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The contribution of optimism and quality of life to depression in an acute coronary syndrome population

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Abstract

Background: Numerous longitudinal studies have revealed that depression following an acute cardiac event poses a risk factor for poor cardiac outcomes. It is therefore important to identify modifiable predictors of depression in order to develop a variety of interventions with this population. *Aims:* The aim of the present research was to determine whether the relationship between optimism and depressive symptoms was mediated by self-reported quality of life (QOL) in acute coronary syndrome patients. *Methods:* Two weeks following hospital discharge (Time 1) 59 participants completed a self-report questionnaire. Four weeks later (Time 2), 49 of these participants completed the same questionnaire. *Results:* At Time 1, the relationship between optimism and depressive symptoms was partially mediated by functional QOL and symptom QOL. Furthermore, the relationship between Time 1 optimism and Time 2 depressive symptoms was partially mediated by Time 1 functional QOL. When each of the Time 1 variables were used to predict Time 2 depressive symptoms, only optimism continued to predict depressive symptoms over and above the influence of Time 1 depressive symptoms and other covariates. *Conclusion:* These findings suggest the underlying importance of optimism in influencing depressive symptoms in acute coronary syndrome patients, and indicate that optimism and perceptions of functional QOL may be a possible rehabilitation target for this population.

Keywords: Acute coronary syndrome; Depression; Optimism; Quality of life

1. Introduction

Empirical evidence suggests that depressive symptoms after CHD are common, affecting at least 30% of hospitalised patients [1]. Furthermore, a number of longitudinal studies now suggest that depressed individuals with cardiovascular disease are 3.5 times more likely to die within 18 months of a myocardial infarction (MI) compared to individuals who are not depressed and have cardiovascular disease [2]. Even when controlling for severity of disease (including previous MIs), and health risk behaviours (such as smoking), depressive symptoms while in hospital increase risk of cardiac mortality in the ensuing 18 months [2]. Similar findings have been shown among patients with unstable angina [UA] [3]. It is now widely accepted that depression is associated with worse cardiac prognosis among individuals who have already experienced an acute coronary syndrome (i.e., MI or UA) [4].

Given the serious effects of depression in cardiac patients, identifying ways to treat depression in this population is particularly important. As a starting point, potentially modifiable predictors of this depression need to be identified, and there is currently a paucity of research investigating which modifiable *psychological* risk factors are important in promoting depression after adverse cardiac events, and how they interrelate. One such factor showing predictive validity in the cardiac literature is dispositional optimism, a stable personality trait. In an investigation of MI and UA patients, only dispositional optimism at 1 month after discharge predicted depressive symptoms at 1-year follow-up, when controlling for confounds including chest pain, fatigue and Time 1 depression [5]. Other studies have also shown this association between dispositional optimism and depressive symptoms among cardiac patients [6–8].

Dispositional optimism prior to bypass surgery has also been shown to predict quality of life (QOL) after 8 months [9], and optimistic bypass patients reported a more favorable QOL at 6-month follow-up, compared to pessimistic bypass patients [10]. In a longitudinal study of cancer patients

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followed over a period of 2 years, optimists reported better health-related QOL than pessimists at all time points [11]. These associations [6] support the proposition that an optimistic individual will perceive a more positive health status compared to a less optimistic individual. Perhaps then, an individual who perceives a more negative health status may also experience increased depressive symptoms. This suggestion is supported by a recent cross-sectional investigation (N=1024), which demonstrated a strong association between depressive symptoms and patient-reported QOL (health status) [12].

To date, the association between dispositional optimism, QOL and depression has not been examined longitudinally. Neither have any studies examined mediational mechanisms of risk factors and how they might cumulatively influence depression in acute coronary syndrome patients. Therefore, the aim of the current study was to investigate whether QOL variables mediated the relationship between optimism and depressive symptoms following an acute coronary syndrome. Furthermore, although some researchers have found various demographic and physical health variables to be largely unrelated to post-acute cardiac event depression [5,13], we considered it important to simultaneously consider nonpsychological predictors to ensure that the predictive value of psychological variables was not overestimated. Being female [3,14,15], living alone if a male [14], less education [14], unemployment [15], a younger age [16], and a history of being upset [17–19] have been shown to predict depression after cardiac events. In addition, a history of hypertension [14], diabetes [14,15], smoking [5,13,16,19], cardiac problems [3,17,20] and a more severe cardiac disease [2,14,21] have been associated with depression after cardiac events. Using both a cross-sectional and longitudinal design, the present research therefore investigated the predictive value of optimism, above and beyond the influence of health-related QOL, while controlling for relevant demographic and physical health variables.

2. Method

2.1. Participants

Eighty-five inpatients were recruited from three metropolitan hospitals in Adelaide, South Australia—two public and one private—and were sent questionnaires 1 week following discharge (Time 1: T1). The primary inclusion criterion was hospitalisation for an acute coronary syndrome (discharge diagnosis was confirmed through patient medical records). Patients were also required to have the ability to give informed consent, have sufficient English to complete questionnaires, and to be at least 18 years of age.

Fifty-nine patients (69.4%) returned the questionnaires, completed approximately 2 weeks following hospital discharge. Of the 26 patients who never returned the first questionnaire, 15 were ineligible for the following reasons: death (1), critical illness (1), could not be contacted (10), or had since chosen not to participate in the study (3). These 59 patients represent a cross-sectional sample and included 44 men (75%) and 15 women (25%), with a mean age of 62.64 years (S.D.=10.85). Of these patients, 39 were discharged with a diagnosis of myocardial infarction (66%) and 20 with unstable angina (34%).

Of those patients who returned the questionnaire at T1, 49 (83.1%) returned questionnaires which were mailed 4 weeks after completion of the T1 questionnaire and completed approximately 6 weeks following hospital discharge at Time 2 (T2). These 49 patients represent a longitudinal sample and consisted of 36 men (73%) and 13 women (27%), with a mean age of 63.45 years (S.D.=10.63). Of these patients, 30 were discharged with a diagnosis of myocardial infarction (61%) and 19 with unstable angina (39%).

The current study was approved by the Flinders University Social and Behavioural Research Ethics Committee and the relevant hospital ethics committees. The investigation conforms with the principles outlined in the Declaration of Helsinki (Br. Med. J. 1964;ii:177).

2.2. Measures

2.2.1. Quality of life

The 30-item European Organisation for Research and Treatment of Cancer Quality of Life (EORTC QOL) Questionnaire [22] was used to measure QOL. This questionnaire was considered appropriate for a cardiac population who, like a cancer population, experience an acute treatment period, life and death issues, and lifelong implications for health. Of 30 questions, 28 were answered using a four-point Likert scale, ranging from 1 (not at all) to 4 (very much), and two were scored using a seven-point rating scale from 1 (very poor) to 7 (excellent).

Typically, this scale consists of nine multi-item scales. However, for the purpose of the current study, three QOL subscales were devised: functional, relating to everyday activities, e.g., "Do you have any trouble taking a long walk?" (15 items), symptoms, e.g., "During the past week, were you short of breath?" (13 items), and global health perception, e.g., "How would you rate your overall quality of life during the past week?" (two items, using seven-point scale). A higher score indicated better functional capacity, decreased frequency of symptom presentation, and overall improved global QOL. The present study demonstrated good internal consistency of the measures at T1, with Cronbach's alpha coefficients of 0.85 (functional), 0.79 (symptom), and 0.83 (global).

2.2.2. Dispositional optimism

Optimism was measured using the revised Life Orientation Test (LOT-R) [23]. Participants indicated their agreement to six statements using a five-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree),

where a higher score is indicative of greater optimism. Internal consistency at T1 was acceptable with a Cronbach's alpha coefficient of 0.74.

2.2.3. Depressive symptoms

The Center for Epidemiologic Studies Depression scale (CES-D) [24], designed to identify frequency and severity of depressive symptoms within the general population during the preceding week, was used in the current study. Participants were required to respond to 20 statements using a four-point rating scale ranging from 0 (rarely or none of the time, i.e., less than 1 day) to 3 (most or all of the time, i.e., 5–7 days). A higher score indicated increased depressive symptoms. A cut-off score of 20 was used in the current study to indicate the presence of clinical depression [25]. T1 internal consistency was confirmed in the present study with a Cronbach's alpha coefficient of 0.87.

2.2.4. Covariates

After reviewing previous research, and in consultation with a cardiologist and various cardiac rehabilitation nurses, information on 23 different demographic variables and physical health variables was collected from patient medical records and via questionnaire. At T1, participants completed questions in regard to date of birth, gender, marital status, employment status, education status, and whether English was their first language. Participants were asked to report whether they had ever seen a health professional for a mental health problem or used past and/or current medication treatment for mental health problems. Hospital source and rehabilitation participation (recorded at T2) were also considered potential covariate variables, as were enzymes indicating extent of cardiac damage (peak creatine kinase level and Troponin level). Information concerning hospital procedures was also obtained, including whether the patient, on the current admission, had experienced a coronary angiogram or coronary angioplasty. Additionally, previous admissions for a cardiac event and previous cardiac procedures were recorded. Smoking status and presence of diabetes mellitus or hypertension were also obtained.

3. Results

3.1. Screening for covariates

3.1.1. Cross-sectional sample

A series of Pearson product-moment correlations, independent sample *t*-tests and one-way ANOVAs indicated that, of 22 potential covariate variables (not including rehabilitation participation measured only at T2), previous medication treatment for a mental health problem, previous admission for a cardiac event, an angiogram procedure in previous admission, and marital status, were significantly associated with T1 depressive symptoms. Post-hoc contrasts (Tukey a, α=0.05) revealed that participants who were married reported less depressive symptoms compared to participants who were divorced.

3.1.2. Longitudinal sample

Of 23 potential covariate variables, Troponin level was moderately positively correlated with T2 depression (r=0.32, p=0.02), and both previous admission for a cardiac event, and an angioplasty procedure in previous admission, were significantly associated with T2 depressive symptoms, as revealed using independent samples *t*-tests.

3.2. Data screening

Data screening techniques were used for T1 cross-sectional variables, and T1 and T2 longitudinal variables (including covariates). Appropriate transformations were carried out and univariate outliers were identified and either reduced or enlarged such that the raw score was one unit smaller or larger, respectively, than the next most extreme score in the distribution [26]. No multivariate outliers were identified using the Mahalanobis distance statistic, and no multicollinearity was evident.

3.3. Cross-sectional analyses

3.3.1. Descriptive analyses

Sixteen (27.1%) of the 59 participants were identified as having significant depressive symptoms at T1. Table 1 provides descriptive statistics for T1 variables for the total

Table 1
Non-transformed means and standard deviations (S.D.s) for all T1 variables (total group, depressed participants and nondepressed participants) and comparison of these variables between depressed and nondepressed participants[a]

	Total (n=59) mean (S.D.)	Depressed (n=16) mean (S.D.)	Nondepressed (n=43) mean (S.D.)	t(df=57)
Depression	13.95 (9.89)	27.25 (6.55)	9.00 (5.23)	−11.11***
Optimism	14.10 (4.12)	11.19 (3.95)	15.19 (3.67)	3.65**
Function QOL	46.68 (7.19)	40.69 (7.19)	48.90 (5.84)	4.51***
Symptom QOL	42.90 (5.09)	39.31 (5.46)	44.23 (4.29)	3.63**
Global QOL	8.39 (2.59)	7.06 (2.38)	8.88 (2.51)	2.51*

*p<0.05.
**p<0.01.
***p<0.001.
[a] Descriptive statistics prior to transformation.

group, the 'depressed' group, and the 'nondepressed' group, and the results of a series of independent samples *t*-tests showing significant differences on all T1 variables between the 'depressed' and 'nondepressed' group, with depressed people experiencing higher levels of depression and lower levels of optimism and QOL.

3.3.2. Mediational relationships

The four conditions for mediation as specified by Baron and Kenny [27] were examined. For mediation to occur, the relationship between the independent variable (IV), optimism, and the mediator (MV), QOL, (IV→MV) must be significant, the relationship between the MV and the dependent variable (DV), depression, must be significant (MV→DV), the relationship between the IV and the DV must be significant (IV→DV), and when the mediator is controlled the relationship between the IV and the DV (IV→DV|MV) is significantly reduced. In Table 2, mediation is said to occur if IV→MV, MV→DV, IV→DV are all significant (i.e., have significant beta values) and any observed reduction in IV→DV|MV has a significant *z* value.

While the first three conditions were met for all three measures of QOL, the relationship between optimism and depression was only significantly reduced (indicated by the *z* score) when either functional QOL or symptom QOL was entered as a mediator. As there continued to be a significant contribution of optimism to depression in both cases, it was concluded that functional QOL and symptom QOL partially mediated the relationship between optimism and depression.

3.4. Longitudinal analyses

3.4.1. Descriptive analyses

Of the 49 participants who returned both questionnaires, 12 (24.5%) and 7 (14.3%) reported significant depressive symptoms at T1 and T2, respectively. Only two participants depressed at T1 remained depressed at T2. A series of independent samples *t*-tests revealed that there were no significant differences in T1 scores between those who only returned T1 questionnaires and those who returned both questionnaires, on depression, $t(57)=0.50$, $p>0.05$, optimism, $t(57)=-0.59$, $p>0.05$, functional QOL, $t(57)=-0.52$, $p>0.05$, symptom QOL, $t(57)=0.22$, $p>0.05$ and global QOL, $t(57)=0.11$, $p>0.05$.

There were moderate to strong positive correlations between T1 and T2 measures of depression, $r(47)=0.58$, $p<0.001$, optimism, $r(47)=0.77$, $p<0.001$, functional QOL, $r(47)=0.65$, $p<0.001$, symptom QOL, $r(47)=0.62$, $p<.001$, and global QOL, $r(47)=0.48$, $p<0.01$. However, between T1 and T2 there was a significant reduction in depressive symptoms ($t(47)=2.22$, $p<0.05$). Correspondingly, there was a significant increase in QOL, including functional ($t(47)=-3.52$, $p<0.01$), symptom ($t(47)=4.09$, $p<0.001$), and global ($t(47)=-2.86$, $p<0.01$). Optimism levels were unchanged.

3.4.2. Mediational relationships

Table 2 presents the mediational relationships between depression at T2 (DV) and T1 optimism (IV) and QOL variables (MVs). Of all the QOL subscales, T1 optimism was only significantly related to T1 functional QOL, and both were negatively related to T2 depression. When entered singly, and after controlling for covariate effects, optimism and functional QOL predicted 15% ($R^2_{change}=0.15$, $p<0.01$) and 12% ($R^2_{change}=.12$, $p<0.01$) of the variance in depression, respectively. After T1 functional QOL had also been entered as a covariate in a hierarchical regression analysis, the variance attributed to T1 optimism remained significant at 10%. However, analyses revealed that this was considered a significant reduction, thereby suggesting that the relation-

Table 2
Testing mediational relationships with hierarchical multiple regression analyses

Mediational chain: IV[a]→MV[b]→DV[c]	Betas (β) IV→MV	MV→DV	IV→DV[d]	IV→DV|MV[d]	Significance of mediation *z*
Cross-sectional analyses					
(1) Optimism (IV)→Function QOL (MV)→Depression (DV)	0.43**	−0.65***	−0.43***	−0.26*	−2.78*
(2) Optimism (IV)→Symptom QOL (MV)→Depression (DV)	0.34**	−0.54***	−0.43***	−0.32**	−2.01*
(3) Optimism (IV)→Global QOL (MV)→Depression (DV)	0.31*	−0.28*	−0.43***	−0.41**	0.53
Longitudinal analyses					
(1) Optimism (IV)→Function QOL (MV)→Depression (DV)	0.30*	−0.47**	−0.43**	−0.36**	−2.08*
(2) Optimism (IV)→Symptom QOL (MV)→Depression (DV)	0.24	−0.41**	−0.43**	–	–
(3) Optimism (IV)→Global QOL (MV)→Depression (DV)	0.24	−0.17	−0.43**	–	–

Both cross-sectional (predicting T1 depression from T1 optimism and QOL scales; *N*=59) and longitudinal (predicting T2 depression from T1 optimism and QOL scales; *N*=49) analyses are displayed.

[a] IV=independent variable.
[b] MV=mediator variable.
[c] DV=dependent variable.
[d] Controlling for covariates.
* $p<0.05$.
** $p<0.01$.
*** $p<0.001$.

Table 3
Summary of hierarchical multiple regression analyses predicting T2 optimism from T1 depression, after controlling for T1 optimism and covariates

Equation	Variable	R^2	R^2 change	F change
1	Covariates	0.241	0.241	4.75*
	T1 depression	0.307	0.066	4.86*
2	Covariates	0.241	0.241	4.75*
	T1 optimism	0.628	0.388	45.85**
	T1 depression	0.628	0.000	0.001

*$p<0.05$.
**$p<0.001$.

ship between T1 optimism and T2 depression was partially mediated by T1 functional QOL.

3.4.3. T1 psychological predictors of T2 depression

Four hierarchical multiple regression analyses were performed to further investigate the predictive value of each of the T1 optimism and QOL variables, after controlling for T1 depression and the relevant covariate variables. Covariates were entered in step 1, T1 depression in step 2, and the relevant IV in step 3. Only T1 optimism remained as a significant predictor of T2 depression (5% of the variance, $R_{change}^2=0.05$, $p<0.05$). The predicted T2 depression score for the average person (using the CES-D) is 11.23, and after controlling for the effects of the covariates and T1 depression, every standard deviation (S.D.) unit increase in optimism is associated with a T2 depression score that is lower by 0.27 of an S.D. ($\beta=-0.27$, $p<0.05$). Additionally, after controlling for the effects of the covariates and T1 optimism, every S.D. unit increase in T1 depression is associated with a T2 depression score that is higher by 0.50 of an S.D., $\beta=0.50$, $p<0.001$.

Finally, a cross-lag design was tested to determine whether T1 depressive symptoms were related to a change in optimism from T1 to T2 (as opposed to our hypothesis that T1 optimism was predictive of T2 depressive symptoms). T1 depression and T2 optimism were found to be significantly negatively related, $r(47)=-0.38$, $p<0.01$. Two hierarchical regressions were performed. In the first of these, covariates were entered in step 1 followed by T1 depression in step 2 (where T2 optimism was the DV). The second regression involved entering covariates at step 1, followed by T1 optimism at step 2, and finally T1 depression at step 3. T1 depression no longer predicted T2 optimism after controlling for T1 optimism and covariates, allowing confidence in the likelihood of the direction of the relationship being as we had first hypothesised (Table 3).

4. Discussion

The main aim of the current study was to investigate the way in which optimism may influence depression after adverse cardiac events. In particular, we were interested in whether quality of life variables would mediate the relationship between optimism and depression. Furthermore, although the retest period was relatively short (approximately 4 weeks), it was of interest to determine whether the immediate reaction to the cardiac event (i.e., following the beneficial treatment outcome enabling hospital discharge) might influence the individual's psychological wellbeing 4 weeks later when treatment is less intensive (if at all), and individual's might begin to consider the necessary long-term lifestyle changes that must take place to prevent cardiac recurrence.

We found a prevalence rate of depressive symptoms commensurate to that of other post-MI research using similar self-report questionnaires within 2 weeks of hospital admission [2,15]. From the present findings, it is clear that the majority of acute coronary syndrome patients do not experience "significant" depressive symptoms throughout the 6 weeks following the cardiac event, keeping in mind that these interpretations have been based on an arbitrary cut-off score which gives no indication of only mild depressive symptoms, which may also be detrimental to cardiac prognosis. It seems that 2 weeks following hospital discharge, some patients may experience a short-term negative reaction (including increased depressive symptoms and lower levels of optimism and perceptions of QOL), perhaps as an appropriate response to an unexpected long-term health threat [28]. After 4 weeks, as life resumes normality, most patients seem to have adjusted to the event and its consequences, while another small group (10% of our sample) experienced a higher level of depressive symptoms than they did initially.

Also consistent with previous research, dispositional optimism remained stable over time [5,6], providing support for the proposition that dispositional optimism is representative of a maladaptive schema that may be difficult to modify [5]. After controlling for T1 depressive symptoms and other demographic and health covariates, only T1 optimism remained a significant predictor of T2 depressive symptoms, explaining a further 5% of the variance in depressive symptoms, which is consistent with research conducted using a non-cardiac college sample [29] and cardiac patients [5]. Higher levels of optimism may influence the course of depression by decreasing one's vulnerability to experiencing depressive symptomatology.

Dispositional optimism can be assessed simply and quickly and may be used to screen those patients most at risk of developing depressive symptoms. Optimism may also be a possible rehabilitation target for this population, where individuals might explore the positive outcomes of the cardiac event such as lifestyle changes, greater appreciation of health and life, and a change in personal life priorities [30]. Another speculation might suggest that optimism be addressed and modified through aspects of cognitive behaviour therapy based on Beck's cognitive model [31]. Enhancing levels of dispositional optimism

may improve cardiac prognosis [32] and influence compliance with lifestyle changes necessary in cardiac patients [8]. Even still, given the evidence that optimism seems to be a stable trait, it would seem important to identify other psychological influences on depression that may be more amenable to modification.

In contrast with previous research which predicted stability of QOL [9,33], the QOL variables in the present study all significantly increased over time. Strong inverse relationships were found between depressive symptoms and functional QOL, and symptom QOL. Two weeks following hospital discharge for an acute coronary syndrome, having a more positive perception of functional capacity (including cognitive functioning and emotional wellbeing), and reporting less physical symptoms (including pain) are strongly associated with less depressive symptoms. Global QOL, although weakly correlated with depressive symptoms, no longer predicted depressive symptoms after controlling for the effects of covariates.

The cross-sectional relationship between optimism and depressive symptoms was partially mediated by functional QOL and symptom QOL, and the longitudinal relationship between optimism and depressive symptoms was partially mediated by functional QOL. It would therefore seem that in this sample of acute coronary syndrome patients, optimism is working in multiple pathways to influence depressive symptoms. These findings are consistent with the cognitive model [31], which suggests that psychological traits can influence the perception of events, including physical symptoms.

Of the three measures of QOL, functional QOL may be most influenced by optimism. Unlike the symptom measure, functional QOL is a *perception* of salient health indicators after a health crisis, and unlike global QOL, it focuses on health areas that are of *immediate* relevance to the cardiac patient. It is possible that functional QOL may also partially be a product of medical advice and expectations of medical staff immediately following the health crisis, suggesting that it might be beneficial to address perceptions and expectations of functioning early in rehabilitation in order to protect patients against initial depression.

These results must be interpreted in the context of four limitations. First, participants reported only mild depressive symptoms. The protective mechanism of optimism may not operate for all levels of depressive symptoms. Second, given the small sample size it is possible that there is insufficient power to detect some relationships. Replication of these findings is required prior to drawing more definitive conclusions. Third, our QOL questionnaire had not been previously validated for use in cardiac patients. Finally, our response rate of 69% may in some way bias the results of this study. This response rate is commensurate with other cardiac studies [34,35], and few demographic and clinical differences have been found between participators and non-participators in a previous cardiac study [21].

Further research is still required to uncover the mechanisms by which psychological variables cumulatively influence depressive symptoms after an adverse cardiac event. However, in light of the present research, it seems that optimism is associated with depressive symptoms irrespective of mediational mechanisms. Consistent with the conclusions of King et al. [6], it would be beneficial to further investigate optimism and the role it plays after the cardiac event. Additionally, the present research suggests that a focus on functional QOL would also be beneficial in our understanding of promoting good cardiac outcomes after an adverse cardiac event.

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