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## **Exploring the Impact of Illness Perceptions, Self-efficacy, Coping Strategies, and Psychological Distress on Quality of Life in a Post-stroke Cohort**

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1 **Exploring the Common Sense Model and interrelationships between illness**  
2 **perceptions, coping strategies, psychological distress and quality of life in a**  
3 **post-stroke cohort**

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21 Running head: Validation of the CSM in a post-stroke cohort.

22 Keywords: Stroke, common sense model, illness perceptions, coping, self-efficacy,  
23 depression, anxiety and quality of life

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29

30 **Exploring the Impact of Illness Perceptions, Self-Efficacy, Coping Strategies, and**  
31 **Psychological Distress on Quality of Life in a Post-Stroke Cohort**

32 Running head: Validation of the CSM in a post-stroke cohort.

33 Keywords: Stroke, common sense model, illness perceptions, quality of life, anxiety,  
34 depression.

35 **Tables and Figures**

36 Table 1. Pearson's correlation and descriptive statistics of the scales

37 Table 2. Summary of the regression analysis between the five predictor variables on QoL

38 Figure 1. Multiple mediation between illness perception and QoL

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48 **Abstract**

49 This study evaluated the mediating role of self-efficacy, coping, depression and anxiety on  
50 the relationship between illness perceptions and quality of life in stroke survivors (n=72; 32  
51 females; mean [SD] age 65.09 [14.14] years; male mean [SD] age 69.83[11.81]). Illness  
52 perceptions (Brief Illness Perceptions Questionnaire; BIPQ), coping styles (Carver Brief COPE  
53 scale; B-COPE), depression/anxiety (Hospital Anxiety and Depression Scale; HADS), self-  
54 efficacy (General Self-Efficacy Scale; GSE) and quality of life (Assessment of quality of life;  
55 AQOL-6D) were analysed. Correlation analyses showed illness perception, maladaptive  
56 coping, self-efficacy, depression and anxiety to have a significant negative relationship with  
57 quality of life. Mediation analyses showed that while maladaptive coping and self-efficacy  
58 did not mediate the relationship between illness perception and quality of life, depression  
59 and anxiety did. The final model explained 76.74% of the variance in quality of life.  
60 Although based on a relatively small sample size, these results provide evidence for the  
61 important role of psychosocial factors in quality of life in post-stroke cohorts.

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63

## 64 **Introduction**

65 The Common Sense Model (CSM) developed by Leventhal and colleagues (1980) can be  
66 used to understand the psychosocial health of important chronic diseases, such as stroke, by  
67 establishing the relationship between illness symptoms and individual outcomes (e.g.,  
68 quality of life[QoL]) which are mediated by illness perceptions and coping style. In the past,  
69 the CSM has been applied to numerous chronic illnesses including gastrointestinal disorders  
70 (Knowles, Wilson, Connell, & Kamm, 2011), diabetes (Breland, McAndrew, Burns, Leventhal,  
71 & Leventhal, 2013) and arthritis (Knowles et al., 2016). However, the CSM has been applied  
72 to stroke survivors in only few studies (Hagger & Orbell, 2003; Klinedinst, Dunbar & Clark,  
73 2012; Phillips, Diefenbach, Abrams & Horowitz, 2015).

74 The CSM proposes that disease activity shares an integral link with the individual's  
75 perception of their illness, referred to as 'illness perceptions' (Leventhal, Phillips & Burns,  
76 2016). In CSM, illness perceptions refer to the cognitive and emotional perceptions that  
77 individuals develop in response to becoming aware of a threat to their health (Leventhal et  
78 al., 2016). Concisely described by Broadbent et al. (2006), illness perceptions are comprised  
79 of five dimensions: chronicity (is the illness chronic, acute or cyclical?); consequence (how  
80 much does the illness impact on my physical and psychosocial well-being?); causes (what  
81 factors caused or influenced the illness?); identity (how is one impacted by having an  
82 illness?); and cure/control (can the illness be cured or controlled?).

83 The concept of 'coping' is also central to the CSM. According to Lazarus and Folkman  
84 (1984), individuals mediate stress through behaviour and cognition. In CSM, 'adaptive  
85 coping' strategies seek to change the situation (e.g., planning, problem solving), while

86 'maladaptive coping' strategies seek to regulate emotional distress (e.g., praying, avoiding)  
87 (Lazarus & Folkman, 1984).

88           Considering this literature, the CSM may be able to provide new insights into the  
89 relationship between illness parameters and psychosocial outcomes in stroke survivors.  
90 Stroke is the second highest cause of mortality and the third leading cause of disability  
91 worldwide (Feigin, Norrving & Mensah, 2017). Stroke is a neurological condition that occurs  
92 when a blockage or bleed in the brain results in oxygen deprivation and associated cell  
93 death (Sacco et al., 2013). Stroke can produce myriad symptoms including cognitive,  
94 motor/sensory and language impairments (Sacco et al., 2013). In addition, the detrimental  
95 impact of stroke on survivor's psychosocial health is widely noted (Frincu, Lupsa, &  
96 Stefanescu, 2016; Wang & Wang, 2013). Globally, the economic cost of stroke between  
97 2014 and 2015 exceeded \$34 billion in the US (Centres for Disease Control and Prevention,  
98 2019) and €45 billion in the European Union (Stroke Alliance for Europe, 2016). With stroke  
99 healthcare costs exceeding \$606 million in Australia in 2008-2009 (Australian Institute of  
100 Health and Welfare, 2013) the physical, emotional and fiduciary costs of stroke are deeply  
101 concerning.

102 Depression, anxiety and reduced QoL as well as other psychosocial maladies are common  
103 following a stroke (Ayerbe, Ayis, Wolfe & Rudd, 2013). In fact, recent systematic reviews  
104 (Mitchell et al., 2017; Schöttke & Giabbiconi, 2015) estimate that one-third of stroke  
105 survivors experience depression, whilst a further 25% experience clinical anxiety (Chun,  
106 Whiteley, Dennis, Mead & Carson, 2018). Evidence suggests that psychosocial outcomes  
107 such as depression, anxiety and QoL affect each other (Tang, Lau, Mok, Ungvari & Wong,  
108 2013; van Mierlo et al.; 2014 Volz, Möbus, Letsch & Werheid, 2016). Although these

109 relationships are not well understood, evidence suggests that depression is linked to poor  
110 QoL (Zhang et al., 2017). Meanwhile, self-efficacy has been shown to affect QoL and  
111 depression (Robinson-Smith, Johnston & Allen, 2000; Volz, Möbus, Letsch & Werheid, 2016).

112           Given the effectiveness of implementing the CSM in other chronic health conditions  
113 and the importance of psychosocial mediators in health, this study sought to explore the  
114 CSM in stroke survivors. It was hypothesized that, aligned with CSM, self-efficacy, coping  
115 styles, depression and anxiety would act as mediators between illness perceptions and QoL.

## 116 **Methods**

117 Participants were recruited as part of the Stroke and Carer Optimal Health Program (SCOHP)  
118 trial, the details of which have been reported elsewhere (Braiser et a. 2016). An a priori  
119 power analysis using GPower (version 3.1) with an effect size 0.15, error probability alpha  
120 0.05 and power of 0.80 indicated a minimum of 68 individuals to predict QoL with seven  
121 predictor variables. The sample of 72 participants surpassed this requirement.

## 122 **Compliance with ethical standards**

123 This trial was approved by a Melbourne Metropolitan Human Research Ethics Committee  
124 (HREC-A 031/12). Written informed consent was obtained from all participants. The authors  
125 declare no potential conflicts of interest with respect to the research, the authorship,  
126 and/or publication of this article.

## 127 **Materials**

128 **Brief Illness Perceptions Questionnaire (BIPQ) (Broadbent, Petrie, Main & Weinman,**  
129 **2006).**

130 The BIPQ is a 9-item questionnaire evaluating emotional/ cognitive representations of  
131 illness across eight dimensions: emotional response, consequences, timeline, personal  
132 control, treatment control, identity, concern and understanding (Broadbent, 2006). Items  
133 were assessed according to a 11-point rating scale. For example, “How much does your  
134 illness affect your life: 0 [not at all] – 10 [severely affects my life]” (Broadbent et al., 2006).  
135 Reliability analysis was conducted with if the item deleted until the Cronbach’s alpha above  
136 0.7. After removing 2 items (control over illness and helpfulness of treatment), remaining  
137 items demonstrated good internal consistency (0.71). The illness perception scale score was  
138 created by attaining the average of the subscales, with higher scores reflecting more  
139 negative emotional and cognitive representations of illness. Meta-analysis of the BIPQ has  
140 demonstrated construct validity in other chronic diseases such as diabetes (Broadbent, et  
141 al., 2015).

#### 142 **Carver Brief Coping Questionnaire (Brief-COPE) (Carver, 1997).**

143 The Brief-COPE is comprised of 14-subscale questionnaires, with two items per subscale. A  
144 4-point rating scale is used, for example: “1 [I haven’t been doing this at all] to 3 [I’ve been  
145 doing this a lot]” (Carver et al., 1997). Due to sample size constraints, the coping subscales  
146 could not be derived by factor analysis. Instead, subscales were based on those reported by  
147 Carver et al. (1989). Maladaptive coping was based on 12 items (self-distraction, denial,  
148 substance use, behavioural disengagement, venting, self-blame) and had good internal  
149 consistency (0.71). Emotion-focused coping was based on 10 items (emotional support,  
150 positive reframing, humor, acceptance, religion) and had a good internal consistency (0.74).  
151 Finally, problem-focused coping was based on 6 items (active coping, instrumental support,



152 planning) and demonstrated good internal consistency of (0.85). All three subscales were  
153 created as the average of the respective items.

#### 154 **General Self-efficacy Scale (GES) (Schwarzer & Jerusalem, 1995)**

155 The General Self-Efficacy Scale is a 10-item measure which assesses an individual's belief  
156 that they can overcome challenges and situations in their own life, utilising a 4-point scale:  
157 "1 [Not at all true]" to "4 [Exactly true]" (Schwarzer & Jerusalem, 1995, p.38). Items are  
158 summed giving a score range of 10 to 40; higher scores signify greater levels of self-efficacy  
159 (Schwarzer & Jerusalem, 1995). The self-efficacy scale had good internal consistency (0.89).

#### 160 **Hospital Anxiety and Depression Scale (HADS) (Snaith, 2003)**

161 The HADS is a 14-item self-report questionnaire that assesses depression (7 items) and  
162 anxiety (7 items) rated over the previous seven days. Questions are assessed via a 4-point  
163 Likert scale. For example, "I feel tense or 'wound up'" 0 = [not at all] to 3 = [most of the  
164 time] (Snaith, 2003, p. 2). Scores between 16 and 21 indicate the presence of a mood  
165 disorder (Snaith, 2003). The anxiety and depression subscales had good internal consistency  
166 (0.84 and 0.83 respectively). The HADS has been validated for use in stroke survivors,  
167 reporting 60% specificity and 80% sensitivity (Burton & Tyson, 2015).

#### 168 **Assessment of Quality of Life-6 Dimensions (AQoL-6D) (Allen, Inder, Lewin, Attia & Kelly,** 169 **2013).**

170 The AQoL-6D is a multi-attribute self-reported questionnaire that provides a  
171 multidimensional assessment of health-related quality (Allen, Inder, Lewin, Attia & Kelly,  
172 2013). It comprises 20 items which assess 6 domains of QoL (relationships – 3 items,  
173 independent living – 4 items, coping – 3 items, mental health – 4 items, senses – 3 items and  
174 pain – 3 items). Items have between 4 to 6 response options which can be combined to

175 provide an overall score of QoL; higher scores suggest greater impairment in QoL. The QoL  
176 scale had good internal consistency (0.91).

### 177 **Statistical analysis**

178 Prior to conducting multiple regression modeling, the relevant assumptions of this statistical  
179 analysis strategy were tested. The assumption of singularity was met, as the independent  
180 variables were not a combination of other independent variables. An examination of  
181 correlations (see Table 1) revealed that no independent variables were highly correlated.  
182 The assumptions of multicollinearity, normality, linearity and homoscedasticity were all  
183 satisfied (Hair, Black, Babin & Anderson, 2018; Pallant, 2001). Mediation analyses were  
184 carried out using PROCESS macro (version 3.4) for SPSS (Preacher & Hayes, 2008).

### 185 **Results**

186 Participants were 72 stroke survivors (32 females; mean [SD] age 65.09 [14.14] years; male  
187 mean [SD] age 69.83[11.81]), of whom 61 percent were married, 7 percent were defacto, 8  
188 percent were divorced, 2 percent were separated, 17 percent were single, 3 percent were  
189 widowed and 2 percent identified their relationship as 'other'. Mean [SD] time since stroke  
190 was 33 months [28.2].

191 Table 1 shows the descriptive and correlational analyses of the study variables.  
192 Illness perceptions and maladaptive coping were significantly positively correlated, as well  
193 as both having significant positive correlations with anxiety and depression and significant  
194 negative correlations with QoL and self-efficacy. Emotion-focused coping had a positive  
195 correlation with problem-focused coping and a negative correlation with depression, both  
196 relationships were significant. Problem-focused coping had a significant positive correlation  
197 with self-efficacy. Maladaptive coping had a significant positive relationship with

198 depression/anxiety and the other two coping strategies, and a significant negative  
199 correlation with self-efficacy and QoL. In addition, QoL had a significant negative correlation  
200 with depression and anxiety, and a significant positive correlation with self-efficacy. As  
201 emotion and problem-focused coping did not have a significant correlation with QoL, they  
202 were not included in further analysis.

203 INSERT TABLE 1 HERE

204 To evaluate the study hypothesis that that self-efficacy, coping styles, depression  
205 and anxiety act as mediators between illness perceptions and QoL, separate regression  
206 analyses were performed to investigate whether each variable predict QoL. As shown in  
207 Table 2, illness perception, self-efficacy, maladaptive coping, depression and anxiety each  
208 had a unique effect on QoL.

209 INSERT TABLE 2 HERE

210 Mediation analyses with 5000 bootstrap samples were conducted to examine the  
211 potential roles of maladaptive coping, self-efficacy, depression and anxiety as mediators  
212 between illness perceptions and QoL. As shown in Figure 1, consistent with full mediation,  
213 illness perception was no longer a significant predictor of QoL after the mediator variables  
214 were included in the model. Maladaptive coping and self-efficacy did not mediate the  
215 relationship between illness perception and QoL. This suggests that depression and anxiety  
216 fully mediate the relationship between QoL and illness perception. The final model was  
217 found to account for 76.74% of the variance in QoL.

218 INSERT FIGURE 1 HERE

219 **Discussion**

220 Whilst the global prevalence of stroke is increasing (Gorelick, 2019), medical advances are  
221 leading to improved survival rates (Warner, Harrington, Sacco & Elkind, 2019; Seminog,  
222 Scarborough, Wright, Rayner & Goldacre, 2019). While higher survival rates are positive, it is  
223 also well-established that post-stroke cohorts report greater rates of depression and anxiety  
224 compared to healthy control groups (Campbell Burton et al., 2012; Cumming, Blomstrand,  
225 Skoog & Linden; Lincoln et al., 2013) as well as poorer QoL (Abubakar, & Isezuo., 2012;  
226 Franzen-Dahlin & Laska, 2012). Given this, the identification of psychosocial variables that  
227 can be utilised by psychological interventions to target and promote QoL in stroke survivors  
228 is essential. The evaluation of well established psychosocial models of health outcomes,  
229 such as the CSM, provide a strong theoretical and practical basis to identify and evaluate  
230 psychosocial variables.

231         Based on the CSM our study found partial support for the hypothesis in that  
232 maladaptive anxiety and depression mediated the relationship between illness perceptions  
233 and QoL. This reflects the premise that mental health is a key marker of QoL (Lincoln et al.,  
234 2013; Northcott, Moss, Harrison, & Hilari, 2015). Although not found to act as a mediator,  
235 self-efficacy was found to be predicted by illness perceptions. Coping styles are complex and  
236 have been conceptualised in numerous ways to exemplify their diverse impact. In CSM,  
237 coping styles are essential to one's welfare and are thought to determine key outcomes  
238 (Lazarus & Folkman., 1984.) In support of other CSM-based research, coping (specifically  
239 maladaptive coping), was predicted by illness perceptions (Knowles et al, 2019). The findings  
240 that maladaptive coping, and not other forms of coping (emotion- and problem-focused)  
241 was predicted by illness perceptions is consistent with past research (Knowles et al, 2017;

242 Knowles et al, 2019). While the influence of QoL by maladaptive coping was not significant,  
243 these findings reflect the more influential role of maladaptive coping than adaptive coping  
244 styles. It should also be acknowledged that although not tested in this study, both self-  
245 efficacy and maladaptive coping may also have a direct impact on anxiety and depression.  
246 While this is the first study to provide partial evidence for the CSM in a stroke cohort, it is  
247 not without limitations. The first limitation was that no measure of health status was  
248 collected, despite being a key predictor variable of illness perceptions in the CSM. The small  
249 number of participants and self-reported nature the questionnaires, may bias the results  
250 and only reflect the perceptions of participants and not the wider post-stroke population.  
251 The study design was cross-sectional and therefore true causal (mediation) relationships  
252 could not be evaluated; nor could bi-directional pathways be evaluated. Future research  
253 should seek to replicate and extend the current findings by utilisng more advanced  
254 statistical approaches such as structural equation modeling (SEM), to better control for  
255 measurement error and inter-item correlations, and assess for multiple  
256 simultaneous mediational relationships. An extended CSM in a post-stroke cohort could also  
257 explore the potential mediating role of other psychosocial variables which have been found  
258 to be associated with post-stroke outcomes, like QoL, including optimism (Kim, Park &  
259 Peterson, 2011) and carer support (King, Hartke & Houle, 2010). While acknowledging these  
260 limitations, the study has identified several potential psychosocial variables, specifically  
261 illness perceptions, maladaptive coping, self-efficacy, and depression and anxiety which  
262 could be targeted through psychological interventions such as cognitive behaviour therapy  
263 (CBT) the promote QoL in a post-stroke cohort.

264 **Conclusion**

265 Along with higher rates of anxiety and depression, post stroke cohorts are also at risk of  
266 reduced QoL. Based on the CSM, this study explored the potential mediational role of self-  
267 efficacy, coping strategies, and anxiety and depression between illness perceptions and QoL  
268 in a post-stroke cohort. The findings suggest that that along illness perceptions, anxiety and  
269 depression should be targets for modification using well-established psychological  
270 interventions such as CBT to enhance QoL in post-stroke cohorts.

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442 **Appendix 1.**

443 **Table 1.** Pearson's correlation and descriptive statistics of the scales

Variable	1	2	3	4	5	6	7	Cronbach's alpha	Mean (SD)
1. Illness perceptions	-							0.71	6.49 (2.28)
2. Maladaptive coping	0.33**	-						0.71	1.65 (1.96)
3. Emotion-focused coping	-0.06	0.20*	-					0.74	2.26 (0.54)
4. Problem-focused coping	0.19	0.33**	0.66**	-				0.85	2.58 (0.80)
5. Self-efficacy	-0.35*	-0.35**	0.14	0.19*	-			0.89	30.04 (5.27)
6. Anxiety	0.49**	0.51**	-0.03	0.14	-0.42**	-		0.84	7.16 (4.07)
7. Depression	0.48**	0.41**	-0.23*	-0.09	-0.46**	0.63**	-	0.83	6.33 (4.24)
8. Quality of Life	-0.56**	-0.51**	0.03	-0.06	0.53**	-0.69**	-0.77**	0.91	0.63 (0.21)

444 *Note: \*p < .05 and \*\*p < .001.*

445 **Table 2.** Summary of the regression analysis between the five predictor variables on QoL.

<b>Variable</b>	<b>B</b>	<b>SE</b>	<b><math>\beta</math></b>	<b>t</b>	<b>CI</b>	<b>R<sup>2</sup></b>
Illness perception	-0.06	0.01	-0.56**	-5.22	[-0.09, -.04]	31.6%
Maladaptive Coping	-0.28	0.05	-0.51**	-6.20	[-0.37, -.19]	25.7%
Self-efficacy	0.03	0.01	0.53**	6.77	[0.02, .03]	28.0%
Anxiety	-0.04	0.01	-0.69**	-10.57	[-0.04, -0.03]	48.0%
Depression	-0.04	0.01	-0.77**	-13.06	[-.05, -.03]	58.5%

446 *Note: \*\*p < .001.*

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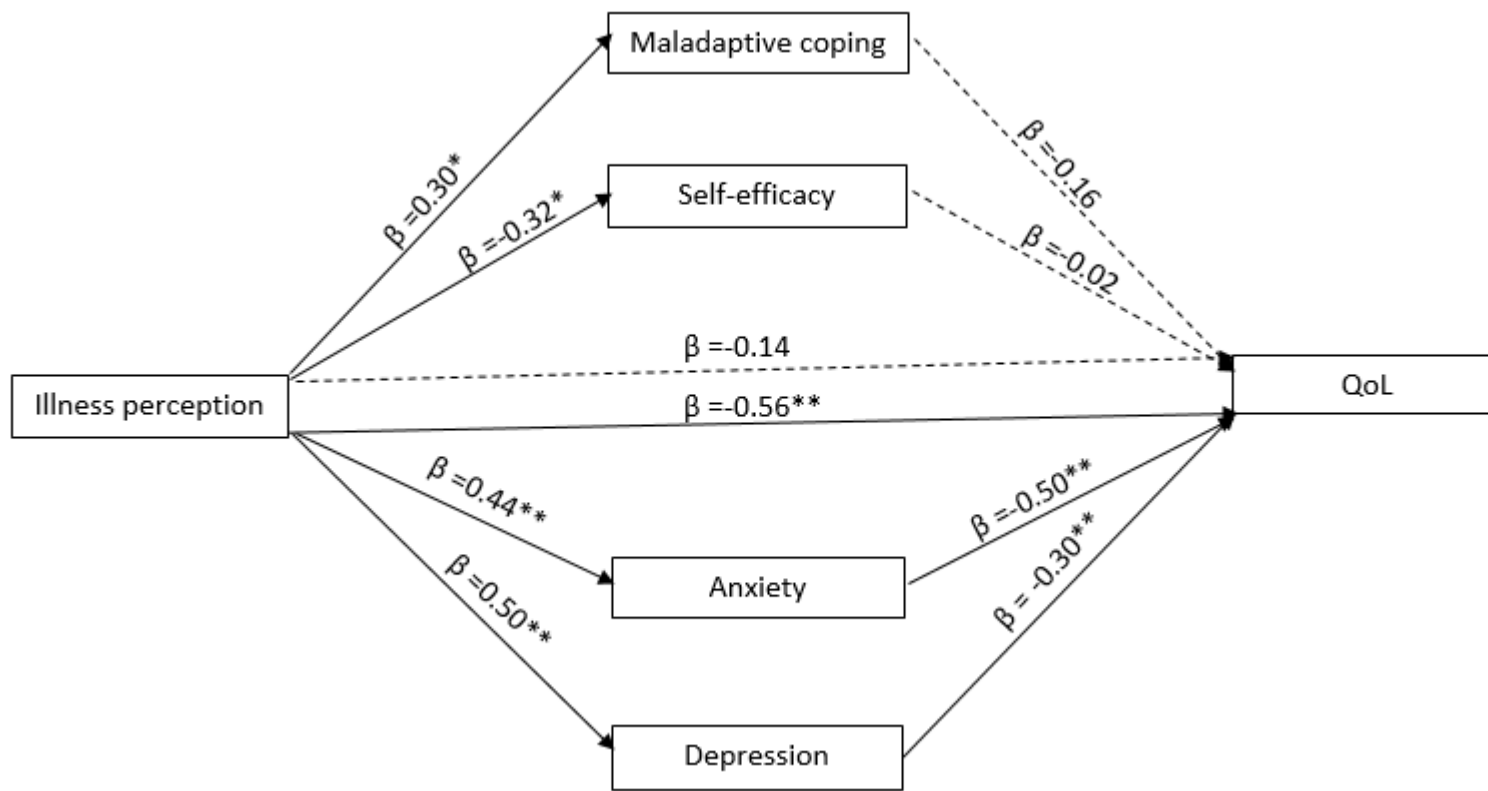
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455 **Figure 1.** Multiple mediation between illness perception and QoL (\* $p < 0.05$ , \*\* $p < 0.001$ ).