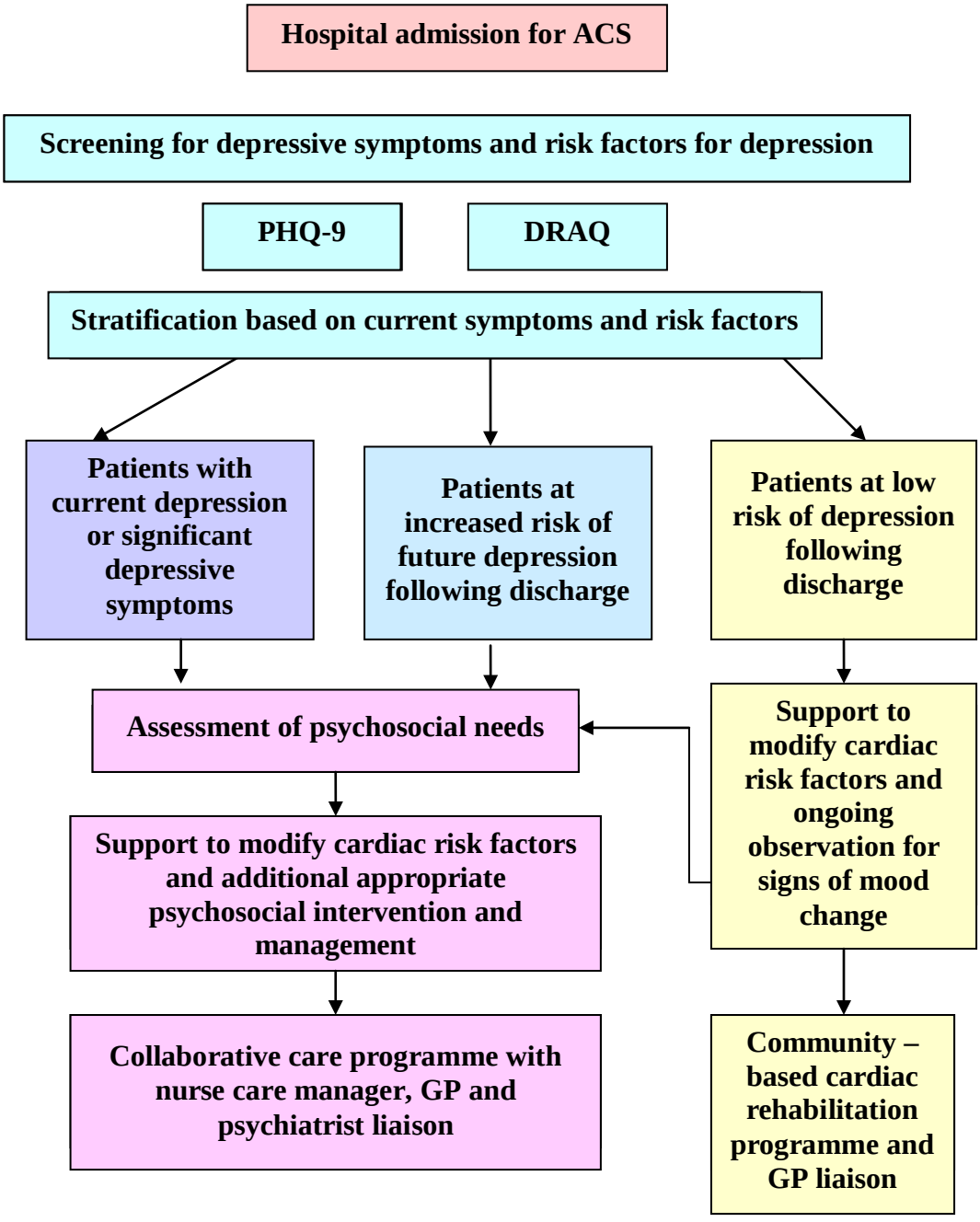


Figure 6.2 illustrates the role the DRAQ would play in an integrated depression screening and management programme based on a collaborative care model. Patients admitted to hospital following an ACS event would be screened for depressive symptoms and risk factors for depression. Risk stratification would identify a large proportion of patients who did not have significant symptoms of depression and were considered at low risk of developing depression based on known risk factors. This group of patients would still require support and further education to modify their cardiac risk factors, however, they may be able to use community-based cardiac rehabilitation or on-line/telephone support programmes effectively in order to meet these needs. The "Coaching patients On Achieving Cardiovascular Health Programme (COACH)" is an example of such a programme that has been proven to increase adherence to cardiac medications and reduce risk factors in participants up to 18 months following cessation of the programme (Jelinek et al., 2009). In combination with GP and Consultant Cardiologist medical follow-up, community based rehabilitation could represent a cost-effective and appropriate secondary prevention strategy for this group of patients.

Based on current evidence, the patients who were identified as having depression or at risk of depression, should be regarded as a group vulnerable to adverse-medical and social outcomes in need of greater support to modify cardiac risk factors. Following assessment of their psychosocial needs, these patients could be referred to a collaborative care programme providing a high level of psychological support and management of depression and cardiac risk factors.

Figure 6.2
A depression screening and management programme based on a collaborative care model



Note. ACS = acute coronary syndrome; PHQ-9 = Patient Health Questionnaire-9; DRAQ = Depression Risk Assessment Questionnaire; GP = General Practitioner.

Another benefit of risk stratification of patients whilst in hospital relates to more effective use of resources compared to repetitive screening of low risk patients once discharged into the community. It is acknowledged that the low risk group of patients may still develop symptoms of depression following discharge. However, raising awareness of the prevalence and symptoms of depression, through education of the patient and their family, may help to identify changes in mood requiring formal screening. The early recognition of patients at risk of developing depression affords an important opportunity for proactive psychosocial, medical and cardiac risk modification strategies. Identifying patients at risk of depression is a novel concept in cardiology settings and therefore the benefits of early identification have yet to be demonstrated in patients with ACS. One such benefit may be the prevention of depression in post-ACS patients. Evidence of the role of selective serotonin reuptake inhibitors (SSRIs) in prevention of depression has been found in studies of post-stroke patients (Chen, Patel, Guo, & Zhan, 2007) and more recently in post-ACS patients (Hansen et al., 2012). The latter evidence came from a randomised, placebo-controlled trial of 240 non-depressed post-ACS patients. The trial was able to demonstrate that 12 months treatment with escitalopram, an SSRI, prevented the development of depression in post-ACS patients. The trial was not sufficiently powered to analyse the effects of treatment on cardiac mortality or morbidity and therefore further research is required in this promising field of inquiry. Hansen et al., (2012) recommended the identification of 'high-risk' patients, defined as those with depressive symptoms following ACS but not yet depressed, who might benefit from early preventive antidepressant treatment. Assessing risk factors for depression using the DRAQ, in addition to assessing the presence of depressive symptoms alone, is likely to enhance the detection of such high risk patients.

Contextual Data

The instrument development process described in this thesis has included a qualitative research component in recognition of the importance of practice context to the development of effective and relevant tools. This is regarded by the researcher as particularly important with respect to the slow uptake of guidelines recommending depression screening for cardiac patients (Lichtman et al., 2008). The DRAQ is intended for use in conjunction with the PHQ-9 and as part of an integrated

screening, risk stratification and depression management programme. Exploring the barriers and facilitators to the uptake of depression screening is therefore regarded as an essential process that has strengthened the development the DRAQ and prevented the development of the tool in isolation of relevant issues related to current practice.

The findings from the qualitative component of this research have highlighted a number of issues that are significant to practice and have previously been identified in the literature. The lack of a systematic approach to depression screening at the research site is consistent with other research suggesting that, although validated screening instruments exist, patients are not routinely screened for depression (Herridge et al., 2005; Huffman et al., 2006a).

Complex changes in practice often involve barriers at various levels and include characteristics of the professionals and patients involved as well as the social, organisational, economic and political context (Grol & Wensing, 2004). This point is reflected in the qualitative research findings of this study. The lack of a systematic screening protocol was related to the perceived time-constraints and nursing staff work-load, a potential organisational or economic barrier. However, a lack of mental health skills and knowledge was perceived as equally important by staff, reflecting a characteristic of the clinical staff. Poor access to specialised psychiatric support services and lack of mental health related knowledge and skills have also been identified as significant barriers to the identification of depression in Australia (Goldston & Baillie, 2008; Hickie et al., 2002; Savard, 2004).

The staff also viewed the role of stigma as a potential barrier to the uptake of screening suggesting that patients would not wish to discuss a diagnosis of depression or any possible mental health problems. Interestingly, this was not a viewpoint expressed by patients themselves. During assessment of the DRAQ for acceptability, only two of the 11 participants stated that they found questions about their mental health and financial situation embarrassing. All of the participants agreed that it was appropriate to be asked questions about mental health and social situation whilst in hospital for heart problems.

It is interesting that many of the findings regarding barriers to implementation of a depression screening protocol have previously been discussed in relation to

screening for post-stroke depression (White, Towers, Turner, & Hambridge, 2013). Identifying depression in post-stroke patients parallels many of the challenges found in the cardiac setting. For example, depression is common following a stroke but it is not often identified and frequently remains untreated in clinical settings (Herrmann et al., 2011). Health professional compliance to recommended guidelines has similarly been reported as inconsistent and influenced by both individual factors, such as belief in the effectiveness of screening and knowledge deficit, as well as organizational barriers, such as perceived time-constraints and support from colleagues (Hart & Morris, 2008).

In a recent Australian study the investigators conducted semi-structured interviews with seven clinicians, five neurologists and two rehabilitation physicians, in order to identify factors relating to screening for post-stroke depression (White et al., 2013). The results were remarkably similar to the contextual study findings discussed in this thesis. All of the doctors reported relying on recognising the symptoms or unusual characteristics as prompts to explore a diagnosis of depression but none used routine screening methods or tools. Equally, the physician's acknowledged the possibility that only the severe cases would be identified in this way with milder cases being missed. A lack of routine screening for post-stroke depression was also attributed to time constraints, in particular the need to focus on the physical implications of a stoke and secondary prevention treatments during consultations. Similarly, the physician's identified low levels of confidence and experience in mental health skills. All participants acknowledged a lack of training and related mental health education. As a consequence, the physicians preferred to leave the management of depression to the patient's GP, who was perceived as having a more established relationship with the patient.

It is clear that the barriers to depression screening identified in a cardiac setting can been seen elsewhere and relate to both individual factors such as education and training as well as structural factors related to medical priorities and healthcare settings. The advantage of identifying common barriers is that it is possible to observe how these barriers may have been overcome in similar clinical settings.

A promising new area of research would involve the provision of electronic decision support systems for depression screening and individualized treatment guidelines. Decision support systems have been found to improve adherence to recommended clinical guidelines and enhance the delivery of preventive care services (Kawamoto, Houlihan, Balas, & Lobach, 2005). Touchscreen computers could be used to streamline assessments and provide real time feedback of not only screening results but also recommended management for the individual patient based on their results and depression risk factor profile (Kawamoto et al., 2005). This is a type of clinical innovation that may be required to overcome the reported time constraints and lack of mental health related skills.

Limitations of the DRAQ Design

Whilst the process undertaken to design the DRAQ has been based on a robust and systematic research methodology, as with all research, it is important to discuss the limitations of the research undertaken and clearly identify areas of potential weakness. The systematic literature search was limited to studies published in English and therefore may be at risk of publication bias. If key information likely to affect the quality assessment was absent, the Oxford EMB Grade was reduced. Authors were not contacted by the researcher regarding methods or to supply missing data. The literature search, data extraction, quality critique and evidence grading were undertaken by one researcher alone and therefore did not benefit from a full independent assessment. However, these processes were undertaken with guidance from a supervisory team with methodological and relevant content knowledge. Furthermore, the expert panel review concurred with the initial findings from the literature review covering the majority of items associated with depression in cardiac patients.

The studies reviewed have been conducted over a 17-year period from 1992 (Forrester et al., 1992) to 2009 (Stafford et al., 2009). Over this time period the diagnostic criteria for both depression and ACS have evolved and this represents a significant barrier to comparison of the studies. Heterogeneity between studies is demonstrated by the differing study designs, the measures used to assess depression, the temporal relationship of the risk factor to depression (cross-sectional or

prospective associations), the wide array of risk factors studied and the varying definitions of each risk factor. A high level of heterogeneity between studies has precluded the use of meta-analysis and comparisons of the strengths of associations between risk factors and depression across multiple studies has not been possible.

There is insufficient evidence to determine from the current cardiac literature whether the simultaneous presence of multiple risk factors results in a cumulative increase in the risk of depression in cardiac patients.

A number of risk factors for depression in patients with heart disease may not yet be identified. The paucity of data regarding biomedical risk factors identified has further reduced the scope of this review to comment on their relationship with cardiac depression. This thesis has described the early stages of the development and psychometric testing of the DRAQ. Underpinning the design of the DRAQ has been a careful critique of the available evidence regarding risk factors for depression in ACS patients and a strong focus on both the content validity and clinical utility of the questionnaire.

The DRAQ still requires additional psychometric testing to assess the predictive validity of the questionnaire and this will require a larger sample of ACS patients recruited to a prospective, longitudinal study. Assessment of the predictive validity of the DRAQ will also allow the development of a method to score the questionnaire to indicate high, medium or low risk categories. Further instrument development needs to focus on the five-item staff assessed instrument and future research is required to assess its clinical utility.

Recommendations for Practice

The research conducted has given rise to the following recommendations for future practice:

1. The adoption of a systematic approach to the identification of depression in ACS patients using valid screening tools. This requires the identification of depressive symptoms in hospital and stratification of patients into high

and low risk groups based on the assessment of the risk of developing depression. Such a screening approach would be an essential part of a depression management strategy based on a collaborative care model that focussed on both improving the patient's psychological health outcomes and cardiac risk profile.

2. Provision of education and support for increased knowledge regarding depression and mental health related skills across both medical and nursing disciplines. A knowledge deficit associated with the care of mental health issues in an acute medical setting seemed to also be common across medical specialities and therefore this issue could be addressed at both a local level but also may require changes to medical and nursing curricula at a university level.

3. Improved staff and patient access to psychiatric support services. Such issues need to be addressed at both local levels through State Health Department policy but also at a Federal level where funding should be directed towards supporting mental health education and improving the funding of mental health services in the community.

Recommendations for Research

1. Further psychometric testing is required to assess the predictive validity of the DRAQ. This requires a large sample (n = 300) of ACS patients to be recruited to a prospective, longitudinal, observational study requiring a minimum following up period of four months. Predictive validity would be established by comparing the results of the DRAQ during admission in patients who subsequently developed depression following discharge from hospital. Questions indicating a high predictive validity would remain in the questionnaire, those found to have a poor level of predictive validity would be removed.

2. The 5-item staff tool requires additional development and predictive validity testing in a sample of ACS patients. Ideally, nurses would be involved in the use of the tool and an additional qualitative study

conducted to establish how the nurses perceived the clinical utility of the tool and how best to integrate its use in the clinical setting.

3. Future research could focus on the development of novel pharmacological therapies to prevent the onset of depression following an ACS event and examine whether preventing depression through pharmacological or psychotherapy support can improve mortality or morbidity in this high-risk group.

4. Further research is required in the area of collaborative care based depression management. In particular, large randomised controlled trials are required that are sufficiently powered to examine the effect of such programmes on morbidity and mortality as well as health related quality of life, adherence to medical therapies and cardiac risk factor modification.

5. Finally, continued and sustained research into the barriers preventing the uptake of depression screening in the cardiac setting should be a priority. In particular, research exploring new technological solutions for the provision of depression screening should be investigated as a matter of urgency in order to address a well-established evidence to practice gap.

Conclusions

This thesis has described the initial development and psychometric testing of the DRAQ in response to the increasing recognition of psychological factors mediating health outcomes. Results of the research programme have confirmed that ACS patients are at considerable risk of poor psychological health and thus worse medical health outcomes following a hospital admission for ACS. Whilst findings indicated nursing and medical staff were very supportive of depression screening, much research is needed to establish a systematic approach to depression screening and the identification of high risk patient groups. Beyond screening is the importance of intervening appropriately to achieve optimal health outcomes. Detecting such groups creates opportunities to explore preventive therapies rather than observing the onset of depression and then treating the disease.

References

Aalto, A., Aro, A., Weinman, J., Heijmans, M., Manderbacka, K., & Elovainio, M. (2006). Sociodemographic, disease status, and illness perceptions predictors of global self-ratings of health and quality of life among those with coronary heart disease - One year follow-up study. *Quality of Life Research, 15*(8), 1307 - 1322.

ABS. (2005). *Suicides Australia catalogue No 3309*. Canberra. Retrieved from htp://abs.gov.au/AUSSTATS/abs@nsf/mf/3309.0

ABS. (2007). *Year Book Australia*. (ABS Catalogue No 1301.0). Canberra: Australian Bureau of Statistics.

ABS. (2008). *The Health and Welfare of Australia's Aboriginal and Torres Strait Islander Peoples*. Canberra.

ABS. (2012). *Year Book Australia*. (ABS Catalogue No 1301.0). Canberra: Australian Bureau of Statistics.

Ahern, D., Gorkin, L., Anderson, J., Tierney, C., Hallstrom, A., Ewart, C., et al. (1990). Biobehavioral variables and mortality or cardiac arrest in the Cardiac Arrhythmia Pilot Study [CAPS]. *The American Journal of Cardiology, 66*, 59 - 62.

AIHW. (2009). *Measuring the social and emotional wellbeing of Aboriginal and Torres Strait Islander peoples*. Canberra: AIHW.

Aktar, M., Mallik, S., & Ahmed, M. (2004). Symptoms of depression and anxiety in post-myocardial infarction patients. *Journal of the College of Physicians and Surgeons of Pakistan, 14*(10), 615 - 618.

Alston, M. (2012). Rural male suicide in Australia. *Social Science and Medicine, 74*, 515 - 522.

Alston, M., & Kent, J. (2004). *Social impacts of drought: Report to NSW agriculture*. Wagga Wagga.

Amin, A., Jones, A., Nugent, K., Rumsfeld, J., & Spertus, J. (2006). The prevalence of unrecognized depression in patients with acute coronary syndrome. *American Heart Journal, 152*(5), 928 - 934.

Andrade, L., Caraveo-Anduaga, J., Berglund, P., Bijl, R., De Graaf, R., Vollebergh, W., et al. (2003). The epidemiology of major depressive episodes: results from the International Consortium of Psychiatric Epidemiology (ICPE) Surveys. *International Journal of Methods in Psychiatric Research, 12*, 3 - 21.

Andrade, L., Eaton, W., & Chilcoat, HD. (1996). Lifetime comorbidity of panic attacks and major depression in a population-based study: age of onset. *Psychological Medicine, 26*, 991 - 996.

Angermann, C., Gelbrich, G., Stork, S., Schowalter, M., Deckert, J., Ertl, G., et al. (2011). Somatic correlates of comorbid major depression in patients with systolic heart failure. *International Journal of Cardiology, 147*, 66 - 73.

Angst, J., & Merikangas, K. (1997). The depressive spectrum: diagnostic classification and course. *Journal of Affective Disorders, 45*, 31 - 40.

APA. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: American Psychiatric Association.

Aroney, C., Aylward, P., Kelly, A., Chew, D., & Clune, E. (2006). National Heart Foundation of Australia & Cardiac Society of Australia and New ZealandGuidelines for the Management of Acute Coronary Syndromes 2006. *Medical Journal of Australia, 184*, S1 - S32.

Bambauer, K., Locke, S., Aupont, O., Mullan, M., & McLaughlin, T. (2005). Using the Hospital Anxiety and Depression Scale to screen for depression in cardiac patients. *General Hospital Psychiatry, 27*, 275 - 284.

Bane, C., Hughes, C., & McElnay, J. (2006). The impact of depressive symptoms and psychosocial factors on medication adherence in cardiovascular disease. *Patient Education and Counselling, 60*, 187 - 193.

Barbour, R. (1998). Mixing qualitative methods: Quality assurance or qualitative quagmire? *Qualitative Health Research, 8*, 352 - 361.

Barth, J., Schumacher, M., & Herrmann-Lingen, C. (2004). Depression as a risk factor for mortality in patients with coronary heart disease: A meta-analysis. *Psychosomatic Medicine, 66*, 802-813.

Bebbington, P., Hurry, J., & Tennant, C. (1988). Adversity and the symptoms of depression. *International Journal of Social Psychiatry 34*, 163 - 171.

Beck, C., Joseph, L., Belisle, P., & Pilote, L. (2001). Predictors of quality of life 6 months and 1 year after acute myocardial infarction. *American Heart Journal, 142*, 271 - 279.

Beekman, A., Copeland, J., & Prince, R. (1999). Review of community prevalence of depression in later life. *British Journal of Psychiatry, 174*, 307 - 311.

Beirut, L., Heath, A., Bucholz, K., Dinwiddie, S., Madden, P., Stratham, D., et al. (1999). Major depressive disorder in a community-based twin sample. *Archives of General Psychiatry, 56*, 557 - 563.

Belmaker, R., & Agam, G. (2008). Major depressive disorder. *New England Journal of Medicine, 358*, 55 - 68.

Berger, A., Duval, S., Jacobs, D., Barber, M., Vazquez, G., Lee, S., et al. (2008). Relation of length of hospital stay in acute myocardial infarction to postdischarge mortality. *The American Journal of Cardiology, 101*(4), 428 - 434.

Birmaher, B., Ryan, N., & Williamson, D. (1996). Childhood and adolescent depression: A review of the past 10 years. Part I. *Journal of American Academic Child Adolescent Psychiatry, 35*, 1427 - 1439.

Bjerkeset, O., Nordahl, H., Mykletun, A., Holmen, J., & Dahl, A. (2005). Anxiety and depression following myocardial infarction: gender differences in a 5-year prospective study. *Journal of Psychosomatic Research, 58*, 153 - 161.

Bland, J., & Altman, D. (1997). Cronbach's alpha. *British Medical Journal, 314*, 572.

Bowling, A. (1999). *Research methods in health. Investigating health and health services.* Philadelphia: Open University Press.

Breslau, N., Novak, S., & Kessler, R. (2004). Psychiatric disorders and stages of smoking *Biological Psychiatry, 55*, 69 - 76.

Breslau, N., Peterson, E., Schultz, L., Chilcoat, H., & Andreski, P. (1998). Major depression and stages of smoking: a longitudinal investigation. *Archives of General Psychiatry, 55*, 161 - 166.

Breslau, N., Schultz, L., & Peterson, E. (1995). Sex differences in depression: a role for pre existing anxiety. *Psychiatry Research, 58*, 1-12.

Brown, G., Andrews, B., Harris, T., Adler, L., & Bridge, L. (1986b). Social support, self-esteem and depression. *Psychological Medicine, 16*, 813 - 831.

Brown, G., Bifulco, A., Harris, T., & Bridge, L. (1986a). Life stress, chronic subclinical symptoms and vulnerability to clinical depression. *Journal of Affective Disorders, 11*, 1-19.

Bruce, M. (2002). Psychosocial risk factors for depressive disorders in late life. *Biological Psychiatry, 52,* 175 - 184.

Brugha, T., Bebbington, P., MacCarthy, B., Sturt, E., Wykes, T., & Potter, J. (1990). Gender, social support and recovery from depressive disorders: a prospective clinical study. *Psychological Medicine, 20*, 147 - 156.

Brugha, T., Sharpe, S., & Cooper, S. (1998). The Leicester 500 project: social support and the development of post-natal depressive symptoms - a prospective cohort survey. *Psychological Medicine, 28*, 63 - 79.

Brummett, B., Barefoot, J., Vitaliano, P., & Siegler, I. (2003). Associations among social support, income, and symptoms of depression in an educated sample: the UNC Alumni Heart Study. *Journal of Behavioural Medicine, 10*, 239 - 250.

Bush, D., Zieglestein, R., Tayback, M., Richter, D., Stevens, S., Zahalsky, H., et al. (2001). Even minimal symptoms of depression increase mortality risk after acute myocardial infarction. *American Journal of Cardiology, 88*(4), 337-341.

Butterworth, P., Rodgers, B., & Windsor, T. (2009). Financial hardship, socio-economic position and depression: Results from the PATH Through Life Survey. *Social Science and Medicine, 69*, 229 - 237.

Byrt, T. (1996). How good is that agreement? *Epidemiology, 7*, 561.

Carmody, T., Vieten, C., & Austin, J. (2007). Negative affect, emotional acceptance, and smoking cessation. *Journal of Psychoactive Drugs, 39*, 499 - 508.

Carney, R., & Freedland, K. (2008). Depression in patients with coronary heart disease. *The American Journal of Medicine, 121*, S20 - S27.

Carney, R., Howells, W., Blumenthal, J., Freedland, K., Stein, P., Berkman, L., et al. (2007). Heart rate turbulence, depression, and survival after Acute Myocardial Infarction. *Psychosomatic Medicine, 69*(1), 4 - 9.

Chang, H., & Chiang, T. (2009). Depressive symptoms, smoking, and cigarette price elasticity: results from a population-based survey in Taiwan. *International Journal of Public Health, 54*, 421 - 426.

Chen, Y., Patel, N., Guo, J., & Zhan, S. (2007). Antidepressant prophylaxis for poststroke depression: a meta-analysis. *International Clinical Psychopharmacology, 22*, 159 - 166.

Cheng, D., Spittal, M., Yip, F., & Pirkis, J. (2012). *Spatial analysis of suicide mortality in Australia: Investigation of metropolitan-rural-remote differentials of suicide risk across states/territories. Social Science and Medicine*. doi:10.1016/j.socscimed.2012.04.008

Cheok, F., Schrader, G., Banham, D., Marker, J., & Hordacre, A. (2003). Identification, course, and treatment of depression after admission for a cardiac condition: Rationale and patient characteristics for the identifying depression as a comorbid condition (IDACC) project. *American Heart Journal, 146*, 978 - 984.

Cohen, S., Gottlieb, B., & Underwood, L. (2000). Social relationships and health. In S. Cohen, L. Underwood & B. Gottlieb (Eds.), *Social support measurement and intervention: A guide for health and social scientists.* (pp. 3 - 25). New York: Oxford University Press.

Coiro, M. (2001). Depressive symptoms among women receiving welfare. *Women Health, 32*, 1 - 23.

Colquhoun, D., Bunker, S., Clarke, D., Glozier, N., Hare, D., Hickie, I., et al. (2013). Screening, referral and treatment for depression in patients with coronary heart disease. *Medical Journal of Australia, 198*(9), 483 - 484.

Cortina, J. (1993). What is coefficient alpha: an examination of theory and applications. *Journal of Applied Psychology, 78*, 98 - 104.

Creed, F., & Dickens, C. (2007). Depression in the medically ill. In A. Steptoe (Ed.), *Depression and physical illness.* (1st ed., pp. 4). Cambridge: Cambridge University Press.

Cuijpers, P., Beekman, A., & Smit, F. (2006). Predicting onset of major depressive disorder and dysthymia in older adults with subthreshold depression: a

community-based study *International Journal of Geriatric Psychiatry, 21*, 811 - 818.

Danziger, S., Carlson, M., & Henley, J. (2001). Post-welfare employment and psychological well-being. *Women Health, 32*, 47 - 78.

Davidson, K., Burg, M., Kronish, I., Shimbo, D., Dettenborn, L., Mehran, R., et al. (2010). Association of anhedonia with recurrent Major Adverse Cardiac Events and mortality 1 year after acute coronary syndrome. *Archives of General Psychiatry, 67*(5), 480 - 488.

Davidson, K., Rieckmann, N., & Lesperance, F. (2004). Psychological theories of depression: potential application for the prevention of acute coronary syndrome recurrence. *Psychosomatic Medicine, 66*(2), 165 - 173.

Davidson, K., Rieckmann, N., & Rapp, M. (2005). Definitions and distinctions among depressive syndromes and symptoms: Implications for a better understanding of the depression-cardiovascular disease association. *Psychosomatic Medicine, 67*(Supplement 1), S6 - S9.

Davis, L. (1992). Instrument review: Getting the most from your panel of experts. *Applied Nursing Research, 5*, 104 - 107.

Dawson, B., & Trapp, R. (2001). *Basic and clinical biostatistics* (3rd ed.). New York: McGraw-Hill.

de Jonge, P., Ormel, J., van den Brink, R., van Melle, J., Spijkerman, T., Kuijpers, P., et al. (2006a). Symptom Dimensions of Depression following Myocardial Infarction and their relationship with Somatic Health Status and Cardiovascular Prognosis. *American Journal of Psychiatry, 163*, 138-144.

de Jonge, P., Rosmalen, J., Kema, I., Doornbos, B., Van Melle, J., Pouwer, F., et al. (2010). Psychophysiological biomarkers explaining the association between depression and prognosis in coronary artery patients: A critical review of the literature. *Neuroscience and Biobehavioral Reviews, 35*, 84 - 90.

de Jonge, P., van den Brink, R., Spijkerman, T., & Ormel, J. (2006b). Only incident depressive episodes after myocardial infarction are associated with new cardiovascular events. *Journal of the American College of Cardiology 48*, 2204- -2208.

De Vellis, R. (2003). *Scale development: theory and applications*. Thousand Oaks, CA: Sage.

Dickens, C., McGowan, L., Percival, C., Tomenson, B., Cotter, L., Heagerty, A., et al. (2008a). New onset depression following myocardial infarction predicts cardiac mortality. *Psychosomatic Medicine, 70*, 450 - 455.

Dickens, C., McGowan, L., Percival, C., Tomenson, B., Cotter, L., Heagerty, A., et al. (2008b). Negative illness perceptions are associated with new-onset depression following myocardial infarction. *General Hospital Psychiatry, 30*, 414 - 420.

Dickens, C., Percival, C., McGowan, L., Douglas, J., Tomenson, B., Cotter, L., et al. (2004). The risk factors for depression in first myocardial infarction patients. *Psychological Medicine, 34*, 1083 - 1092.

DiMatteo, M., Lepper, H., & Croghan, T. (2000). Depression is a risk factor for noncompliance with medical treatment: meta-analysis of the effects of anxiety and depression on patient adherence. *Archives of Internal Medicine, 160*(14), 2101 - 2107.

Dixon, E., Hameed, M., Sutherland, F., Cook, D., & Doig, C. (2005). Evaluating meta-analysis in the general surgical literature: A critical appraisal. *Annals of Surgery, 241*, pp 450 - 459.

Dobbels, F., De Geest, S., Vanhees, L., Schepens, K., Fagard, R., & Vanhaecke, J. (2002). Depression and the heart: a systematic overview of definition, measurement, consequences and treatment of depression in cardiovascular disease. *European Journal of Cardiovascular Nursing, 1*, 45 - 55.

Dohrenwend, B. (2000). The role of adversity and stress in psychopathology: some evidence and its implications for theory and research. *Journal of Health, Society and Behavior, 41*, 1 - 19.

Doyle, F., Conroy, R., McGee, H., & Delaney, M. (2010). Depressive symptoms in persons with acute coronary syndrome: Specific symptom scales and prognosis. *Journal of Psychosomatic Research, 68*, 121 - 130.

Emden, C., Kowanko, I., De Crespigny, C., & Murray, G. (2005). Better medication management for Indigenous Australians: Findings from the field. *Australian Journal of Primary Health, 11*, 80 - 90.

Faramawi, M., Gustat, J., Wildman, R., Rice, J., Johnson, E., & Sherwin, R. (2007). Relation between depressive symptoms and common carotid artery atherosclerosis in American persons > 65 years of age. *American Journal of Cardiology, 99*, 1610 - 1613.

Farmer, A. (2001). Review: twin studies show that genes and individual environmental influences contribute to the aetiology of major depression. *Evidence Based Mental Health, 4*, 62.

Fava, M., & Kendler, K. (2000). Major Depressive Disorder. *Neuron, 28*, 335 - 341.

Fergusson, D., Goodwin, R., & Horwood, L. (2003). Major depression and cigarette smoking: results of a 21-year longitudinal study. *Psychological Medicine, 33*, 1357 - 1367.

Flensborg-Madsen, T., von Scholten, M., Flachs, E., Mortensen, E., Prescott, E., & Schurmann-Tolstrup, J. (2011). Tobacco smoking as a risk factor for depression. A 26-year population-based follow-up study. *Journal of Psychiatric Research, 45*, 143 - 149.

Forrester, A., Lipsey, J., Teitelbaum, M., Depaulo, J., & Andrzejewski, P. (1992). Depression following myocardial infarction. *The International Journal of Psychiatry in Medicine, 22*(1), 33 - 46.

Forsell, Y., & Winblad, B. (1999). Incidence of major depression in a very elderly population. *International Journal of Geriatric Psychiatry, 14*, 368 - 372.

Frasure-Smith, N., Lesperance, F., Juneau, M., Talajic, M., & Bourassa, M. (1999). Gender, depression, and one-year prognosis after myocardial infarction. *Psychosomatic Medicine, 61*(1), 26-37.

Frasure-Smith, N., Lesperance, F., & Talajic, M. (1995). Depression and the 18-month prognosis after myocardial infarction. *Circulation, 91*, 999-1005.

Freedland, K., Rich, M., Skala, J., Carney, R., Davila-Roman, V., & Jaffe, A. (2003). Prevalence of depression in hospitalized patients with congestive heart failure. *Psychosomatic Medicine, 65*, 119 - 128.

French, D., Lewin, R., Watson, N., & Thompson, D. (2005). Do illness perceptions predict attendance at cardiac rehabilitation and quality of life following myocardial infarction? *Journal of Psychosomatic Research, 59*(5), 315 - 522.

Friedman, M., & Griffin, J. (2001). Relationship of physical symptoms and physical functioning to depression in patients with heart failure. *Heart Lung, 30*, 98 - 104.

Frone, M. (2000). Work-family conflict and employee psychiatric disorders: the National Comorbidity Survey *Journal of Applied Psychology, 85*, 888 - 895.

Fucito, L., & Juliano, L. (2009). Depression moderates smoking behaviour in response to a sad mood induction. *Psychology of Addictive Behaviors, 23*, 546 - 551.

Fuhrer, R., Stansfeld, S., Chemali, J., & Shipley, M. (1999). Gender, social relations and mental health: prospective findings from an occupational cohort (Whitehall II study). *Social Science and Medicine, 48*, 77 - 87.

Geckova, A., Dijk, J., Stewart, R., Groothoff, J., & Post, D. (2003). Influence of social support on health among gender and socioeconomic groups of adolescents. *European Journal of Public Health, 13*, 44 - 50.

Geerlings, S., Beekman, A., Deeg, D., & van Tilburg, W. (2000). Physical health and the onset and persistence of depression in older adults: an eight-wave prospective community-based study. *Psychological Medicine, 30*, 369 - 380.

George, L., Blazer, D., Hughes, C., & Fowler, N. (1989). Social support and the outcome of major depression. *British Journal of Psychiatry, 154*, 478 - 485.

Gilbody, S., Bower, P., Fletcher, J., Richards, D., & Sutton, A. (2006). Collaborative care for depression: a cumulative meta-analysis and review of longer term outcomes. *Archives of Internal Medicine, 166*, 2314 - 2321.

Gilman, S., Kawachi, I., & Fitzmaurice, G. (2002). Socioeconomic status in childhood and lifetime risk of major depression. *International Journal of Epidemiology, 31*, 359 - 367.

Gilman, S., Kawachi, I., & Fitzmaurice, G. (2003). Family disruption in childhood and risk of adult depression. *American Journal of Psychiatry, 160*, 939 - 946.

Glassman, A., & Shapiro, P. (1998). Depression and the course of coronary artery disease. *American Journal of Psychiatry, 155*(1), 4 - 11.

Glasziou, P. (2010). *How to read a Systematic Review: The FAST tool* [PowerPoint slides]. Centre for Evidence Based Medicine. University of Oxford. Oxford. Retrieved from University of Oxford Centre for Evidence Based Medicine EBM website: http://www.cebm.net

Glazer, K., Emery, C., Frid, D., & Banyasz, R. (2002). Psychological predictors of adherence and outcomes among patients in cardiac rehabilitation. *Journal of Cardiopulmonary Rehabilitation, 22*(1), 40 - 46.

Goldston, K., & Baillie, A. (2008). Depression and coronary heart disease: a review of the epidemiological evidence, explanatory mechanisms and management approaches. *Clinical Psychology Review, 28*, 288 - 306.

Grace, S., Abbey, S., Kapral, M., Fang, J., Nolan, R., & Stewart, D. (2005). Effect of depression on five-year mortality after an acute coronary syndrome. *American Journal of Cardiology, 96*, 1179-1185.

Grant, J., & Davis, L. (1997). Selection and use of content experts for instrument development. *Research in Nursing and Health, 20*, 269 - 274.

Grant, J., & Kinney, M. (1992). Using the Delphi technique to examine the content validity of nursing diagnoses. *Nursing Diagnosis, 3*, 12 - 22.

Groenwold, R., & Rovers, M. (2010). The Catch-22 of appraisals on the quality of observational studies. *Journal of Clinical Epidemiology, 63*, 1059 - 1060.

Grol, R., & Wensing, M. (2004). What drives change? Barriers to and incentives for achieving evidence-based practice. *Medical Journal of Australia, 180*, s57 - s60.

Haas, D., Davidson, K., Schwartz, D., Rieckmann, N., Roman, M., Pickering, T., et al. (2005). Depressive symptoms are independently predictive of carotid atherosclerosis. *American Journal of Cardiology, 95*, 547 - 550.

Hammond, A., Yu, S., Esa, K., Jabbour, J., Wakefield, L., Ryan, P., et al. (2008). Factors associated with persistent risk of depression in older people following discharge from an acute cardiac unit. *International Psychogeriatrics, 20*(4), pp 738- -751.

Hansen, B., Hanash, J., Rasmussen, A., Hansen, J., Andersen, N., Nielsen, O., et al. (2012). Effects of escitalopram in prevention of depression in patients with

acute coronary syndrome (DECARD). *Journal of Psychosomatic Research, 72*, 11 - 16.

Hare, D., & Davis, C. (1996). Cardiac Depression Scale: Validation of a new depression scale for cardiac patients. *Journal of Psychosomatic Research, 40*(4), 379 - 386.

Hart, S., & Morris, R. (2008). Screening for depression after stroke: an exploration of professionals' compliance with guidelines. *Clinical Rehabilitation, 22*, 60 - 70.

Hasnain, M., Vieweg, W., Lesnefsky, E., & Pandurangi, A. (2011). Depression screening in patients with coronary heart disease: A critical evaluation of the AHA guidelines. *Journal of Psychosomatic Research, 71*, 6 - 12.

Henderson, A., Korten, A., & Jacomb, P. (1997). The course of depression in the elderly: a longitudinal community-based study in Australia. *Psychological Medicine, 27*, 119 - 129.

Hermele, S., Olivio, E., Namerow, P., & Oz, M. (2007). Illness representations and psychological distress in patients undergoing coronary artery bypass graft surgery. *Psychological Health Medicine, 12*(5), 580 - 591.

Herridge, M., Stimler, C., Southard, D., & King, M. (2005). Depression screening in cardiac rehabilitation: AACVPR Task Force Report. *Journal of Cardiopulmonary Rehabilitation, 25*(1), 11 - 13.

Herrmann, N., Seitz, D., Fischer, H., Saposnik, G., Calzavara, A., Anderson, G., et al. (2011). Detection and treatment of post stroke depression: results from the registry of the Canadian stroke network. *International Journal of Geriatric Psychiatry, 26*, 1195 - 1200.

Hickie, I., Davenport, T., & Ricci, C. (2002). Screening for depression in general practice and related medical settings. *Medical Journal of Australia, 177*, s111 - s116.

Hippisley-Cox, J., Fielding, K., & Pringle, M. (1998). Depression as a risk factor for ischaemic heart disease in men: population based case-control study. *British Medical Journal, 316*, 1714-1719.

Hoen, P., Whooley, M., Martens, E., Van Melle, J., & de Jonge, P. (2010). Differential associations between specific depressive symptoms and cardiovascular prognosis in patients with stable coronary heart disease. *Journal of the American College of Cardiology, 56*(11), 838 - 844.

Horwath, E., Johnson, J., Klerman, G., & Weissman, M. (1992). Depressive symptoms as relative and attributable risk factors for first onset major depression. *Archives of General Psychiatry, 49*(10), 817 - 823.

Huffman, J., Mastromauro, C., Sowden, G., Fricchione, G., Healy, B., & Januzzi, J. (2011). Impact of a depression care management program for hospitalised cardiac patients. *Circulation: Cardiovascular Quality and Outcomes, 4*(2), 198 - 205.

Huffman, J., Smith, F., Blais, M., Beiser, B., Januzzi, J., & Fricchione, G. (2006a). Recognition and treatment of depression and anxiety in patients with acute myocardial infarction. *American Journal of Cardiology, 98,* 319 - 324.

Huffman, J., Smith, F., Blais, M., Beiser, M., Januzzi, J., & Fricchione, G. (2006b). Rapid screening for major depression in post-myocardial infarction patients: an investigation using Beck Depression Inventory II items. *Heart, 92,* 1656 - 1660.

Hulley, S., Cummings, S., Browner, W., Grady, D., Hearst, N., & Newman, T. (2001). *Designing clinical research* (2nd ed.). Philadelphia, PA: Lippincott, Williams & Wilkins.

Huurree, T., Eerola, M., Rahkonen, O., & Aro, H. (2007). Does social support affect the relationship between socioeconomic status and depression? A longitudinal study form adolescence to adulthood. *Journal of Affective Disorders, 100,* 55 - 64.

Hybels, C., Blazer, D., & Steffens, D. (2005). Predictors of partial remission in older patients treated for major depression: The role of comorbid dysthymia. *The American Journal of Geriatric Psychiatry, 13,* 713 - 721.

Jansson, M., Gatz, M., Berg, S., Johansson, B., Malmberg, B., McClearn, G., et al. (2004). Gender differences in heritability of depressive symptoms in the elderly. *Psychological Medicine, 34,* 471 - 479.

Jelinek, M., Vale, M., Liew, D., Grigg, L., Dart, A., Hare, D., et al. (2009). The COACH Program produces sustained improvements in cardiovascular risk factors and adherence to recommended medications -Two year follow-up. *Heart, Lung and Circulation, 18,* 388 - 392.

Jiang, W., Alexander, J., Christopher, E., Kuchibhatla, M., Gaulden, L., & Cuffe, M. (2001). Relationship of depression to increased risk of mortality and rehospitalization in patients with congestive heart failure. *Archives of Internal Medicine, 161,* 1849 - 1856.

Jiang, W., Glassman, A., Krishnan, R., O'Connor, C., & Califf, R. (2005). Depression and ischemic heart disease: What have we learned so far and what we must do in the future? *American Heart Journal, 150,* 54 - 78.

Johnson, J., Cohen, P., & Brook, J. (1999). A longitudinal investigation of social causation and social selection processes involved in the association between socioeconomic status and psychiatric disorders. *Journal of Abnormal Psychology 108,* 490 - 499.

Joynt, K., Whellan, D., & O'Connor, C. (2004). Why is depression bad for the failing heart? A review of the mechanistic relationship between depression and heart failure. *Journal of Cardiac Failure, 10*(3), 258 - 271.

Judd, F., Cooper, A.-M., Fraser, C., & Davis, J. (2006). Rural suicide-people or place effects? *Australian and New Zealand Journal of Psychiatry, 40*(3), 208 - 216.

Judd, L. (2000). Psychosocial disability during the long-term course of unipolar major depressive disorder. *Archives of General Psychiatry, 57*, 375 - 380.

Kanai, T., Takeuchi, H., Furukawa, T., Yoshimura, R., Imaizumi, T., Kitamura, T., et al. (2003). Time to recurrence after recovery from major depressive episodes and its predictors *Psychological Medicine, 33*, 839 - 845.

Karel, M. (1997). Aging and depression: vulnerability and stress across adulthood. *Clinical Psychology Review, 17*, 847 - 879.

Katon, W., Lin, E., Von Korff, M., Ciechanowski, P., Ludman, E., Young, B., et al. (2010). Collaborative care for patients with depression and chronic illnesses. *New England Journal of Medicine, 363*, 2611 - 2620.

Kawamoto, K., Houlihan, C., Balas, E., & Lobach, D. (2005). Improving clinical practice using decision support systems: a systematic review of trials to identify features critical to success. *British Medical Journal 330*, 765 - 773.

Kendler, K., Gardner, C., & Prescott, C. (2002). Toward a comprehensive developmental model for major depression in women. *American Journal of Psychiatry, 159*, 1133 - 1145.

Kendler, K., Gardner, C., & Prescott, C. (2006a). Toward a comprehensive developmental model for major depression in men. *American Journal of Psychiatry, 163*, 115 - 124.

Kendler, K., Gatz, M., Gardner, C., & Pedersen, N. (2006b). A Swedish national twin study of lifetime major depression. *American Journal of Psychiatry, 163*(1), 109 - 114.

Kendler, K., Karkowski, & Prescott, C. (1999). Causal relationship between stressful life events and the onset of major depression. *American Journal of Psychiatry, 156*(6), 837 - 841.

Kendler, K., Karkowski, L., & Prescott, C. (1998). Stressful life events and major depression; Risk period, long-term contextual threat, and diagnostic specificity. *Journal of Nervous and Mental Disease, 186*, 661 - 669.

Kendler, K., Kessler, R., Neale, M., Heath, A., & Eaves, L. (1993). The prediction of major depression in women: toward an integrated etiologic model. *American Journal of Psychiatry, 150*, 1139 - 1148

Kendler, K., Thornton, L., & Prescott, C. (2001). Gender differences in the rates of exposure to stressful life events and sensitivity to their depressogenic effects. *American Journal of Psychiatry, 158*, 587 - 593.

Kennedy, N., Abbot, R., & Paykel, E. (2003). Remission and recurrence of depression in the maintenance era: long-term outcome in a Cambridge cohort. *Psychological Medicine, 33*, 827 - 838.

Kessler, R. (1997b). The effects of stressful life events on depression. *Annual Review of Psychology, 48*, 191 - 214.

Kessler, R., Berglund, P., & Demler, O. (2003). The epidemiology of major depressive disorder: results from the national comorbidity survey replication (NCS-R). *Journal of the American Medical Association, 289,* 3095 - 3105.

Kessler, R., & Magee, W. (1994). Childhood family violence and adult recurrent depression. *Journal of Health and Social Behaviour, 35,* 13 - 27.

Kessler, R., Zhao, S., Blazer, D., & Swartz, M. (1997a). Prevalence, correlates, and course of minor depression and major depression in the national comorbidity survey. *Journal of Affective Disorders, 45,* 19 - 30.

Ketterer, M., Wulsin, L., Cao, J., Schairer, J., Hakim, A., Hudson, M., et al. (2006). "Major" depressive disorder, coronary heart disease, and the DSM - IV threshold problem. *Psychosomatics, 47*(1), 50 - 55.

Klein, D., Lewinsohn, P., Seeley, J., & Rohde, P. (2001). A family study of major depressive disorder in a community sample of adolescents. *Archives of General Psychiatry, 58,* 13 - 20.

Kovacs, M., & Beck, A. (1978). Maladaptive cognitive structures in depression. *American Journal of Psychiatry, 135*(5), 525 - 533.

Kraemer, H., Stice, E., Kazdin, A., Offord, D., & Kupfer, D. (2001). How do risk factors work together? Mediators, moderators, and independent, overlapping, and proxy risk factors. *American Journal of Psychiatry, 158,* 848 - 856.

Kroenke, K., Spitzer, R., & Williams, J. (2001). The PHQ-9: validity of a brief depression severity measure. *Journal of General Internal Medicine, 16,* 606 - 613.

Kroenke, K., Spitzer, R., & Williams, J. (2003). The Patient Health Questionnaire-2: validity of a two-item depression screener. *Medical Care, 41,* 1284 - 1292.

Kuehner, C. (2003). Gender differences in unipolar depression: an update of epidemiological findings and possible explanations. *Acta Psychiatr Scand, 108*(3), 163 - 174.

Kuijpers, P., Hamulyak, K., Strik, J., Wellens, H., & Honig, A. (2002). Beta-thromboglobulin and platelet factor 4 levels in post-myocardial infarction patients with major depression. *Psychiatry Research, 109,* 207 - 210.

Lara, M., Leader, J., & Klein, D. (1997). The association between social support and course of depression: Is it confounded with personality? *Journal of Abnormal Psychology, 106,* 478 - 482.

Lawrence, R., & Farmer, R. (2004). *Lecture notes: Epidemiology and public health medicine* (5th ed.). Oxford: Blackwell Publishing.

Leroy, M., Loas, G., & Perez-Dias, F. (2010). Anhedonia as a predictor of clinical events after acute coronary syndromes: a 3-year prospective study. *Comprehensive Psychiatry, 51,* 8 - 14.

Lesperance, F., & Frasure-Smith, N. (2000). Depression in patients with cardiac disease: a practical review. *Journal of Psychosomatic Research, 48*, 379 - 391.

Lesperance, F., Frasure-Smith, N., Juneau, M., & Theroux, P. (2000). Depression and 1-year prognosis in unstable angina. *Archives of Internal Medicine, 160*(9), 1354 - 1360.

Lesperance, F., Frasure-Smith, N., & Talajic, M. (1996). Major depression before and after myocardial infarction: Its nature and consequences. *Psychosomatic Medicine, 58*, 99 - 110.

Lesperance, F., Frasure-Smith, N., Theroux, P., & Irwin, M. (2004). The association between major depression and levels of soluble intercellular adhesion molecule 1, interleukin-6, and C-reactive protein in patients with recent acute coronary syndromes. *American Journal of Psychiatry, 161*, 271 - 277.

Lewinsohn, P., Clarke, G., Seeley, J., & Rohde, P. (1994a). Major depression in community adolescents: Age at onset, episode duration, and time to recurrence. *Journal of American Academic Child & Adolescent Psychiatry, 33*, 809 - 818.

Lewinsohn, P., Hoberman, H., & Rosenbaum, M. (1988). A prospective study of risk factors for unipolar depression. *Journal of Abnormal Psychology, 97*, 251 - 264.

Lewinsohn, P., Roberts, R., Seeley, J., Rohde, P., & Gotlib, I. (1994b). Adolescent Psychopathology II: Psychosocial risk factors for depression. *Journal of Abnormal Psychology, 103*, 303 - 315.

Lewinsohn, P., Solomon, A., Seeley, J., & Zeiss, A. (2000). Clinical implications of "subthreshold" depressive symptoms. *Journal of Abnormal Psychology, 109*(2), 345 - 351.

Liberati, A., Altman, D., Tetzlaff, J., Mulrow, C., Gotzsche, P., Ioannidis, J., et al. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *Journal of Clinical Epidemiology, 62*, e 1- e34. Retrieved from http://www.prisma-statement.org/ website: doi:10.1016/j.jclinepi.2009.06.006

Lichtman, J., Bigger, J., Blumenthal, J., Frasure-Smith, N., Kaufmann, P., Lesperance, F., et al. (2008). Depression and Coronary Heart Disease: Recommendations for screening, referral, and treatment: A Science Advisory from the American Heart Association Prevention Committee of the Council on Cardiovascular Nursing, Council on Clinical Cardiology, Council on Epidemiology and Prevention, and Interdisciplinary Council on Quality of Care and Outcomes Research: Endorsed by the American Psychiatric Association. *Circulation, 118*, 1768 - 1775.

Linfante, A., Allan, R., Smith, S. J., & Mosca, L. (2003). Psychosocial factors predict coronary heart disease, but what predicts psychosocial risk in women? *Journal of American Medical Womens Association, 58*(4), 248-253.

Lorant, V., Deliege, D., Eaton, W., Robert, A., Philippot, P., & Ansseau, M. (2003). Socioeconomic inequalities in depression: A meta-analysis. *American Journal of Epidemiology, 157*(2), 98 - 112.

Lynn, M. (1986). Determination and quantification of content validity. *Nursing Research, 35*, 382 - 385.

Malhi, G., & Berk, M. (2007). Does dopamine dysfunction drive depression? *Acta Psychiatr Scand, Supplementum*, 116 - 124.

Mallen, C., Peat, G., & Croft, P. (2006). Quality assessment of observational studies is not commonplace in systematic reviews. *Journal of Clinical Epidemiology, 59*, 765 - 769.

Mallik, S., Spertus, J., Reid, K., Kimberley, J., Krumholz, H., Harlan, M., et al. (2006). Depressive symptoms after acute myocardial infarction: Evidence for highest rates in younger women. *Archives of Internal Medicine, 166*(8), 876 - 883.

Martens, E., Smith, O., Winter, J., Denollet, J., & Pederson, S. (2008). Cardiac history, prior depression and personality predict course of depressive symptoms after myocardial infarction. *Psychological Medicine, 38*, 257 - 264.

Martuza, V. (1977). *Applying norm-referenced and criterion-referenced measurement in education*. Boston: Allyn & Bacon.

Mayou, R., Gill, D., Thompson, D., Day, A., Hicks, N., Volmink, J., et al. (2000). Depression and anxiety as predictors of outcome after myocardial infarction. *Psychosomatic Medicine, 62*, 212 - 219.

McCaffery, J., Frasure-Smith, N., Dube, M.-P., Theroux, P., Rouleau, G., Duan, Q., et al. (2006). Common genetic vulnerability to depressive symptoms and coronary artery disease: A review and development of candidate genes related to inflammation and serotonin. *Psychosomatic Medicine, 68*, 187 - 200.

McGue, M., & Christensen, K. (1997). Genetic and environmental contributions to depression symptomatology: evidence from Danish twins 75 years of age and older. *Journal of Abnormal Psychology, 106*, 439 - 448.

McManus, D., Pipkin, S., & Whooley, M. (2005). Screening for depression in patients with coronary heart disease (Data from the Heart and Soul Study). *American Journal of Cardiology, 96*, 1076 - 1081.

Meijer, A., Conradi, H., Bos, E., Thombs, B., Van Melle, J., & de Jonge, P. (2011). Prognostic association of depression following myocardial infarction with mortality and cardiovascular events: a meta-analysis of 25 years of research. *General Hospital Psychiatry, 33*, 203 - 216.

Mendes de Leon, C., DiLillo, V., Czajkowski, S., Norten, J., Schaefer, J., Catellier, D., et al. (2001). Psychosocial characteristics after acute myocardial infarction: The ENRICHD pilot study. *Journal of Cardiopulmonary Rehabilitation, 21*(6), 353 - 362.

Meyers, V., Gerber, Y., Benyamini, Y., Goldbourt, U., & Drory, Y. (2012). Post-myocardial infarction depression: Increased hospital admissions and reduced adoption of secondary preventative measures - A longitudinal study. *Journal of Psychosomatic Research, 72,* 5 - 10.

Mghir, R., Freed, W., Raskin, A., & Katon, W. (1995). Depression and post traumatic stress disorder among a community sample of adolescent and young adult Afghan refugees. *Journal of Nervous Mental Disorders, 183,* 24 - 30.

Mickelson, K., & Kubansky, L. (2003). Social distribution of social support: the mediating role of life events. *American Journal of Community Psychology, 32,* 265 - 281.

Mojtabai, R., & Olfson, M. (2004). Major depression in community-dwelling middle-aged and older adults: prevalence and 2-and 4-year follow-up symptoms. *Psychological Medicine, 34,* 623 - 634.

Moller-Leimkuhler, A.-M. (2007). Gender differences in cardiovascular disease and comorbid depression. *Dialogues in clinical neuroscience. Neuropsychiatry and cardiovascular disease, 9*(1), 71 - 83.

Morse, J. (2000). Determining sample size. *Qualitative Health Research, 10,* 3 - 5.

Morse, J. (2003). Principles of mixed methods and multimethod research. In A. Tashakkori & C. Teddie (Eds.), *Handbook of mixed methods in social and behavioral research.* Thousand Oaks, CA: Sage Publications.

Morse, J., & Richards, L. (2002). *Read me first for a user's guide to qualitative methods* (1st ed.). Thousand Oaks, California: Sage Publications.

Mosovich, S., Boone, R., Reichnberg, A., Bansilal, S., Shaffer, J., Dahlman, K., et al. (2008). New insights into the link between cardiovascular disease and depression. *International Journal of Clinical Practice, 62*(3), 423 - 432.

Moss-Morris, R., Weinman, J., Petrie, K., Cameron, L., & Buick, D. (2008). The Revised Illness Perception Questionnaire (IPQ-R). *Psychological Health, 17*(1), 1 - 16.

Mundt, C., Reck, C., Backenstrass, M., Kronmueller, K., & Fiedler, P. (2000). Reconfirmation of the role of life events for the timing of depressive episodes. A two-year prospective follow-up study. *Journal of Affective Disorders, 59,* 23 - 30.

Muntaner, C., Eaton, W., Miech, R., & O'Campo, P. (2004). Socioeconomic position and major mental disorders. *Epidemiologic Reviews, 26,* 53 - 62.

Naqvi, T., Rafique, A., Andreas, V., Rahban, M., Mirocha, M., & Naqvi, S. (2007). Predictors of depressive symptoms post-acute coronary syndrome. *Gender Medicine, 4*(4), 339 - 351.

Nazroo, J., Edwards, A., & Brown, G. (1997). Gender differences in the onset of depression following a shared life event: a study of couples. *Psychological Medicine, 27*, 9 - 19.

Nicholson, A., Kuper, H., & Hemingway, H. (2006). Depression as an aetiologic and prognostic factor in coronary heart disease: a meta-analysis of 6,362 events among 146,538 participants in 54 observational studies. *European Heart Journal, 27*, 2763 - 2774.

Nunnally, J., & Bernstein, L. (1994). *Psychometric theory*. New York: McGraw-Hill Higher INC.

O'brien, A. (2005). Factors shaping Indigenous mental health: An ethnographic account of growing up Koori from a Gubba perspective. *Australian Journal of Holistic Nursing, 12*, 11 - 20.

O'Campo, P., Eaton, W., & Muntaner, C. (2004). Labor market experiences, work organization, gender inequalities, and health status: results from a prospective study of US employed women. *Social Science and Medicine, 58*, 585 - 594.

O'Connor, C., Gurbel, P., & Serebruany, V. (2000). Depression and ischemic heart disease. *American Heart Journal, 140*, 63 - 69.

Oldehinkel, A., Ormel, J., & Neeleman, J. (2000). Predictors of time to remission from depression in primary care patients: Do some people benefit more from positive life change than others? *Journal of Abnormal Psychology, 109*, 299 - 307.

Olsson, I., Nordstroem, M.-L., & Arinell, H. (1999). Adolescent depression and stressful life events. *Nordic Journal of Psychiatry, 53*, 339 - 346.

Overbaugh, K. (2009). Acute coronary syndrome. *American Journal of Nursing, 109*(5), 42 - 52.

Page, A., Morrell, S., Taylor, R., Dudley, M., & Carter, G. (2007). Further increases in rural suicide in young Australian adults: secular trends, 1979 - 2003. *Journal of Social Science and Medicine, 65*(3), 442 - 453.

Parashar, S., Rumsfeld, J., Spertus, J., Reid, K., Wenger, N., Krumholz, H., et al. (2006). Time course of depression and outcome of myocardial infarction. *Archives of Internal Medicine, 166*, 2035 - 2043.

Parker, G., Hilton, T., Walsh, W., Owen, C., Heruc, G., Olley, A., et al. (2008). Timing is everything: The onset of depression and acute coronary syndrome outcome. *Biological Psychiatry, 64*, 660 - 666.

Paykel, E., Ramana, R., Cooper, Z., Hayhurst, H., Kerr, J., & Barocka, A. (1995). Residual symptoms after partial remission: an important outcome in depression. *Psychological Medicine, 25*, 1171 - 1180.

Piccinelli, M., & Wilkinson, G. (2000). Gender differences in depression. *British Journal of Psychiatry, 177*, 486 - 492.

Polit, D., & Beck, C. (2006a). The Content Validity Index: Are you sure you know what's being reported? Critique and recommendations. *Research in Nursing and Health, 29*, 489 - 497.

Polit, D., & Beck, C. (2006b). *Essentials of Nursing Research. Methods, appraisal, and utilization* (6th ed.). Philadelphia: Lippincott, Williams & Wilkins.

Portney, L., & Watkins, M. (2000). *Foundations of clinical research: applications to practice* (2nd ed.). Upper Saddle River, New Jersey: Prentice-Hall.

Power, C., Stansfeld, S., & Mathews, S. (2002). Childhood and adulthood risk factors for socioeconomic differentials in psychological distress: evidence from the 1958 British birth cohort. *Social Science and Medicine, 55*, 1989 - 2004.

Prince, M., Harwood, R., Thomas, A., & Mann, A. (1998). A prospective population-based cohort of the effects of disablement and social milieu on the onset and maintenance of late-life depression: the Gospel Oak Project VII. *Psychosocial Medicine, 28*, 337 - 350.

Rattray, J., & Jones, M. (2007). Essential elements of questionnaire design and development. *Journal of Clinical Nursing, 16*(2), 234 - 243.

Reading, R., & Reynolds, S. (2001). Debt, social disadvantage and maternal depression. *Social Science and Medicine, 53*, 441 - 453.

Reddy, P., Dunbar, J., Janus, E., Wolff, A., Bunker, S., Morgan, M., et al. (2007). Identifying depression in patients following admission for acute coronary syndrome. *Australian Journal of Rural Health, 15*, 137 - 138.

Rijsdijk, F., Sham, P., Sterne, A., Purcell, S., McGuffin, P., Farmer, A., et al. (2001). Life events and depression in a community sample of siblings. *Psychological Medicine, 31*, 401 - 410.

Ritchie, J., & Spencer, L. (1994). Qualitative data analysis for applied policy research. In A. Bryman & G. Burgess (Eds.), *Analyzing qualitative data*. (pp. 173 - 194). London: Routledge.

Ritsher, J., Warner, V., & Johnson, J. (2001). Inter-generational longitudinal study of social class and depression: a test of causation and social selection models. *British Journal of Psychiatry*, s84 - 90.

Ritter, C., Hobfoll, S., & Lavin, J. (2000). Stress, psychological resources, and depressive symptomatology during pregnancy in low-income, inner city women. *Health Psychology, 19*, 576 - 585.

Rodgers, B. (1994). Pathways between parental divorce and adult depression. *Journal of Child Psychology and Psychiatry, 35*, 1289 - 1308.

Roest, A., Thombs, B., Grace, S., Stewart, D., Abbey, S., & de Jonge, P. (2011). Somatic/affective symptoms, but not cognitive/affective symptoms, of depression after acute coronary syndrome are associated with 12-month all-cause mortality. *Journal of Affective Disorders, 131*, 151 - 163.

Rollman, B., Belnap, B., LeMenager, M., Mazumdar, S., Houck, P., Counihan, P., et al. (2009). Telephone-delivered collaborative care for treating post-CABG depression: A randomised trial. *The Journal of the American Medical Association, 302*(19), 2095 - 2103.

Rozanski, A., Blumenthal, J., & Davidson, K. (2005). The epidemiology, pathophysiology, and management of psychosocial risk factors in cardiac practice. *Journal of the American College of Cardiology, 45*, 637 - 651.

Rugulies, R. (2002). Depression as a predictor for coronary heart disease. A review and meta-analysis. *American Journal of Preventive Medicine, 23*, 51 - 61.

Rutledge, T., Reis, V., Linke, S., Greenberg, B., & Mills, P. (2006). Depression in Heart Failure. A meta-analytic review of prevalence, intervention effects, and associations with clinical outcomes. *Journal of the American College of Cardiology, 48*(8), 1527 - 1537.

Rutter, M., Caspi, A., & Moffatt, T. (2003). Using sex differences in psychopathology to study causal mechanisms: unifying issues and research strategies. *Journal of Child Psychology and Psychiatry, 44*, 1092 - 1115.

Sadock, B., & Sadock, V. (2003). *Synopsis of Psychiatry: Behavioral Sciences/Clinical Psychiatry* (9th ed.). Philadelphia, PA: Lippincott, Williams and Wilkins.

Savard, M. (2004). Bridging the communication gap between physicians and their patients with physical symptoms of depression. *Primary Care Companion Journal of Clinical Psychiatry, 6 (suppl 1)*, 17 - 24.

Schoevers, R., Beekman, A., & Deeg, D. (2000). Risk factors for depression in later life: results of prospective community based study (AMSTEL). *Journal of Affective Disorders, 59*, 127 - 137.

Schrader, G., Cheok, F., Hordacre, A., & Guiver, N. (2004). Predictors of depression three months after cardiac hospitalization. *Psychosomatic Medicine, 66*, 514 - 520.

Schrader, G., Cheok, F., Hordacre, A., & Marker, J. (2006). Predictors of depression 12 months after cardiac hospitalization: the Identifying Depression as a Comorbid Condition study. *Australian and New Zealand Journal of Psychiatry, 40*, 1025 - 1030.

Seldenrijk, A., Vogelzangs, N., van Hout, H., van Marwijk, H., Diamant, M., & Penninx, B. (2010). Depressive and anxiety disorders and risk of subclinical atherosclerosis. Findings from the Netherlands Study of Depression and Anxiety (NESDA). *Journal of Psychosomatic Research, 69*, 203 - 210.

Shamliyan, T., Kane, R., & Dickinson, S. (2010). A systematic review of tools used to assess the quality of observational studies that examine incidence or prevalence and risk factors for disease. *Journal of Clinical Epidemiology, 63*, 765 - 769.

Shapiro, P., Fedoronko, D., Epstein, L., Mirasol, E., & Desai, C. (2008). Psychiatric aspects of heart and lung disease in critical care. *Critical Care Clinics, 24*, 921 - 947.

Shimizu, Y., Yamada, S., Miyake, F., & Izumi, T. (2011). The effects of depression on the course of functional limitations in patients with chronic heart failure. *Journal of Cardiac Failure, 17*(6), 503 - 510

Skapinakis, P. (2007). Socioeconomic position and common mental disorders: what we need to know? *International Journal of Epidemiology, 36*, 786 - 788.

Smit, F., Ederveen, A., & Cuipers, P. (2006). Opportunities for cost-effective prevention of late-life depression: an epidemiological approach. *Archives of General Psychiatry, 63*, 290 - 296.

Smit, F., Smit, N., Schoevers, R., Deeg, D., Beekman, A., & Cuijpers, P. (2008). An epidemiological approach to depression prevention in old age. *American Journal of Geriatric Psychiatry, 16*(6), 444 - 453.

Smith, P., & Blumenthal, J. (2011). Psychiatric and behavioral aspects of cardiovascular disease. *Rev Esp Cardiol. , 64*(10), 924 - 933.

Snyderman, D., & Wynn, D. (2009). Depression in cancer patients. *Primary Care 36*, 703 - 719.

Solomon, D., Keller, M., Leon, A., Mueller, T., Shea, T., Warshaw, M., et al. (1997). Recovery from major depression: a 10 - year prospective follow-up across multiple episodes *Archives of General Psychiatry, 54*, 1001 - 1006.

Spielberger, C., Gorsuch, R., Lushene, R., Vagg, P., & Jacobs, G. (1983). *Manual for the State-Trait Anxiety Inventory (form Y)*. Palo Alto, (CA): Consulting Psychologists Press.

Spijker, J., Bijl, R., de Graft, R., & Nolen, W. (2001). Determinants of poor 1-year outcome of DSM-III-R major depression in the general population. Results from the Netherlands mental health survey and incidence study (NEMESIS). *Acta Psychiatrica Scandanavica, 103*, 122 - 130.

Spijkerman, T., de Jonge, P., van den Brink, R., Jansen, J., May, J., Crijns, H., et al. (2005b). Depression following myocardial infarction: first-ever versus ongoing and recurrent episodes. *General Hospital Psychiatry, 27*, 411 - 417.

Spijkerman, T., van den Brink, R., Jansen, J., Crijns, H., & Ormel, J. (2005a). Who is at risk of post-MI depressive symptoms? *Journal of Psychosomatic Research, 58*, 425 - 432.

Stafford, L., Berk, M., & Jackson, D. (2007). Validity of the Hospital Anxiety and Depression Scale and Patient Health Questionnaire-9 to screen for depression in patients with coronary artery disease. *General Hospital Psychiatry, 29*, 417 - 424.

Stafford, L., Berk, M., & Jackson, H. (2009). Are illness perceptions about coronary disease predictive of depression and quality of life outcomes? *Journal of Psychosomatic Research, 66*, 211 - 220.

Stansfeld, S., & Rasul, F. (2006). Psychosocial factors, depression and illness. In A. Steptoe (Ed.), *Depression and Physical Illness.* Cambridge: Cambridge University Press.

Stansfield, S., Head, J., Fuhrer, R., Wardle, J., & Cattell, V. (2003). Social inequalities in depressive symptoms and physical functioning in the Whitehall II study: exploring a common cause explanation. *Journal of Epidmiol. Community Health, 57*, 361 - 367.

Steptoe, A. (2007a). Depression and the development of coronary heart disease. In A. Steptoe (Ed.), *Depression and physical illness.* (1st ed.). New York: Cambridge University Press.

Steptoe, A. (2007b). Integrating clinical with biobehavioural studies of depression and physical illness. In A. Steptoe (Ed.), *Depression and physical illness.* Cambridge: Cambridge University Press.

Steptoe, A., Magid, K., Edwards, S., Brydon, L., Hong, Y., & Erusalimsky, J. (2003). The influence of psychological stress and socioeconomic status on platelet activation in men. *Atherosclerosis, 168*, 57 - 63.

Stewart, J., Janicki, D., Muldoon, M., Sutton-Tyrell, K., & Kamarck, T. (2007). Negative emotions and 3 year progression of subclinical atherosclerosis. *Archives of General Psychiatry, 64*, 225 - 233.

Strik, J., Denollet, J., Lousberg, R., & Honig, A. (2003b). Comparing symptoms of depression and anxiety as predictors of cardiac events and increased health care consumption after myocardial infarction. *Journal of the Amercian College of Cardiology, 42*(10), 1801 - 1807.

Strik, J., Honig, A., Lousberg, R., & Denollet, J. (2001a). Sensitivity and specificity of observer and self-report questionnaires in major and minor depression following myocardial infarction. *Psychosomatic Medicine, 42*, 423 - 428.

Strik, J., Honig, A., Lousberg, R., van Os, J., van den Berg, E., & van Praag, H. (2001b). Clinical correlates of depression following myocardial infarction. *International Journal of Psychiatry in Medicine, 31*(3), 255 - 264.

Strik, J., Honig, A., & Maes, M. (2001c). Depression and myocardial infarction: relationship between heart and mind. *Progressive Neuro-Psychopharmacology and Biological Psychiatry, 25*(879 - 892)

Strik, J., Lousberg, R., Cheriex, E., & Honig, A. (2004). One year cumulative incidence of depression following myocardial infarction and impact on cardiac outcome. *Journal of Psychosomatic Research, 56*, 59 - 66.

Strik, J., van Praag, H., & Honig, A. (2003a). Depressie na een eerste hartinfarct: Een prospectieve studie naar incientie, prognose, risicofactoren en behandeling. *Tijdschrift voor gerontologie en geriatrie, 34*(3), 104 - 112.

Sullivan, P., Neale, M., & Kendler, K. (2000). Genetic epidemiology of major depression: review and meta-analysis. *American Journal of Psychiatry, 157*(10), 1552 - 1562.

Tashakkori, A., & Teddie, C. (Eds.). (2003). *Handbook of mixed methods in social and behavioral research* Thousand Oaks, CA: Sage Publications.

Thombs, B., Bass, E., Ford, D., Stewart, K., Tsilidis, K., Patel, U., et al. (2006). Prevalence of depression in survivors of acute myocardial infarction. Review of the evidence. *Journal of General Internal Medicine, 21*, 30 - 38.

Thombs, B., de Jonge, P., Coyne, J., Whooley, M., Frasure-Smith, N., & Mitchell, A. (2008). Depression screening and patient outcomes in cardiovascular care: a systematic review. *Journal of the American Medical Association, 300*, 2161 - 2171.

Torpy, J. (2011). Heart Failure. *Journal of American Medical Association, 306*(19), 2175.

Travella, J., Forrester, A., Schultz, S., & Robinson, R. (1994). Depression following myocardial infarction: a one year longitudinal study. *International Journal of Psychiatry Medicine, 24*(4), 357 - 369.

Turvey, C., Conwell, Y., & Jones, M. (2002). Risk factors for late-life suicide: a prospective community-based study. *American Journal of Geriatric Psychiatry, 10*, 398 - 406.

Ustan, T. (2000). Cross-national epidemiology of depression and gender. *Journal of Gender Specific Medicine, 3*, 54 - 58.

Van der Kooy, K., van Hout, H., Marwijk, H., Marten, H., Stehouwer, C., & Beekman, A. (2007). Depression and the risk of cardiovascular diseases: systematic review and meta-analysis. *International Journal of Geriatric Psychiatry, 22*, 613 - 626.

van Melle, J., de Jonge, P., Kuyper, A., Honig, A., Schene, A., Crijns, H., et al. (2006). Prediction of depressive disorder following myocardial infarction. *International Journal of Cardiology, 109*(1), 88 - 94.

van Melle, J., de Jonge, P., Ormel, J., Crijns, H., van Veldhuisen, D., Honig, A., et al. (2005). Relationship between left ventricular dysfunction and depression following myocardial infarction: data from the MIND-IT *European Heart Journal, 26*, 2650 - 2656.

van Melle, J., de Jonge, P., Spijkerman, T., Tijssen, J., Ormel, J., van Veldhuisen, D., et al. (2004). Prognostic association of depression following myocardial infarction with mortality and cardiovascular events: a meta-analysis. *Psychosomatic Medicine, 66*, 814 - 822.

Viera, A., & Garrett, J. (2005). Understanding inter-observer agreement: the kappa statistic. *Family Medicine, 37*(5), 360 - 363.

Vink, D., Aartsen, M., & Schoevers, R. (2008). Risk factors for anxiety and depression in the elderly: a review. *Journal of Affective Disorders, 106*, 29 - 44.

Wade, T., & Kendler, K. (2000). The relationship between social support and major depression: Cross-sectional, longitudinal, and genetic perspectives. *Journal of Nervous and Mental Disease, 188*, 251 - 258.

Wampold, B., Miami, T., Baskin, T., & Callen, T. (2002). A meta-(re) analysis of the effects of cognitive therapy versus "other therapies" for depression. *Journal of Affective Disorders, 68*(2), 159 - 165.

Watkins, L., Schneiderman, N., Blumenthal, J., Sheps, D., Catellier, D., Taylor, C., et al. (2003). Cognitive and somatic symptoms of depression are associated with medical comorbidity in patients after acute myocardial infarction. *American Heart Journal, 146*, 48 - 54.

Weinman, J., Petrie, K., & Moss-Morris, R. (1996). The Illness Perception Questionnaire: a new method for assessing the cognitive representation of illness. *Psychological Health, 11*, 431 - 445.

Weissman, M., Gammon, G., Merikangas, K., Warner, V., Prusoff, B., & Sholomskas, D. (1987). Children of depressed parents: increased psychopathology and early onset of major depression. *Archives of General Psychiatry, 44*, 847 - 853.

Weissman, M., Warner, V., Wickramaratne, P., Moreau, D., & Olfson, M. (1997). Offspring of depressed parents: 10 years later. *Archives of General Psychiatry, 54*, 932 - 940.

Weissman, M., Wickramaratne, P., Nomura, Y., Warner, V., Verdeli, H., Pilowsky, D., et al. (2005). A 3-generation study. *Archives of General Psychiatry, 62*, 29 - 36.

White, J., Towers, S., Turner, A., & Hambridge. (2013). Electronic screening and decision support for poststroke depression: An exploration of doctor's and patient's perceptions of acceptability. *Archives of Physical Medicine and Rehabilitation, 94*, 788 - 790.

Whitehead, D., Strike, P., Perkins-Porras, L., & Steptoe, A. (2005). Frequency of distress and fear of dying during acute coronary syndromes and consequences for adaptation. *American Journal of Cardiology, 96*, 1512 - 1516.

Whooley, M. (2009). To screen or not to screen? *Journal of the American College of Cardiology, 54*, 891 - 893.

Wilhelm, K., Mitchell, P., Slade, T., Brownhill, S., & Andrews, G. (2003). Prevalence and correlates of DSM-IV major depression in an Australian national survey. *Journal of Affective Disorders, 75*, 155 - 162.

Williamson, D., Birmaher, B., Axelson, D., Ryan, N., & Dahl, R. (2004). First episode of depression in children at low and high familial risk for depression. *Journal of American Academic Child Adolescent Psychiatry, 43*, 291 - 297.

Win, S., Parakh, K., Eze-Nliam, C., Gottdiener, J., Kop, W., & Ziegelstein, R. (2011). Depressive symptoms, physical inactivity and risk of cardiovascular mortality in older adults: the Cardiovascular Health Study. *Heart, 97*, 500 - 505.

Wittchen, H., Kessler, R., Pfister, H., & Lieb, R. (2000). Why do people with anxiety disorders become depressed? A prospective-longitudinal community study. *Acta Psychiatr Scand, 101*, 14 - 23.

Wulsin, L., & Singal, B. (2003). Do depressive symptoms increase the risk for the onset of coronary disease? A systematic quantitative review. *Psychosomatic Medicine, 65*, 201 - 210.

Ye, S., Muntner, P., Daichi, S., Judd, S., Richman, J., Davidson, K., et al. (2013). Behavioral mechanisms, elevated depressive symptoms, and the risk for myocardial infarction or death in individuals with coronary heart disease. *Journal of American College of Cardiology, 61*, 622 - 630.

Ziegelstein, R., Kim, S., Kao, D., Fauerbach, J., Thombs, B., McCann, U., et al. (2005). Can doctors and nurses recognize depression in patients hospitalized with acute myocardial infarction in the absence of formal screening? *Psychosomatic Medicine, 67*(3), 393 - 397.

Zieglestein, R., Fauerbach, J., Stevens, S., Romanelli, J., Richter, D., & Bush, D. (2000). Patients with depression are less likely to follow recommendations to reduce cardiac risk during recovery from a myocardial infarction. *Archives of Internal Medicine, 160*(12), 1818 - 1823.

Zigmond, A., & Snaith, R. (1983). The Hospital Anxiety and Depression Scale. *Acta Psychiatr Scand, 67*, 361 - 370.

Appendix A: Summary of Included Articles

Authors	Study design/ evidence grade/definition of 'depression'	Participants	Setting/Cardiac diagnosis	Risk factors associated with depression
Aktar et al., 2004 Paskistan	Cross-sectional data observational study **EBM level 4** Depressive symptoms (HADS)	100	During admission, AMI	Female, younger age, low socio-economic status
Cheok et al., 2003* Australia	Cross-sectional data Prospective, observational cohort **EBM level 2b** Depressive symptoms (HADS; CES-D)	833	During admission, AMI, CHF, arrhythmia, CABG, angioplasty	Female, younger age, lower education, divorce, unemployment
Frasure-Smith et.al., 1999 Canada	Cross-sectional combined data from 2 observational studies **EBM level 2b** Depressive symptoms (BDI)	896	During admission, AMI	Female, advanced Killip Class, impaired LVEF (≤ 35%)
Forrester et al., 1992 USA	Cross-sectional data observational study **EBM level 2b** Structured clinical interview (DSM III)	129	During admission (within 10 days), AMI	Female, prior mood disorder, large MI, functional impairment, quality of relationships
Lesperance et al., 2000 Canada	Cross-sectional data, observational study **EBM level 2b** Depressive symptoms (BDI)	430	During admission, unstable angina	Female, current smoking, prior CABG, prescription of nitrates (anti-anginal drugs)

Note. * = One of three papers describing the IDACC study data at baseline, 3 months and 12 months; AMI = acute myocardial infarction; BDI = Beck Depression Inventory; CABG = coronary artery bypass grafts; CES- D= Center for Epidemiological Studies Depression Scale; CHF = congestive heart failure; DSM = Diagnostic and Statistical Manual of mental disorders; EBM = Evidence Based Medicine; HADS = Hospital Anxiety Depression Scale; LVEF = left ventricular ejection fraction; MI = myocardial infarction.

Authors	Study design/ evidence grade/definition of 'depression'	Participants	Setting/Cardiac diagnosis	Risk factors associated with depression
Linfante et al., 2003 USA	Cross-sectional data, observational study **EBM level 2b** Depressive symptoms (PRIME-MD)	304 (females only)	During admission, ACS, angina, CABG, PTCA	Younger age (≤ 65 years), reduced exercise (30 mins ≤ 3x per wk), having dependents
Mallik et al., 2006 USA	Cross-sectional data, observational study **EBM level 2b** Depressive symptoms (PHQ-9)	2,498	During hospital admission, AMI	Afr. American, younger age, lower social support, low SE indicators, prior MI, comorbid conditions
Mendes de Leon et al., 2001 USA	Cross-sectional data, observational study **EBM level 4** Depressive symptoms (BDI)	88	AMI	Younger aged females, females with lower levels of social support
Naqvi et al., 2007 USA	Cross-sectional data survey design **EBM level 2b** Depressive symptoms (ZSDS)	944	Recently discharged, ACS	Female, prior MI, history of smoking, diabetes mellitus
Watkins et al., 2003 USA	Cross-sectional data observational study **EBM level 2b** Depressive symptoms (BDI)	2, 481	During hospital admission, AMI	Female, younger age, lower education, medical comorbidity,

Note. ACS = acute coronary syndrome; Afr. = African; AMI = acute myocardial infarction; BDI = Beck Depression Inventory; CABG = coronary artery bypass grafts; EBM = Evidence Based Medicine; MI = myocardial infarction; PHQ-9 = Patient Health Questionnaire 9; PRIME-MD = Prime Care Evaluation of Mental Disorders; PTCA = percutaneous transluminal coronary angioplasty; SE = socio-economic; wk = week; ZSDS = Zung Self-rating Depression Scale.

Authors	Study design/ evidence grade/definition of 'depression'	Participants	Setting/Cardiac diagnosis	Risk factors associated with depression
Bjerkeset et al., 2005 Norway	Prospective, population-based cohort **EBM level 4** Depressive symptoms (HADS)	512	Community health survey, First MI between baseline and 5 year follow-up visit	Female, past history of depression, daily smoking, Obesity (BMI ≥ 30)
Dickens et al., 2004 UK	Prospective, observational cohort **EBM level 2b** Depressive symptoms (HADS)	314	Retrospective assessment of depression, baseline during admission for AMI, 12 months follow-up visit	Female, younger age, no close confidant, Life events, psychiatric ph, separation from mother, health problems, angina
Dickens et al., 2008 UK	Prospective, observational cohort **EBM level 4b** Depressive symptoms (HADS)	269	During admission for first MI, 6 months and 12 month follow-up visit	Negative illness perceptions at base-line
Hammond et al., 2008 Australia	Prospective, observational cohort **EBM level 2b** Depressive symptoms (GDS-15)	155 > 60 years	During acute admission for ACS, CHF, arrhythmia,	Hospitalised in the previous 6 months, angina, hospital stay >4 days, impaired level of subjective social support
Lesperance et al., 1996 Canada	Prospective, observational cohort **EBM level 2b** Modified interview schedule (DIS; BDI)	222	During admission for AMI, 6 months and 12 month follow-up visits	Younger age (≤ 65 yrs), Prior history of depression, Presence of depressive symptoms in hospital

Note. ACS = acute coronary syndrome; AMI = acute myocardial infarction; BDI = Beck Depression Inventory; BMI = Body Mass Index; CHF = congestive heart failure; DIS = Diagnostic Interview Schedule; EBM = Evidence Based Medicine; GDS = Geriatric Depression Scale; HADS = Hospital Anxiety Depression Scale; MI = myocardial infarction; ph = past history.

Authors	Study design/ evidence grade/definition of 'depression'	Participants	Setting/Cardiac diagnosis	Risk factors associated with depression
Martens et al., 2008 Netherlands	Prospective, observational cohort **EBM level 4** Depressive symptoms (BDI)	287	During admission for AMI, 2 months and 12 months follow-up	Type – D personality, previous cardiac history, past history of MDD, medical comorbidity
Mayou et al., 2000 UK	Prospective, epidemiological survey **EBM level 4** Depressive symptoms (HADS)	347	During admission for MI, 3 months and 12 months follow-up	Younger age, prior psychological difficulties, longer hospital stay, in-hospital distress
Schrader et al., 2004* Australia	Prospective, observational cohort **EBM level 2b** Depressive symptoms (HADS; CES-D)	833	3 month follow-up post admission for AMI, CHF, arrhythmia, CABG, angioplasty	Depressive symptoms in hospital, younger age, smoking, cardiac ph, self-report ph depression/stress
Schrader et al., 2006* Australia	Prospective, observational cohort **EBM level 2b** Depressive symptoms (HADS; CES-D)	739	12 month follow-up post admission for AMI, CHF, arrhythmia, CABG, angioplasty	Depression during index admission, self-report ph depression/stress, smoking
Spijkerman et al., 2005a Netherlands	Prospective, observational cohort **EBM level 2b** Depressive symptoms (BDI)	502	During admission for MI, 3, 6 and 12 month follow-up	Pre-MI vital exhaustion, ph. depression, living alone, ↓ e.s.t. work load, female, admission length, LVEF (< 40%)

Note. * = One of three papers describing the IDACC study data at baseline, 3 months and 12 months; AMI = acute myocardial infarction; BDI = Beck Depression Inventory; CABG = coronary artery bypass grafts; CES = Center for Epidemiological Studies Depression Scale; CHF = congestive heart failure; EBM = Evidence Based Medicine; e.s.t. = exercise stress test; HADS = Hospital Anxiety Depression Scale; LVEF = left ventricular ejection fraction; MDD = major depressive disorder; MI = myocardial infarction; ph = past history; ↓ = reduced/lower.

Authors	Study design/ evidence grade/definition of 'depression'	Participants	Setting/Cardiac diagnosis	Risk factors associated with depression
Spijkerman et al., 2005b Netherlands	Prospective, observational cohort **EBM level 2b** Structured clinical interview (ICD-10 criteria for depressive disorder)	468	During admission for MI, 3, 6, and 12 months follow-up	**↓ education, smoking, ↑neuroticism score. *** Female, in hospital revascularization, LVEF (< 40%), arrhythmic events. Younger age.
Stafford et al., 2009 Australia	Prospective survey **EBM level 4** Depressive symptoms (HADS)	193	3 months and 9 months post-admission for MI, PTCA, CABG	Negative illness beliefs re: poorer personal control and more serious life consequences, neuroticism
Strik et al., 2001a Netherlands	Prospective, matched, case-control study design **EBM level 3b** Clinical interview (DSM-III-R; SCL-90; Zung)	35	Following first AMI, Sample with diagnosed depression vs matched non-depressed controls	Benzodiazepines use, cardiac complications, prior depression, smoking
Strik et al., 2003 Netherlands	Data from prospective, consecutive cohorts **EBM level 2b** Structured clinical interview (DSM-IV; HADS; BDI; SCL-90, ZSDS)	412	During admission for MI, follow-up visits every 3 months over a 1 to 6 year period	Female, ph depression, Personality traits, old age, smoking, complications, benzodiazepines use

Note. ** = In patients with a past history of depression; *** = In patients with no past history of depression; AMI = acute myocardial infarction; BDI = Beck Depression Inventory; CABG = coronary artery bypass grafts; DSM = Diagnostic and Statistical Manual of mental disorders; EBM = Evidence Based Medicine; HADS = Hospital Anxiety Depression Scale; ICD-10 = International Classification of Diseases, 10th revision; LVEF = left ventricular ejection fraction; MI = myocardial infarction; ph = past history; PTCA = percutaneous transluminal coronary angioplasty; SCL-90 = Symptom Check List 90; ZSDS = Zung Self-rating Depression Scale; ↑ = increased; ↓ = reduced/lower.

Authors	Study design/ evidence grade/definition of 'depression'	Participants	Setting/Cardiac diagnosis	Risk factors associated with depression
van Melle et al., 2005**** Netherlands	Prospective, observational cohort **EBM level 2b** Structured clinical interview (ICD-10; BDI)	1, 989	During admission for AMI, 3, 6, 9 and 12 months follow-up	Graded relationship between LV dysfunction and depression
van Melle et al., 2006 **** Netherlands	Prospective, observational cohort **EBM level 2b** Structured clinical interview (ICD-10; BDI)	2, 177	During admission for AMI, 3, 6, 9 and 12 months follow-up	Depressive symptoms in hospital, younger age (< 60 years), reduced LVEF (≤ 30%)
Whitehead et al., 2005 UK	Prospective, observational cohort **EBM level 2b** Depressive symptoms (BDI)	184	During admission for ACS, 1 week and 3 months follow-up	High levels of in-hospital distress and fear of dying

Note. **** = One paper from same MIND-IT study data; ACS = acute coronary syndrome; AMI = acute myocardial infarction; BDI = Beck Depression Inventory; EBM = Evidence Based Medicine; ICD-10 = International Classification of Diseases, 10th revision; LV = left ventricular; LVEF = left ventricular ejection fraction.

Appendix B: Oxford Centre of Evidence-Based Medicine Levels of Evidence (2009)

Level	Therapy/Prevention, Aetiology/Harm	Prognosis	Diagnosis	Differential diagnosis/symptom prevalence study	Economic and decision analyses
1a	SR (with homogeneity*) of RCTs	SR (with homogeneity*) of inception cohort studies; CDR† validated in different populations	SR (with homogeneity*) of Level 1 diagnostic studies; CDR† with 1b studies from different clinical centres	SR (with homogeneity*) of prospective cohort studies	SR (with homogeneity*) of Level 1 economic studies
1b	Individual RCT (with narrow Confidence Interval‡)	Individual inception cohort study with > 80% follow-up; CDR† validated in a single population	Validating** cohort study with good††† reference standards; or CDR† tested within one clinical centre	Prospective cohort study with good follow-up****	Analysis based on clinically sensible costs or alternatives; systematic review(s) of the evidence; and including multi-way sensitivity analyses
1c	All or none§	All or none case-series	Absolute SpPins and SnNouts††	All or none case-series	Absolute better-value or worse-value analyses ††††
2a	SR (with homogeneity*) of cohort studies	SR (with homogeneity*) of either retrospective cohort studies or untreated control groups in RCTs	SR (with homogeneity*) of Level >2 diagnostic studies	SR (with homogeneity*) of 2b and better studies	SR (with homogeneity*) of Level >2 economic studies
2b	Individual cohort study (including low quality RCT; e.g., <80% follow-up)	Retrospective cohort study or follow-up of untreated control patients in an RCT; Derivation of CDR† or validated on split-sample§§§ only	Exploratory** cohort study with good††† reference standards; CDR† after derivation, or validated only on split-sample§§§ or databases	Retrospective cohort study, or poor follow-up	Analysis based on clinically sensible costs or alternatives; limited review(s) of the evidence, or single studies; and including multi-way sensitivity analyses
2c	"Outcomes" Research; Ecological studies	"Outcomes" Research		Ecological studies	Audit or outcomes research
3a	SR (with homogeneity*) of case-control studies		SR (with homogeneity*) of 3b and better studies	SR (with homogeneity*) of 3b and better studies	SR (with homogeneity*) of 3b and better studies
3b	Individual Case-Control Study		Non-consecutive study; or without consistently applied reference standards	Non-consecutive cohort study, or very limited population	Analysis based on limited alternatives or costs, poor quality estimates of data, but including sensitivity analyses incorporating clinically sensible variations
4	Case-series (and poor quality cohort and case-control studies§§)	Case-series (and poor quality prognostic cohort studies***)	Case-control study, poor or non-independent reference standard	Case-series or superseded reference standards	Analysis with no sensitivity analysis
5	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on physiology, bench research or "first principles"	Expert opinion without explicit critical appraisal, or based on economic theory or "first principles"

Produced by Bob Phillips, Chris Ball, Dave Sackett, Doug Badenoch, Sharon Straus, Brian Haynes, Martin Dawes since November 1998. Updated by Jeremy Howick March 2009.

Notes
Users can add a minus-sign "-" to denote the level of that fails to provide a conclusive answer because:

EITHER a single result with a wide Confidence Interval
OR a Systematic Review with troublesome heterogeneity.
Such evidence is inconclusive, and therefore can only generate Grade D recommendations.

*	By homogeneity we mean a systematic review that is free of worrisome variations (heterogeneity) in the directions and degrees of results between individual studies. Not all systematic reviews with statistically significant heterogeneity need be worrisome, and not all worrisome heterogeneity need be statistically significant. As noted above, studies displaying worrisome heterogeneity should be tagged with a "-" at the end of their designated level.
†	Clinical Decision Rule. (These are algorithms or scoring systems that lead to a prognostic estimation or a diagnostic category.)
‡	See note above for advice on how to understand, rate and use trials or other studies with wide confidence intervals.
§	Met when all patients died before the Rx became available, but some now survive on it; or when some patients died before the Rx became available, but none now die on it.
§§	By poor quality cohort study we mean one that failed to clearly define comparison groups and/or failed to measure exposures and outcomes in the same (preferably blinded), objective way in both exposed and non-exposed individuals and/or failed to identify or appropriately control known confounders and/or failed to carry out a sufficiently long and complete follow-up of patients. By poor quality case-control study we mean one that failed to clearly define comparison groups and/or failed to measure exposures and outcomes in the same (preferably blinded), objective way in both cases and controls and/or failed to identify or appropriately control known confounders.
§§§	Split-sample validation is achieved by collecting all the information in a single tranche, then artificially dividing this into "derivation" and "validation" samples.
††	An "Absolute SpPin" is a diagnostic finding whose Specificity is so high that a Positive result rules-in the diagnosis. An "Absolute SnNout" is a diagnostic finding whose Sensitivity is so high that a Negative result rules-out the diagnosis.
‡‡	Good, better, bad and worse refer to the comparisons between treatments in terms of their clinical risks and benefits.
†††	Good reference standards are independent of the test, and applied blindly or objectively to applied to all patients. Poor reference standards are haphazardly applied, but still independent of the test. Use of a non-independent reference standard (where the 'test' is included in the 'reference', or where the 'testing' affects the 'reference') implies a level 4 study.
††††	Better-value treatments are clearly as good but cheaper, or better at the same or reduced cost. Worse-value treatments are as good and more expensive, or worse and the equally or more expensive.
**	Validating studies test the quality of a specific diagnostic test, based on prior evidence. An exploratory study collects information and trawls the data (e.g. using a regression analysis) to find which factors are 'significant'.
***	By poor quality prognostic cohort study we mean one in which sampling was biased in favour of patients who already had the target outcome, or the measurement of outcomes was accomplished in <80% of study patients, or outcomes were determined in an unblinded, non-objective way, or there was no correction for confounding factors.
****	Good follow-up in a differential diagnosis study is >80%, with adequate time for alternative diagnoses to emerge (for example 1-6 months acute, 1 - 5 years chronic)

Grades of Recommendation

A	consistent level 1 studies
B	consistent level 2 or 3 studies ***or*** extrapolations from level 1 studies
C	level 4 studies ***or*** extrapolations from level 2 or 3 studies
D	level 5 evidence ***or*** troublingly inconsistent or inconclusive studies of any level

"Extrapolations" are where data is used in a situation that has potentially clinically important differences than the original study situation.

Appendix C: Risk Factors for Depression with Oxford Centre of EBM Grades of Recommendation (2009)

Risk factors for depression by domain	Number of studies where the risk factor is associated with depression in cross-sectional data	Number of studies where the risk factor is associated with depression in prospective data	Oxford Centre of EBM Grades of Recommendation and comments
Psychological			
History of depressive disorder, self reported stress or anxiety Differing criteria/measurement: Self-report history of previous depression diagnosis, anxiety or stress Lifetime diagnosis of MDD according to DSM-III-R, DSM-IV or ICD-10 criteria.	**6 level 2b studies:** Dickens et al. (2004) (prior to MI; in hospital) Lesperance et al. (1996) Spijkerman et al. (2005a) Forrester et al. (1992) Mallik et al. (2006) Cheok et al. (2003) **1 level 4 study:** Mayou et al. (2000)	**4 level 2b studies:** Schrader et al. (2004) Spijkerman et al. (2005a) Lesperance et al. (1996) Strik et. al. (2003) **1 level 3b study:** Strik et al. (2001a) **2 level 4 studies:** Bjerkeset et al. (2005) Martens et al. (2008)	• Consistent level 2b/3b studies • Both prospective and cross-sectional studies in cardiac samples • Large amount of supporting evidence from prospective studies in psychiatric literature • **EBM grade B**
Depressive symptoms present in hospital Various scales used to measure depressive symptoms: CES-D; BDI; HADS		**3 level 2b studies:** Schrader et al. (2004) Lesperance et al. (1996) van Melle et al. (2006) **1 level 4 study:** Mayou et al. (2000)	• Consistent level 2b studies • Prospective studies in cardiac samples • Supporting evidence from prospective studies in psychiatric literature • **EBM grade B**

Note. BDI = Beck Depression Inventory; DSM = Diagnostic and Statistical Manual of mental disorders; EBM = Evidence Based Medicine; HADS = Hospital Anxiety Depression Scale; ICD-10 = International Classification of Diseases, 10th revision; MDD = major depressive disorder; MI = myocardial infarction.

Trait Neuroticism as measured by NEO-FFI; Eysenck Personality Questionnaire		**2 level 2b studies:** Strik et al. (2003) Spijkerman et al. (2005b) **1 level 4 study:** Stafford et al. (2009)	• Some limited level 2b studies • Prospective studies in cardiac samples • Supporting evidence from psychiatric literature • **Limited grade B evidence**
Introversion as measured by Eysenck Personality Questionnaire		**1 level 2b study:** Strik et al. (2003)	• Limited level 2b evidence • Prospective study in cardiac sample • Supporting evidence in psychiatric literature • **Limited grade B evidence**
In hospital anxiety as measured by State-Trait Anxiety Inventory	**1 level 2b study:** Frasure-Smith et al. (1999)		• Limited level 2b evidence • Cross-sectional study in cardiac sample • Supporting evidence in psych. literature for co-morbidity of depression and anxiety
Prescription of benzodiazepines in hospital (alprazolam, oxazepam, temazepam, lorazepam, and nitrazepam		**1 level 3b study:** Strik et al. (2001a) **1 level 2b study:** Strik et al. (2003)	• Limited level 2b/3b evidence • Prospective studies in cardiac sample • **Limited grade B**

Note. NEO-FFI = NEO Five-Factor Inventory.

Acute distress/fear of dying in hospital assessed by 3 items: "I was frightened when the symptoms came on," "I thought that I might be dying when the symptoms came on", and "I found my cardiac event stressful".		**1 level 2b study:** Whitehead et al. (2005)	• Limited level 2b evidence • Prospective study in cardiac sample • Large amount of supporting evidence in psychiatric literature for co-morbidity of depression and anxiety • **Limited grade B**
Negative perceptions re cardiac diagnosis as measured by the Illness Perception Questionnaire (IPQ) and IPQ-R (revised because of psychometric problems with IPQ)		**2 level 4 studies:** Dickens et al. (2008) Stafford et al. (2009)	• Limited level 4 evidence • Prospective studies in cardiac sample • **Limited grade C evidence**
Life event in year prior to MI retrospectively assessed by the Life Events and Difficulties Schedule	**1 level 2b study:** Dickens et al. (2004) (data collected retrospectively not prospectively)		• Limited level 2b evidence • Cross-sectional study in cardiac sample • Large amount of supporting evidence in psychiatric literature for life events as risk factor for depression • **Limited level B evidence**

Note. IPQ = Illness Perception Questionnaire; IPQ-R = Illness Perception Questionnaire Revised; MI = myocardial infarction.

Pre MI vital exhaustion Defined by Appels (author of Maastrict Questionnaire) as a state which is present when an individual complains of unusual fatigue, decreasing energy and feeling dejected or defeated.		**1 level 2b study:** Spijkerman et al. (2005a)	• Maastrict Questionnaire issues and retrospective data collection that has limited the quality of evidence specifically regarding vital exhaustion as RF for depression • **Limited level D evidence**
Expressed anger as measured by Spielberger Anger Expression Scale	**1 level 2b study:** Frasure-Smith et al. (1999)		• Limited level 2b evidence • Cross-sectional study in cardiac sample only • Supporting evidence for anger and irritability as symptoms of current depression in psych literature. • **Limited level B evidence**
Type 'D' personality as measured the Type-D Scale (Denollet, 2005) based on 2 sub-scales, negative affectivity and social inhibition.		**1 level 4 study:** Martens et al. (2008)	• Limited level 4 evidence • Prospective study in cardiac sample • **Limited level C evidence**

Note. MI = myocardial infarction; RF = risk factor.

Demographic			
Female gender	**9 level 2b studies:** Dickens et al. (2004) (prior to MI) Lesperance et al. (1996) Forrester et al. (1992) Frasure-Smith et al. (1999) Mallik et al. (2006) Watkins et al. (2003) Naqvi et al. (2007) Cheok et al. (2003) Lesperance et al. (2000) **2 level 4 studies:** Mendes de Leon et al. (2001) Aktar et al. (2004)	**3 level 2b studies:** Spijkerman et al. (2005a) Spijkerman et al. (2005b) Strik et al. (2003) **1 level 4 study:** Bjerkeset et al. (2005)	• Consistent level 2b studies • Both prospective and cross-sectional studies in cardiac samples • Large amount of supporting evidence from prospective studies in psychiatric literature • **EBM grade B**

Note. EBM = Evidence Based Medicine; MI = myocardial infarction.

Younger age Differing definitions: • ≤54 yrs Schrader et. al. (2004); Cheok et. al. (2003) • ≤ 60 yrs van Melle et. al. (2006) • ≤ 60 yrs Mendes de Leon et. al. (2001) • ≤ 65 yrs Lesperance et. al. (1996) Linfante et. al. (2003)	**5 level 2b studies:** Dickens et al. (2004) (depression prior to MI admission; depression in hospital) Mallik et al. (2006) Watkins et al. (2003) Linfante et al. (2003) Cheok et al. (2003) **3 level 4 studies:** Mendes de Leon et al. (2001) Mayou et al. (2000) Aktar et al. (2004)	**4 level 2b studies:** Schrader et al. (2004) Lesperance et al. (1996) van Melle et al. (2006) Spijkerman et al. (2005b)	• Consistent level 2b studies • Both prospective and cross-sectional studies in cardiac samples • **EBM grade B**
Older age (Not accurately defined in paper)		**1 level 4 study:** Bjerkeset et al. (2005)	• Limited level 4 evidence • Prospective study in cardiac sample • Evidence for late-onset depression in psych literature • Age poorly defined • **Limited level C evidence**
Ethnicity African Americans	**1 level 2b study:** Mallik et al. (2006) (US study)		• Limited level 2b evidence • Cross-sectional study in cardiac sample • Not directly applicable to Australian population • **Limited level B evidence**

Note. EBM = Evidence Based Medicine; MI = myocardial infarction.

Behavioural			
Smoking: defined as current smoking on admission or daily smoking at baseline	**4 level 2b studies:** Mallik et al. (2006) (RF for women only) Naqvi et al. (2007) Cheok et al. (2003) Lesperance et al. (2000) **1 level 4 study:** Mayou et al. (2000)	**2 level 2b studies:** Schrader et al. (2004) Spijkerman et al. (2005b) **1 level 4 study:** Bjerkeset et al. (2005)	• Consistent level 2b studies • Both prospective and cross-sectional studies in cardiac samples • Large amount of supporting evidence from psychiatric literature for association of smoking with depression • **EBM grade B**
Difficulty stopping smoking defined as not being able to stop smoking after MI		**1 level 2b:** Strik et al. (2003) **1 level 3b:** Strik et al. (2001a)	• Consistent level 2b /3b studies • Both prospective studies in cardiac samples • Large amount of supporting evidence in psychiatric literature • **EBM grade B**
Increased alcohol consumption defined as alcohol intake above the 97th percentile (frequency of intake) during the previous month		**1 level 4 study:** Bjerkeset et al. (2005)	• Limited level 4 evidence • Prospective study in cardiac sample • Support for increased alcohol intake in those already depressed in psychiatric literature • **Limited level C evidence**

Note. EBM = Evidence Based Medicine; MI = myocardial infarction; RF = risk factor.

Reduced level of exercise (differing definitions) Physically active < once per week; Exercise < three days per week	**2 level 2b studies:** Lesperance et al. (1996) Linfante et al. (2003) (female sample only)		• Limited level 2b evidence • Cross-sectional data in cardiac samples only • Reduced activity a symptom of current depression • No strong prospective data • Differing definitions • **Limited level C evidence**
Social			
Lower level of education ≤ 7 years **Years of education** High school or less, Left school before the age of 14yrs	**4 level 2b studies:** Frasure-Smith et al. (1999) Mallik et al. (2006) (Men only) Watkins et al. (2003) Cheok et al. (2003)	**1 level 2b study:** Spijkerman et al. (2005b) (in those with a history of depression)	• Consistent level 2b evidence • Both prospective and cross-sectional studies in cardiac samples • Support for association with lower level of education and depression in psych literature • **EBM grade B**
Childhood separation from mother	**1 level 2b study:** Dickens et al. (2004)		• Limited level 2b evidence • Cross-sectional study in cardiac sample • Some supporting evidence as risk factor for early onset depression in psych literature • **Limited level B evidence**

Note. EBM = Evidence Based Medicine.

Marital status: **Single** **Divorced; separated**	**2 level 2b studies:** Mallik et al. (2006) (Men only) Lesperance et al. (2000) **1 level 2b study:** Cheok et al. (2003)		• Limited level 2b evidence • Cross-sectional studies in cardiac sample • Support for an association between divorce/separation (as a significant life event) and depression in psych. literature • **Limited level B evidence**
Unemployed	**2 level 2b studies:** Cheok et al. (2003) Mallik et al. (2006)		• Limited level 2b evidence • Cross-sectional studies in cardiac sample • Good support for unemployment associated with low family income/ stress /socioeconomic indicators and depression • **Limited level B evidence**
Lower socioeconomic position	**1 level 2b study** Mallik et al. (2006) **1 level 4 study** Aktar et al. (2004)		• Limited level 2b/4 evidence • Cross-sectional data in cardiac samples • Good support for lower SEP and financial strain associated with depression and other risk factors for depression • **Limited level b evidence**

Note. psych. = psychiatric; SEP = socio-economic position.

Having dependents as a woman Child, spouse, parent, or other for whom subject had full responsibility	**1 level 2b study:** Linfante et al. (2003) (female sample only)		• Limited level 2b evidence • Cross-sectional study in cardiac sample • Support for social role of women increasing risk of depression in some women/circumstances but not a significant risk factor in isolation of other RFs • **Limited level C evidence**
Social isolation **No close friends or confidant** **Living alone** **Reduced quality and satisfaction with personal relationships** **Lower perceived social support** (as measured by PSSS)	**1 level 2b study:** Dickens et al. (2004) **4 level 2b studies:** Dickens et. al (2004) Lesperance et al. (1996) Frasure-Smith et al. (1999) Lesperance et al. (2000) **1 level 2b study:** Spijkerman et al. (2005a) **1 level 2b study:** Forrester et al. (1992) **1 level 2b study:** Frasure-Smith et al. (1999)	**1 level 2b study:** Hammond et al. (2008)	• Consistent level 2b evidence • Cross-sectional and prospective studies in cardiac samples • Support for association between reduced social support as a mediating factor and depression in psych. literature • **EBM grade B**

Note. EBM = Evidence Based Medicine; PSSS = Perceived Social Support Scale; RF = risk factors.

Lower scores on the SF-36 completed in hospital based on retrospective recall of the four weeks prior to admission	**1 level 4 study:** Mayou et al. (2000)		• Limited level 4 evidence • Cross-sectional study in cardiac sample • Retrospective data collection • **Limited level C evidence**
Medical			
Impaired Left Ventricular Ejection Fraction (LVEF) van Melle et al. LVEF <30% Spijkerman et al. LVEF <40% Lesperance et al. LVEF <45% Watkins et al. LVEF <40% Mallik et al. LVEF <40% Frasure-Smith et al. LVEF ≤35% **Advanced Killip class** Frasure-Smith et al. ≥ 2 Mallik et al. ≥ 2 **Diagnosis of CHF** (recorded in medical records)	**4 level 2b studies:** Frasure-Smith et al. (1999) Mallik et al. (2006) (RF for men only) Watkins et al. (2003) (past history of MI) Lesperance et al. (2000) **2 level 2b studies:** Frasure-Smith et al. (1999) Mallik et al. (2006) Watkins et al. (2003)	**2 level 2b studies:** van Melle et al. (2006) Spijkerman et al. (2005b) (no history of depression)	• Consistent level 2b evidence • Both prospective and cross-sectional studies in cardiac samples • Supporting evidence of high prevalence of depression in heart failure patients • **EBM grade B**

Note. CHF = congestive heart failure; EBM = Evidence Based Medicine; LVEF = left ventricular ejection fraction; MI = myocardial infarction.

History of a MI or cardiac condition	**4 level 2b studies:** Mallik et al. (2006) Naqvi et al. (2007) Cheok et al. (2003) Lesperance et al. (2000)	**1 level 2b study:** Schrader et al. (2004) **1 level 4 study:** Martens et al. (2008)	• Consistent level 2b evidence • Both prospective and cross-sectional studies in cardiac samples • **EBM grade B**
Other co-morbid condition Watkins et. al.: rhematological disease, pulmonary disease, CHF, diabetes (type not specified), peripheral vascular disease. Naqvi et al.: diabetes (type not specified) Malik et al.:diabetes (type not specified) Cheok et al. :obesity (BMI > 40), chronic conditions not defined Martens et al.: arthritis, renal insufficiency, COPD **Pre-existing non-cardiac condition** not defined **Marked health difficulty in self or others:** defined as by Life Events & Difficulties Schedule	**4 level 2b studies:** Watkins et al. (2003) Naqvi et al. (2007) Cheok et al. (2003) Malik et al. (2006) **1 level 2b study** Dickens et al. (2004)	**1 level 4 study:** Martens et al. (2008) **1 level 2b study:** Dickens et al. (2004)	• Limited level 2b/4 evidence • Differing definitions of co-morbid conditions • Both prospective and cross-sectional studies in cardiac samples • **Limited level B evidence**

Note. BMI = Body Mass Index; CHF = congestive heart failure; COPD = chronic obstructive pulmonary disease; EBM = Evidence Based Medicine; MI = myocardial infarction.

Obesity Bjerkeset et al. (BMI ≥ 30) Cheok et al. (BMI > 40) Mallik et al. (BMI ≥ 30)	**2 level 2b studies:** Cheok et al. (2003) Mallik et al. (2006)	**1 level 4 study:** Bjerkeset et al. (2005)	• Limited level 2b/4 evidence • Both prospective and cross-sectional studies in cardiac samples • **Limited level C evidence**
Revascularization in hospital (PTCA; CABG)	**1 level 2b study** Mallik et al. (2006) (Men only)	**1 level 2b study** Spijkerman et al. (2005b) (patients without a history of depression)	• Limited level 2b evidence • Both prospective and cross-sectional studies in cardiac samples • **Limited level B evidence**
Arrhythmic event in hospital (AF; VF; VT)		**1 level 2b study:** Spijkerman et al. (2005b) (patients without history of depression) **1 level 3b study** Strik et al. (2001a)	• Limited level 2b evidence • Prospective association in cardiac sample with history of depression • **Limited level B evidence**
Complications in hospital Strik et al. recurrent angina, prescription of benzodiazepines Hammond et al. Discharge diagnosis of angina		**1 level 2b study:** Strik et al. (2003) Hammond et al. (2008) **1 level 3b study:** Strik et al. (2001a)	• Limited level 2b/3b evidence • Both prospective and cross-sectional studies in cardiac samples • **Limited level B evidence**
Duration of admission The longer the hospital stay > risk for depression	**1 level 4 study:** Mayou et al. (2000)	**2 level 2b studies:** Spijkerman et al. (2005b) Hammond et al. (2008)	• Limited level 2b/4 evidence • Both prospective and cross-sectional studies in cardiac samples • **Limited level C evidence**

Note. AF = atrial fibrillation; BMI = Body Mass Index; CABG = coronary artery bypass grafts; PTCA = percutaneous transluminal coronary angioplasty; VF = ventricular fibrillation; VT = ventricular tachycardia.

Frequency of chest pain at 12 months as reported by patients for one month prior to study visit		**1 level 2b study:** Dickens et al. (2004)	• Limited level 2b evidence • Prospective association in cardiac sample • **Limited level B evidence**
History of Hypercholesterolaemia No definition for hypercholesterolaemia reported	**1 level 2b study:** Mallik et al. (2006) (RF for women only)		• Limited level 2b evidence • Cross-sectional study in female cardiac sample only • **Limited level B evidence**
Prescription of nitrates and triple anti-ischaemic therapy (combination calcium channel blockers, β-blockers, nitrates)	**1 level 2b:** Lesperance et al. (2000) (UA sample only)		• Limited level 2b evidence • Cross-sectional studies in cardiac sample • **Limited level B evidence**
Treatment with diuretics (during admission)		**1 level 4:** Martens et al. (2008)	• Limited level 4 evidence • Related to CHF evidence • Prospective association in cardiac sample • **Limited level C evidence**
Prescribed sodium warfarin on discharge	**1 level 2b study:** Lesperance et al. (1996)		• Limited level 2b evidence • Cross-sectional study in cardiac sample • **Limited level B evidence**

Note. CHF = congestive heart failure; RF = risk factor; UA = unstable angina.

CK ≥ 1500 u/L	**1 level 2b study:** Forrester et al. (1992)		• Limited level 2b evidence • Cross-sectional study in cardiac sample • **Limited level B evidence**
History of treatment for hypertension No definition of hypertension	**2 level 2b studies:** Mallik et al. (2006) (Men only) Frasure-Smith et al. (1999)		• Limited level 2b evidence • Cross-sectional studies in cardiac sample • **Limited level B evidence**
Physical functional impairment as measured by the Johns Hopkins Functioning Inventory	**1 level 2b study:** Forrester et al. (1992)		• Limited level 2b evidence • Cross-sectional study in cardiac sample • Support for functional impairment/disability as risk factor for depression in psych literature • **Limited level B evidence**
Reduced maximum work load on exercise testing	**1 level 2b study:** Spijkerman et al. (2005a)		• Limited level 2b evidence • Cross-sectional study in cardiac sample • **Limited level B evidence**
Health Related Quality of life, frequency of angina, and physical limitations as measured by the Seattle Angina Questionnaire	**1 level 2b study:** Mallik et al. (2006)		• Limited level 2b evidence • Cross-sectional study in cardiac sample • **Limited level B evidence**

Note. CK = total serum creatine kinase.

Appendix D: Invitation Letter for Expert Panel

School of Nursing & Midwifery | Curtin University of Technology

Heart Research Institute
Ground Floor, R Block
Sir Charles Gairdner Hospital
Nedlands
WA 6009
21st April 2010

Address of recipient
(send by email)

Dear ... .

Re: Invitation to be a member of an expert review panel

I am a PhD Student at Curtin University School of Nursing and Midwifery undertaking a project entitled:

Identifying those at risk of depression following a diagnosis of acute coronary syndrome: Developing a screening intervention for use in the acute care hospital setting.

As part of my programme of study I plan to conduct an expert panel review of a questionnaire that is being developed to identify cardiac patients 'at risk' of developing depression following discharge into the community. The questionnaire will assist hospital based cardiac rehabilitation teams identify patients with risk factors associated with the development of depression, for example, a past history of major depressive disorder. This is a letter of invitation for you to be a member of a small review panel of clinicians and researchers in order to gain your expert opinion of the questionnaire.

The content domain of the questionnaire has been identified from a review of risk factors associated with the development of depression in acute coronary syndrome patients. Each research paper has been graded using the Oxford EBM grading system and an overall assessment of the level of evidence has been performed for each risk factor. The references are available on request.

Panel members are being asked to indicate the relevance of each item contained in the brief questionnaire and to provide overall comments to improve the quality of the questionnaire. More detailed instructions are contained in the attached review document.

This PhD project has gained Human Research Ethical Committee approval from both Curtin University of Technology (151/2007) and Sir Charles Gairdner Hospital (2009-130). The results of the review and final validation processes will be disseminated to interested panel members. By returning the enclosed questionnaire and review document it will be assumed you have consented to participate in this stage of the research process. Whilst you will be identified as a panel member in the final thesis, no specific data will be linked to your identity, nor will you be indentified in any subsequent publication.

The questionnaire and review documents are attached to this email. If you would like to provide some expert feedback on these please feel free to do so by return email. If you do not wish to participate at this time please inform me by email.

Thank you for your consideration of this request

Yours sincerely

Ms Jo Crittenden

PhD candidate, Curtin University of Technology and
Heart Research Institute
Sir Charles Gairdner Hospital
Nedlands, WA

Supervisory Team

Prof. Patricia Davidson	Curtin University of Technology, Sydney Campus, NSW
Prof. Gavin Leslie	Curtin University of Technology, Perth, WA
Prof. Sean Hood	University of Western Australia, Perth, WA
Clinical Prof. Peter Thompson	University of Western Australia, Perth, WA

Appendix E: Review Document for Expert Panel

Please review the questions and rate each item for relevance as a risk factor for depression in cardiac patients by placing x in the appropriate box. Under each item, please provide any suggestions/recommendations for item revision.

Ratings: **1 = not relevant**
2 = unable to assess relevance without item revision
3 = relevant but may need minor alteration
4 = very relevant

Risk Factor: Life events in year prior to admission to hospital for acute myocardial infarction (Limited grade B evidence in ACS samples) **Q1** Not including your admission to hospital, have things happened to you or your family in the past 12 months that have caused you to feel very stressed or depressed?	**1**	**2**	**3**	**4**
Risk Factor: Self reported stress or anxiety (Oxford EBM level of evidence grade B) **Q2** In the past have you often felt stressed or anxious?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Past History of depressive disorder (Oxford EBM level of evidence grade B) **Q3** Have you been told by a doctor that you were depressed?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: History of other mental health disorders (Oxford EBM level of evidence grade B) **Q4** Have you been told by a doctor that you have any other mental health problems?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Acute distress associated with event (Oxford EBM level of evidence grade B) **Q5** Were you very frightened when you had your heart attack or severe chest pain?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Fear of dying (Oxford EBM level of evidence grade B) **Q6** Did you think that you might die when you had your heart attack or severe chest pain?	**1**	**2**	**3**	**4**
Comment				

Risk Factor: In hospital anxiety (limited grade B evidence in ACS samples) **Q7** Have you felt very stressed by your illness?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: In hospital anxiety (limited grade B evidence in ACS samples) **Q8** Have you felt confused or found it difficult to make a decision?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Negative perceptions regarding cardiac diagnosis (limited grade C evidence in ACS samples) **Q9** Do you feel that your current heart problem will last a long time?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Negative perceptions regarding cardiac diagnosis (limited grade C evidence in ACS samples) **Q10** Are you concerned that you will **not** get better?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Ethnicity. Insufficient research in cardiac samples to assess evidence base **Q11** Are you an Aboriginal or Torres Strait Islander person?	**1**	**2**	**3**	**4**
Comment Please specifically comment on whether you consider that Aboriginal /TSI origin may be considered a risk factor for depression due to the high burden of psychological stress found in these communities.				
Risk Factor: Responsibility for dependents (limited grade B evidence in ACS samples) **Q12** Are you a carer for a child, parent or other who is dependent on you?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Living alone (Oxford EBM level of evidence grade B) **Q13** Do you live alone most of the time?	**1**	**2**	**3**	**4**
Comment				

Risk Factor: No close friend or confidant for support (Oxford EBM level of evidence grade B) **Q14** Are you **without** a close friend or partner you can rely on for emotional support?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Financial concerns (limited grade B evidence in ACS samples) **Q15** Will your heart condition significantly worsen your financial situation?	**1**	**2**	**3**	**4**
Comment				
Questions answered by staff members				
Risk Factor: Female gender (Oxford EBM level of evidence grade B) **S1** Is the patient female?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Younger age (Oxford EBM level of evidence grade B) **S2** Is the patient aged 65 years or less?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Impaired left ventricular function (Oxford EBM level of evidence grade B) **S3** Does the patient have a LVEF $\leq$ 40% or a recorded diagnosis of CHF?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Prior cardiac history (Oxford EBM level of evidence grade B) **S4** Does the patient have a prior history of MI or CABG?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Smoking prior to admission (Oxford EBM level of evidence grade B) **S5** Does the patient have a history of smoking on most days of the week?	**1**	**2**	**3**	**4**
Comment				
Risk Factor: Past History of depressive disorder (Oxford EBM level of evidence grade B) **S6** Does the patient have a past history of depression?	**1**	**2**	**3**	**4**
Comment				

Risk Factor: Current depressive symptoms (Oxford EBM level of evidence grade B) The depression scale that will be used in the project has yet to be determined **S7** Has the patient scored **above** the cut-off score > 5 on the depression scale *PHQ-9*	**1**	**2**	**3**	**4**
Comment				
Additional questions: In an Australian context, there is insufficient evidence to assess Ethnicity as a risk factor for depression in cardiac patients. In your opinion, are there special groups of people or circumstances (eg recent migration) that may be seen to increase the risk of depression following ACS?				
Are there any redundant questions?				
Are there any significant risk factors that are not represented in the questionnaire?				

Appendix F: DRAQ (Pre-Panel Review)

Depression Risk Assessment Questionnaire (DRAQ)

Please circle YES or NO in the column to show your answer.

These questions are about your past mental health:		
Q1	Not including your current admission to hospital, have things happened to you or your family in the past 12 months that have caused you to feel very stressed or depressed? *Please specify*: _____	**YES NO**
Q2	In the past have you often felt stressed or anxious? *If a doctor has said that you have a 'stress-related' problem please specify*: _____	**YES NO**
Q3	Have you been told by a doctor that you were depressed? *Please specify details if known*: _____	**YES NO**
Q4	Have you been told by a doctor that you have any other mental health problems? *Please specify if details known:* _____	**YES NO**
These questions are about when you first realised you had a serious heart problem:		
Q5	Were you very frightened when you had your heart attack or severe chest pain?	**YES NO**
Q6	Did you think that you might die when you had your heart attack or severe chest pain?	**YES NO**
These questions are about your current stay in hospital:		
Q7	Have you felt very stressed by your illness?	**YES NO**
Q8	Have you felt confused or found it difficult to make a decision?	**YES NO**

These questions are about how you feel towards your heart problem and discharge home:			
Q9	Do you feel that your current heart problem will last a long time?	**YES**	**NO**
Q10	Are you concerned that you will **not** get better?	**YES**	**NO**
These questions are about your social background (optional):			
Q11	Are you an Aboriginal or Torres Strait Islander person?	**YES**	**NO**
Q12	Are you a carer for a child, parent or other who is dependent on you?	**YES**	**NO**
Q13	Do you live alone most of the time?	**YES**	**NO**
Q14	Are you **without** a close friend or partner you can rely on for emotional support?	**YES**	**NO**
Q15	Will your heart condition significantly worsen your financial situation?	**YES**	**NO**

Please make comments or provide further information below:

Thank you for completing the questionnaire

Appendix G: DRAQ (Staff)

Depression Risk Assessment Questionnaire (DRAQ)

STAFF ONLY

Please circle YES or NO in the column to show your answer.

Please total the number of YES answers given by the patient and staff as indicated

S1	Is the patient female?	**YES NO**
S2	Is the patient aged 65 years or less?	**YES NO**
S3	Does the patient have a LVEF ≤ 40% or a recorded diagnosis of CHF?	**YES NO**
S4	Does the patient have a prior history of MI or CABG?	**YES NO**
S5	Does the patient have a history of smoking on most days of the week?	**YES NO**
S6	Does the patient have a past history of depression?	**YES NO**
S7	Has the patient scored **above** the cut-off score ***(insert score)*** on the depression scale ***(insert name of depression scale to be used)***	**YES NO**

SCORE: Patient ( )
Staff ( )
TOTAL ( )

Appendix H: HREC Approval Letter, Curtin University

memorandum

To	A/Prof Gavin Leslie Nursing and Midwifery
From	A/Professor Stephan Millett, Executive Officer, Human Research Ethics Committee
Subject	Protocol Approval **HR 151/2007**
Date	19 December 2007
Copy	Dr Anne Williams, Nursing and Midwifery Ms Jo Crittenden (52 Pollock St, Bentley, WA 6102) Graduate Studies Officer, Faculty of Health Sciences

Curtin University of Technology
Office of Research and Development
Human Research Ethics Committee
TELEPHONE 9266 2784
FACSIMILE 9266 3793
EMAIL hrec@curtin.edu.au

Thank you for your application submitted to the Human Research Ethics Committee (HREC) for the project titled "*Identifying those at risk of depression following a diagnosis of acute coronary syndrome. Development and preliminary psychometric testing of a screening instrument*". Your application has been reviewed by the HREC and is **approved** subject to the conditions detailed below:

1. Potential participants need to be approached initially by someone other than a member of the research team.
2. Explain how much time a patient deemed ready for discharge will have to consider the option to participate or not and what opportunities they have to consult with others.
   a. How will this affect voluntary consent or limit the number of participants?
3. Minor amendments:
   a. Please include a lay title as well as a study title;
   b. Please clarify if there are any implications for Curtin in the undertaking to provide medical treatment in the result of an adverse event.
   c. A summary of results for interested participants should be offered.
   d. Consent form: 1) If it is not a requirement that a family member/friend be present when the study is explained, point #3 should be removed.

Please provide your response to the above as soon as practicable.

Please note the following:

- You are authorised to commence your research as stated in your proposal when a response is received and approved by the Executive Officer
- The approval number for your project is **HR 151/2007.** *Please quote this number in any future correspondence.*
- Approval of this project is for a period of twelve months **11-12-2007** to **11-12-2008**. To renew this approval a completed Form B must be submitted before the expiry date **11-12-2008**.
- If you are a Higher Degree by Research student, data collection must not begin before your Application for Candidacy is approved by your Divisional Graduate Studies Committee.
- The following standard statement **must be** included in the information sheet to participants:

  This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 151/2007). If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.

Appendix I: HREC Approval Letter (Qualitative Study), SCGH

Sir Charles Gairdner Group (SCGG)
Human Research Ethics Committee (HREC) Approval

DETAILS OF STUDY		
SCGH HREC No:	2009-130	
Trial Investigator:	Professor Peter Thompson	
Department:	Heart Research Institute	
Title:	Facilitators and barriers to screening for depression in an acute care setting: A qualitative sub study exploring the perceptions of clinical staff	
Meeting Date:	HREC	17 September 2009
This trial will be endorsed at the Human Research Ethic Committee Meeting on the above date		

OUTCOME

The following documents are endorsed:

- Study Proposal, version 1 dated 25 August 2009
- Clinical Staff Interview Guide, version 2 dated 22 August 2009
- Participant Information Sheet and Consent Form, version 3 dated 10 September 2009

This trial has been approved under the Low Risk Review process in accordance with the Committee's Terms of References and Submission Guidelines. The SCGG HREC is registered with the Australian Health Ethics Committee and operated according to the NHMRC National Statement on Ethical Conduct in Human Research

MRS JENNY WESTGARTH-TAYLOR	J Westgarth-Taylor	10-9-09
Name	*Signature*	*Date*

Details of how the decision to provide a favourable ethical approval and the members present at the meeting can be supplied on request. The SCGG HREC is registered with the Australian Health Ethics Committee and operated according to the NHMRC National Statement on Ethical Conduct in Human Research

It is the responsibility and obligation of the researcher to advise the HREC of any departure from the original protocol that could impact on the ethical approval of the study. Please note that the attachment entitled "Reporting Guidelines for Adverse Events and Deviations from Protocol" forms part of this approval. Under these reporting guidelines you are required to submit formal notice of any changes to documentation, relevant information arising out of ongoing safety monitoring and annual reports on the ethical aspects of your study. An annual report form for your study will be posted to you several weeks in advance of the anniversary of the project's approval date.

As the responsibility for the conduct of the trial lies with you as the investigator, you should sign all communications to the committee.

Appendix J: HREC Approval Letter (Instrument Development), SCGH

Government of **Western Australia**
Department of **Health**

Sir Charles Gairdner Hospital

Sir Charles Gairdner Group (SCGG)
Human Research Ethics Committee (HREC) Approval

DETAILS OF STUDY		
SCGG HREC No:	2009-076	
Site Investigator:	Professor Peter Thompson	
Department:	Heart Research Institute	
Title:	Identifying those at risk of depression following a diagnosis of acute coronary syndrome: Developing a screening intervention for use in the acute care hospital setting	
Meeting Date:	SRS 4 June 2009	HREC 19 August 2010

OUTCOME

The following documents are endorsed:

- Study Protocol, version dated 22 July 2010
- Participant Information Sheet and Consent Form, version 7 dated 25 August 2010
- Depression Risk Assessment Questionnaire (DRAQ), version 3 dated 21 July 2010
- Depression Risk Assessment Questionnaire (DRAQ 2), version 1 dated 18 July 2010
- Patient Health Questionnaire-9 (HPQ-9),
- Depression Screening Management Plan, version 2 dated 14 June 2010

As Delegate of the Chair of the HREC I approve these documents for use as part of the study, subject to satisfactory annual reports and monitoring compliance of the study.

JENNY WESTGARTH-TAYLOR J. Westgarth-Taylor 26-8-10

Name *Signature* *Date*

Details of how the decision to provide a favourable ethical approval and the members present at the meeting can be supplied on request. The SCGG HREC is registered with the Australian Health Ethics Committee and operated according to the NHMRC National Statement on Ethical Conduct in Human Research

It is the responsibility and obligation of the researcher to advise the HREC of any departure from the original protocol that could impact on the ethical approval of the study. Please note that the attachment entitled "Reporting Guidelines for Adverse Events and Deviations from Protocol" forms part of this approval. Under these reporting guidelines you are required to submit formal notice of any changes to documentation, relevant information arising out of ongoing safety monitoring and annual reports on the ethical aspects of your study. An annual report form for your study will be posted to you several weeks in advance of the anniversary of the project's approval date.

As the responsibility for the conduct of the trial lies with you as the investigator, you should sign all communications to the committee.

Sir Charles Gairdner Group Human Research Ethics Committee Level 2 A Block Hospital Ave, Nedlands, WA 6009
Telephone (08) 9346 2999 Fax (08) 9346 3307 ABN: 13 993 250 709
email HREC.SCGH@health.wa.gov.au Website www.scgh.health.wa.gov.au

Appendix K: Participant Information Sheet and Consent (Qualitative Study)

Sir Charles Gairdner Hospital

CLINICAL STAFF PARTICIPANT INFORMATION SHEET

Lay Title: A study exploring the views held by clinical staff regarding screening patients for depression in an acute care setting

Study Title: Facilitators and barriers to screening for depression in an acute care setting: A qualitative study exploring the perceptions of clinical staff

Investigators: Ms Jo Crittenden,
Prof. Gavin Leslie, Prof. Patricia Davidson, Clinical Prof. Peter Thompson, A/Prof. Sean Hood

Please take time to read the following information carefully and discuss it with your friends or family if you wish. Ask us any question if some part of the information is not clear to you or if you would like more information. Please do this before you sign this consent form.

Who is funding this study?
This study is funded as a PhD research project by Curtin University of Technology.

Contact persons:
Should you have questions about the study you may contact:

Ms Jo Crittenden: Phone No. 9345 4301
Phone No. 9358 5607(after hours)
Prof Gavin Leslie Phone No 9266 2070

All study participants will be provided with a copy of the Information Sheet and Consent Form for their personal records.

You may decide to be in the study or not take part at all. If you do decide to take part in this study, you may stop at any time. However, before you decide, it is important that you understand why this research is being done and what it will involve.

Whatever your decision, this decision <u>will not</u> lead to any penalty or affect any benefit to which you are otherwise entitled.

The following information sheet will explain the study and will include details such as:

- Why this study might be suitable for you;
- ***The type, frequency and risks of any procedures required by the study;***
- ***The nature of your participation***
- Your rights and responsibilities

What is the purpose of this study?
Although there is strong evidence regarding the negative effects of depression in post acute coronary syndrome patients, depression remains under diagnosed with screening programmes yet to be fully integrated into routine clinical practice in Australia. This study is part of a programme of research to be undertaken within the Cardiovascular Medicine Department with the following objectives:

- To establish current depression screening practice in the department
- To determine what might facilitate the introduction of depression screening within the department

Why is this study suitable to me?
You have been invited to participate in this study because you are a member of staff within the Cardiovascular Medicine Department with expertise in the care of ACS patients.

How long will I be in this study?
Participants will be asked to help with the study on one occasion only. You will be asked to spend approximately one hour answering questions related to your daily practice.

What will happen if I decide to be in this study?
You will be one of 10 to 15 staff members who have volunteered to help with this research. You will be interviewed in private in the Heart Research Institute or at another mutually agreed private venue. You will be asked questions related to current practice and the possible introduction of depression screening in the department.

Are there any reasons I should not be in this study?
It is anticipated the interview will be concluded within one hour, however, due to the demanding nature of your clinical role, you may find it difficult to find time to assist in this research.

What are the costs to me?
There will be no direct costs to you whilst participating in this study, however, you will not be paid to take part in the study.

What are the possible benefits of taking part?
You may not directly benefit from the study. However, you may find it professionally rewarding to actively participate in the research study.

How will my safety be ensured?
There are no obvious risks to your safety when participating in the study.

What alternatives do I have to going on this study?:
You may refuse to take part without affecting any aspect of your practice or rights as an employee. Whether you decide to participate or not will be kept confidential and known only to the Associate Investigator on site.

What are the possible side effects, risks and discomforts of taking part?
There are no physical risks associated with taking part in this study.

What happens at the end of the study?

Your participation in this study will be complete following your interview. Your interview will be analysed and the findings may be published at a future date.

Will my taking part in this study be kept confidential?

The researcher will need to collect personal data about you which may be sensitive e.g. date of birth and relevant employment information. Any personal information will be kept private and confidential. It will be stored securely and only authorised persons, who understand it must be kept confidential, will have access to it. Specifically, the data gained from the interviews will be kept confidential and you will not be identifiable to other members of staff as a result of discussions about the research programme within the department.

Your study details will be given a number so that your identity will not be apparent. The study records will be kept in the Heart Research Institute during the study and in a locked archive for at least 5 years from the time the study is closed, and may be destroyed at any time thereafter.

Authorised representatives of the hospital Human Research Ethics Committee, the Human Research Ethics Committee of Curtin University of Technology, the investigators or Research Governance and regulatory bodies, may require access to your study records to verify study procedures and/or data. In all cases when dealing with your information, these people are required to comply with privacy laws that protect you.

The results of the research will be made available to other medical personnel through journals or meetings, but you will not be identifiable in these communications. By taking part in this study you agree not to restrict the use of any data even if you withdraw. Your rights under any applicable data protection laws are not affected.

Will I find out the results of the study?
The study is part of a PhD (Nursing) project and may be published in journals or discussed at professional meetings. The research results will be disseminated within the department on completion of the study. A summary of the overall research findings will be provided for interested participants.

Who has reviewed the study?
The Sir Charles Gairdner Group Human Research Ethics Committee has reviewed this study and has given its approval for the conduct of this research study. In doing so this study conforms to the principles set out by the National Statement on Ethical Conduct in Human Research and according to the Good Clinical Practice Guidelines. If you have any ethical concerns regarding the study you can contact the secretary of the Sir Charles Gairdner Group Human Research Ethics Committee on telephone No. (08) 9346.2999

This study has also been approved by Curtin University of Technology Human Research Ethics Committee. If needed, verification of approval can be obtained either in writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U 1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au

Consent Form

Study Title: **Facilitators and barriers to screening for depression in an acute care setting: A qualitative study exploring the perceptions of clinical staff**

Investigators: **Ms Jo Crittenden, Prof. Gavin Leslie, Prof. Patricia Davidson, Clinical Prof. Peter Thompson, A/Prof. Sean Hood**

Participant Name:_____

Date of Birth: _____

1. I have been given clear information (verbal and written) about this study and have been given time to consider whether I want to take part.
2. I have been told about the possible advantages and risks of taking part in the study and I understand what I am being asked to do.
3. I have been able to have a member of my family or a friend with me while I was told about the study. I have been able to ask questions and all questions have been answered satisfactorily.
4. I know that I do not have to take part in the study and that I can withdraw at any time during the study without affecting my future practice or employment. My participation in the study does not affect any right to compensation, which I may have under statute or common law.
5. I agree to take part in this research study and for the data obtained to be published provided my name or other identifying information is not used.

If you are unclear about anything you have read in the Participant Information Sheet or this Consent Form, please speak to the researcher before signing this Consent Form.

Name of Participant Date	Signature of Participant
Name of Investigator Date	Signature of Investigator

The Sir Charles Gairdner Group Human Research Ethics Committee has given ethics approval for the conduct of this project. If you have any ethical concerns regarding the study you can contact the secretary of the Sir Charles Gairdner Group Human Research Ethics Committee on telephone No. (08) 9346.2999

All study participants will be provided with a copy of the Information Sheet and Consent Form for their personal records.

Appendix L: Interview Guide for Qualitative Study

Aim: To establish current screening practice and future development plans.

- From your own clinical experience, how do you determine whether a patient admitted to the department is depressed?
- What procedure is followed if you suspect a patient may be depressed?
- What problems, if any, exist with the current practice?
- What would improve the identification of depressed patients?
- What plans exist to change current practice?

Aim: To determine barriers and facilitators to the introduction of a screening intervention as perceived by key members of the clinical team.

- What barriers are there to establishing a depression screening intervention in the department?
- What would assist the introduction of a depression screening system in the department?
- In the past, how quickly has clinical practice in the department changed because of new clinical guidelines or relevant evidence?
- What resources are you aware of within the hospital that might help facilitate change in clinical practice?

Appendix M: DRAQ (Post Panel Review)

Patient ID label

Depression Risk Assessment Questionnaire (DRAQ)

Please put a circle around your answer.

These questions are about your mental health:		
Q1	Not including your current admission to hospital, have things happened to you or your family in the past 12 months that have caused you to feel depressed? **NO** **YES** ***Please specify:*** A little bit depressed Moderately depressed Very depressed	
Q2	Do you often feel anxious? **NO** **YES** ***Please specify:*** A little bit anxious Moderately anxious Very anxious	
Q3	Have you ever been told by a doctor that you had depression? *Please specify details if known*: _____	**YES** **NO**
Q4	Have you ever been prescribed antidepressant medication?	**YES** **NO**
Q5	Have you ever been told by a doctor that you had any other mental health problems? *Please specify details if known*: _____	**YES** **NO**
These questions are about your social background (optional):		
Q6	Do you live alone most of the time?	**YES** **NO**
Q7	Are you **without** a close friend, partner, or other family member you can rely on for emotional support?	**YES** **NO**
Q8	Will your heart condition have a significant, negative affect on your financial situation?	**YES** **NO**
Q9	Are you an Aboriginal or Torres Strait Islander person?	**YES** **NO**

Please turn over.

Please make comments or provide further information below:

Thank you for completing the questionnaire

Appendix N: Participant Information Sheet and Consent (ACS Sample)

Sir Charles Gairdner Hospital

PARTICIPANT INFORMATION SHEET

Lay Title: **Identifying people at risk of becoming depressed after a heart attack or severe chest pain and developing a practical method of screening patients for depression whilst in hospital.**

Study Title: **Identifying those at risk of depression following a diagnosis of acute coronary syndrome: Developing a screening intervention for use in the acute care hospital setting.**

Investigators: **Ms Jo Crittenden,**
Prof. Gavin Leslie, Prof. Patricia Davidson,
Clinical Prof. Peter Thompson, Prof. Sean Hood

Please take time to read the following information carefully and discuss it with your friends, family and general practitioner if you wish. Ask us any question if some part of the information is not clear to you or if you would like more information. Please do this before you sign this consent form.

Who is funding this study?
This study is funded as a PhD research project by Curtin University of Technology and has received a grant from the Sir Charles Gairdner Hospital Research Advisory Committee.

Contact persons:
Should you have questions about the study you may contact:

Ms Jo Crittenden:	Phone No.	9345 4301
	Phone No.	9358 5607(after hours)
Prof Gavin Leslie	Phone No	9266 2070

All study participants will be provided with a copy of the Information Sheet and Consent Form for their personal records.

You may decide to be in the study or not take part at all. If you do decide to take part in this study, you may stop at any time. However, before you decide, it is important that you understand why this research is being done and what it will involve.

Whatever your decision, this decision will not lead to any penalty or affect your regular medical care or any benefit to which you are otherwise entitled.

The following information sheet will explain the study and will include details such as:

- Why this study might be suitable for you
- The type, frequency and risks of any procedures required by the study
- The nature of your participation
- Your rights and responsibilities

What is the purpose of the study?
Research has found that many people become depressed following a heart attack [myocardial infarction]. At the moment we do not know which patients may become depressed once they have left hospital. The aim of this research project is to develop a questionnaire that might be used to identify people who may become depressed so they can be given extra support or treatment.

Why is this study suitable to me?
You have been invited to participate in this study because you have recently had a heart attack or suffered severe chest pain. People with heart disease may also have depression or be at risk of becoming depressed.

How long will I be in this study?
You will be asked to help us with this study on two occasions only, just before you leave hospital and two weeks later.

What will happen if I decide to be in this study?
You will be one of 220 people who have volunteered to help with this research. You will be asked to complete two short questionnaires by answering a number of questions about your health and social matters. One questionnaire, the Depression Risk Assessment Questionnaire, is still being developed. The answers you give to that questionnaire will be kept confidential and the information will only be used to test the questionnaire itself.

The other questionnaire, the Patient Health Questionnaire -9, will enable the researcher to assess if you are likely to have depression at the moment. The results of the questionnaire will enable the Cardiac Rehabilitation and Heart Failure Service staff to give you extra support and refer you for expert help if required. You, your Cardiologist, and your GP will be informed of the results of the questionnaire.

A few patients (10 to 15) will be asked more detailed questions about the new questionnaire, for example if it is easy to read. They will also be asked whether they think it is appropriate to ask about someone's mental health and social situation whilst in hospital for heart problems.

Once you return home, you will be asked to complete the questionnaires again for a second time and return them in the postage paid envelope

provided. The new questionnaire is in the early stages of development so we do not know how good it is at predicting whether someone might become depressed. It will require further advanced testing and therefore the researcher will be unable to tell you if you are at risk of depression in the future.

If you do feel depressed at any time following discharge, the nurses of the Cardiac Rehabilitation and Heart Failure Service are able to offer support and arrange expert help. The service can be contacted on **08 9346 4302**, Monday to Friday. Alternatively, you could contact your own GP for assistance. Additional information and help is provided by the national organization called ***beyondblue***. The organization has an excellent website and confidential 24 hour telephone information and referral service:

www.beyondblue.org.au **Tel: 1300 22 4636**

Are there any reasons I should not be in this study?
There may be some reasons why the study may not be suitable for you, for instance if you have difficulties reading and writing English because it is not your main language. The researcher will discuss these with you in detail to ensure that this study is appropriate for you.

What are the costs to me?
There will be no direct costs to you whilst participating in this study, however, you will not be paid to take part in the study.

What are the possible benefits of taking part?
You may not directly benefit from the study. The aim of this study is to develop a questionnaire to help identify people who may become depressed following a heart attack. If you take part you will be helping the researcher improve the Depression Risk Assessment Questionnaire so that patients in the future will find it clear and easy to use. It is possible that you may be unaware that you have depression. Completing the Patient Health Questionnaire-9 may help identify this problem for you so you may be given extra support and treatment if required.

How will my safety be ensured?
Being involved in the study will not interfere with your usual medical treatment. You are being asked to complete the forms once your doctors feel you are well enough to go home and 2 weeks after you have been discharged from hospital. However, if you feel unwell whilst you are completing the questionnaires you may stop at any time without obligation to continue.

What alternatives do I have to going on this study?:
You will receive your normal treatment whether you take part in the study or not. You may refuse to take part without affecting your care.

What are the possible side effects, risks and discomforts of taking part?
There are no physical risks in taking part in this study. However, you will be asked about your health and social situation. These questions may upset you or may bring back unpleasant memories. If you feel this may be the case, please tell the researcher so that you have the opportunity to discuss these matters in private with an independent member of the cardiac rehabilitation team. You have the right to withdraw from the study at any time after you have signed the consent form.

What happens at the end of the study?
Once you have completed the newly developed form and the questionnaire for detecting depression on two occasions, you will have finished participating in the study. Your treatment and outpatient care will be unaffected by your participation in the study.

What if something goes wrong?
Medical treatment will be provided at no cost to you for research –related harm. The term "research–related harm" means both physical and mental injury caused by the procedures required by the study.

Your participation in this study does not prejudice any right to compensation that you may have under statute or common law

Will my taking part in this study be kept confidential?

The researchers will need to collect personal data about you, which may be sensitive e.g. date of birth and relevant health information. Any personal or health information will be kept private and confidential. It will be stored securely and only authorised persons, who understand it must be kept confidential, will have access to it.
Your study details will be given a number so that your identity will not be apparent. The study records will be kept in the Heart Research Institute during the study and in a locked archive for at least 5 years from the time the study is closed, and may be destroyed at any time thereafter.

Authorised representatives of the hospital Human Research Ethics Committee, the Human Research Ethics Committee of Curtin University of Technology, the investigators or Research Governance and regulatory bodies, may require access to your study records to verify study procedures and/or data. In all cases when dealing with your information, these people are required to comply with privacy laws that protect you.

The results of the research will be made available to other medical personnel through journals or meetings, but you will not be identifiable in these communications. By taking part in this study you agree not to restrict the use of any data even if you withdraw. Your rights under any applicable data protection laws are not affected.

Will I find out the results of the study?
The study will be completed as a PhD (Nursing) project and may be published in journals or discussed at professional meetings. Due to the nature of the study, no individual results will be available for the newly developed questionnaire; however, results from the depression assessment will be given to yourself, your Cardiologist, your GP and the staff of the Cardiac Rehabilitation and Heart Failure Service.
A summary of the overall research findings will be provided for interested participants.

Who has reviewed the study?
The Sir Charles Gairdner Group Human Research Ethics Committee has reviewed this study and has given its approval for the conduct of this research study. In doing so this study conforms to the principles set out by the National Statement on Ethical Conduct in Research involving Humans and according to the Good Clinical Practice Guidelines.

This study has also been approved by Curtin University of Technology Human Research Ethics Committee (Approval Number HR 151/2007). If needed, verification of approval can be obtained either in writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U 1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au

Consent Form

Study Title: **Identifying those at risk of depression following a diagnosis of acute coronary syndrome: Developing a screening intervention for use in the acute care hospital setting.**

Investigators: **Ms Jo Crittenden, Prof. Gavin Leslie, Prof. Patricia Davidson, Clinical Prof. Peter Thompson, Prof. Sean Hood**

Participant Name:_____

Date of Birth: _____

6. I have been given clear information (verbal and written) about this study and have been given time to consider whether I want to take part.

7. I have been told about the possible advantages and risks of taking part in the study and I understand what I am being asked to do.

8. I have been able to have a member of my family or a friend with me while I was told about the study. I have been able to ask questions and all questions have been answered satisfactorily.

9. I know that I do not have to take part in the study and that I can withdraw at any time during the study without affecting my future medical care. My participation in the study does not affect any right to compensation, which I may have under statute or common law.

10. I agree to take part in this research study and for the data obtained to be published provided my name or other identifying information is not used.

If you are unclear about anything you have read in the Participant Information Sheet or this Consent Form, please speak to your doctor before signing this Consent Form.

Name of Participant	Signature	Date

Name of Investigator	Signature	Date

The Sir Charles Gairdner Group Human Research Ethics Committee has given ethics approval for the conduct of this project. If you have any ethical concerns regarding the study you can contact the secretary of the Sir Charles Gairdner Group Human Research Ethics Committee on telephone No. (08) 9346 2999.

Appendix O: Patient Health Questionnaire - 9

PATIENT HEALTH QUESTIONNAIRE-9 (PHQ-9)

Over the last 2 weeks, how often have you been bothered by any of the following problems? *(Use "✔" to indicate your answer)*	Not at all	Several days	More than half the days	Nearly every day
1. Little interest or pleasure in doing things	0	1	2	3
2. Feeling down, depressed, or hopeless	0	1	2	3
3. Trouble falling or staying asleep, or sleeping too much	0	1	2	3
4. Feeling tired or having little energy	0	1	2	3
5. Poor appetite or overeating	0	1	2	3
6. Feeling bad about yourself — or that you are a failure or have let yourself or your family down	0	1	2	3
7. Trouble concentrating on things, such as reading the newspaper or watching television	0	1	2	3
8. 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 a lot more than usual	0	1	2	3
9. Thoughts that you would be better off dead or of hurting yourself in some way	0	1	2	3

FOR OFFICE CODING 0 + _____ + _____ + _____

=Total Score: _____

If you checked off any problems, 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	Somewhat difficult	Very difficult	Extremely difficult
☐	☐	☐	☐

Developed by Drs. Robert L. Spitzer, Janet B.W. Williams, Kurt Kroenke and colleagues, with an educational grant from Pfizer Inc. No permission required to reproduce, translate, display or distribute.