Report of Empirical Study

HEALTH PSYCHOLOGY OPEN

Health Psychology Open
July-December 2018: 1–6
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DOI: 10.1177/2055102918786865
journals.sagepub.com/home/hpo
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Scale development and psychometric properties of the Cardiac Self-Blame Attributions scale in patients with cardiovascular disease

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Abstract

Patients with cardiovascular disease may attribute their cardiovascular disease to their behaviors (behavioral self-blame) or to their dispositions (characterological self-blame). However, findings are mixed on the effects of behavioral self-blame and characterological self-blame on health outcomes, possibly because there are no validated, multiple-item measures. This study developed and tested an 11-item Cardiac Self-Blame Attributions scale via questionnaire data from 121 patients with cardiovascular disease. Results yielded a two-factor structure that explained 65 percent of the variance, with good reliability and discriminant validity. Findings suggest that the scale is reliable and valid and can be used to understand the cardiac attributions patients create.

Keywords

cardiac rehabilitation, cardiovascular disease, psychometrics, scale development, self-blame attributions

Introduction

Previous research has identified a relationship between casual attributions and adjustment to chronic illness (Malcarne et al., 1995). Identifying a potential cause, or creating an attribution, is a salient part of the adjustment process to serious diseases, especially when etiologic factors have been identified. In cardiovascular disease (CVD), a disease with which specific health behaviors, such as diet, exercise, and smoking (Roger et al., 2011), have been linked to onset, patients readily search for a cause. For example, Bennett and Marte (2013) content-analyzed attributions by patients with CVD after enrollment in cardiac rehabilitation (CR). Results showed that patients created at least one causal attribution (sometimes more) and that attributions fell into three main categories: controllable behavioral causes, uncontrollable biological causes, and stress-related causes. In fact, there are a number of ways to distinguish between types of causal attributions, including controllable versus uncontrollable, and internal versus external.

Janoff-Bulman (1979) makes another type of distinction between the tendency for some patients to attribute their illnesses to their own behaviors, referred to as behavioral self-blame (BSB), and the tendency to attribute their conditions to stable aspects of their dispositions, referred to as characterological self-blame (CSB). Janoff-Bulman (1979) contends that CSB is maladaptive to adjustment because blame

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is attributed to one's personality, which is presumed to be non-modifiable. In contrast, BSB is predicted to be adaptive to adjustment because blame is attributed to modifiable behavioral factors, thereby increasing control appraisals. In addition, self-blame attributions are similar to self-efficacy in that both constructs emphasize perceptions of control. However, self-blame differs from self-efficacy in its attributions to behaviors and traits rather than to motivation or competence.

Most research with non-CVD health conditions supports negative associations between CSB and outcomes (Bennett et al., 2005; Glinder and Compas, 1999; Plaufcan et al., 2012). However, despite Janoff-Bulman's (1979) predictions, findings have been mixed on how BSB relates to physical and mental health. For example, BSB was related to poor adjustment near the time of a breast cancer diagnosis (Plaufcan et al., 2012), and it was positively associated with symptoms of anxiety and depression at 4, 7, and 12 months post-breast cancer diagnosis (Bennett et al., 2005). Conversely, there are some studies that suggest beneficial effects of BSB. For instance, BSB was examined in relation to predictors of positive health changes (e.g. changes in diet, exercise, and smoking) in patients with head and neck, or lung cancer (Lebel et al., 2013); results indicated that BSB significantly predicted the adoption of positive health changes, including decreases in tobacco use. In another study of patients with chronic obstructive pulmonary disease, BSB was negatively associated with symptoms of depression (Plaufcan et al., 2012). Furthermore, participants who endorsed the maximum possible score for BSB reported fewer depressive symptoms, and less impairment in health-related quality of life, than those who scored lower on the measure of BSB.

Research investigating self-blame attributions in patients with CVD, an illness for which health behaviors are paramount, fails to provide a clear picture of the effects on health outcomes. For example, associations between BSB, CSB, and psychological distress were explored among patients enrolled in a Phase II CR program (Bennett et al., 2013). Results indicated that BSB at the beginning of CR was positively related to symptoms of anxiety and depression concurrently, as well as 12 weeks later at the end of CR. Conversely, CSB was not significantly related to such distress symptoms at any time point. In another study, both types of self-blame attributions were tested as predictors of cardiac symptom experiences (i.e. chest pain, pressure/heaviness in chest, and shortness of breath) in patients in CR (Harry et al., 2015). Results showed that both BSB and CSB at the beginning of CR were positively associated with cardiac symptom experiences cross-sectionally, but only CSB predicted symptoms 21 months later. Thus, findings are relatively mixed on how BSB and CSB relate to physical and mental health outcomes in chronic illness populations and specifically for patients with CVD. One possible reason for the discrepant findings is the lack of a multiple-item measure of self-blame with strong psychometric evidence of validity.

In fact, most previous studies examining self-blame have used a single-item measure for each type, with language adapted to each specific illness/condition. For example, several studies use a form of the questions cited by Glinder and Compas (1999): for BSB, "In general, how much do you blame yourself for your past behaviors? In other words, how much do you blame yourself for engaging in behaviors that contributed to your cancer?," and for CSB, "How much do you blame the type of person you are (your personal characteristics) for your cancer? In other words, do you blame yourself for being the type of person who has bad things like cancer happen to them?" (p. 477). It is unlikely that these single-item measures accurately capture self-blame attributions in their conceptual complexity. Furthermore, the psychometric properties of single-item measures have been widely criticized: the internal consistency reliability statistic cannot be computed (Clark and Watson, 1995), and single items are more susceptible to measurement error (Diamantopoulos et al., 2012). Multiple-item scales are advantageous because they are designed to sample a broader range of meaning to cover the full range of a construct (Hoeppner et al., 2011). Thus, this study developed and collected evidence for the validity of a multiple-item measure of self-blame attributions in a cohort of patients with CVD following a cardiac procedure at a hospital in a Midwestern metropolitan area.

Methods

Item development and scale construction

This measurement tool, the Cardiac Self-Blame Attributions (CSBA) scale, aimed to capture self-blame attributions in patients who recently experienced a cardiac event. The initial item pool contained 15 items (eight for measuring BSB and seven for measuring CSB), 2 of which were the original self-blame items used by Glinder and Compas (1999) adapted for CVD, and 13 of which were designed to capture the cognitive and affective components of an attribution for a cardiac event. The items were reviewed by two subject matter experts, who agreed that all 15 were essential to measuring BSB and CSB in patients with CVD, but who recommended small changes in wording in order to increase clarity of the items and decrease redundancy. The response options first proposed included *not at all* (0), *a little* (1), *somewhat* (2), *a lot* (3), and *extremely* (4). Based on subject matter expert feedback, we changed the anchor of *extremely* to *completely*, to more accurately match the wording of the items.

Pilot-testing

The proposed 15-item CSBA scale was administered to five patients (80% male) at a local hospital while they completed

their exercises during CR. All of the pilot participants reported that the instructions and response options were clear. However, a majority of the pilot participants (80%) reported that the item stems of two specific questions were unclear. Reasons cited by pilot participants were related to level of vocabulary, over-generality, and difficulty understanding the exact nature of the questions; thus, these two questions were dropped. The scale was read aloud to each pilot participant, and they did not report any issue with this method of administration. All pilot participants reported that the construct of interest was clearly assessed through the questions. Pilot participants stated that for each question, they considered the amount to which they blamed themselves for their behaviors/character relating to their cardiac events, which was congruent with our aim. In addition, one of our subject matter experts noted that the scale included questions capturing the cognitive and affective components of making an attribution for a cardiac event; he or she recommended that we add one question capturing the behavioral component, and thus one item was added, resulting in the final 14-item scale.

Final measure

The final version of the measure included seven questions for BSB and seven questions for CSB, for a total of 14 items; response options ranged from 0 (*not at all*) to 4 (*completely*). This scaling was used to capture the full range of attributions in both domains of self-blame. The aim was to capture not just individuals who are high or low on self-blame, but the full spectrum of response possibilities. Levels of self-blame can vary greatly among individuals with CVD; therefore, it was necessary to create an inventory that encapsulates high, low, and moderate levels.

Data collection

This study was conducted at a Midwestern hospital. The final 14-item CSBA scale was administered in the cardiology unit individually to eligible patients, while they were recovering from a cardiac procedure. Eligibility was assessed by the Cardiology Pharmacist. Inclusion criteria included being an English-speaking adult over the age of 18 and admission to the hospital for one of the following conditions as a primary diagnosis: myocardial infarction (MI)/acute coronary syndrome, coronary artery bypass grafting, percutaneous coronary intervention (PCI), stable angina, heart valve surgical repair or replacement, or heart or lung transplant. Exclusion criteria included any physical impairment that would limit their ability to complete the questionnaire or participate in a CR program. Patients were invited to participate following their cardiac procedure, but prior to referral to CR and discharge from the hospital. If the patient was interested in participating, informed consent was obtained and the questionnaire was either read to the patient by a research team member or self-administered. The full questionnaire included demographic questions, the CSBA scale, and a measure for discriminant validity. To measure discriminant validity, one question on exercise self-efficacy was used that assessed confidence to exercise on a scale of 1 (*not at all confident*) to 4 (*very confident*). Institutional Review Board approval was obtained from our university and the participating hospital.

Data analysis

Descriptive statistics were used to examine sample characteristics. All statistical analyses were conducted using SPSS version 24.0 (SPSS Inc., Chicago, IL). Parallel analysis and Velicer's minimum average partial (MAP) were conducted and indicated that two factors should be extracted from the 14-item CSBA scale. The first factor analysis employed contained all 14 items of the CSBA scale. Principal axis factoring (PAF) with oblimin rotation was used iteratively to identify potentially unsuitable items. Two reverse-worded items were removed due to lack of evidence of process validity and consistency with other items, and one item was removed due to cross-loading on both factors. Therefore, the final scale contained 11 items.

Results

Participant characteristics

The sample included 121 participants who completed all parts of the questionnaire. The mean age of the participants was 56.1 years (standard deviation (*SD*) = 9.6). The majority of the sample was male (70.2%) and insured (73.1%). Notably, 24 participants who were classified as "insured" received a hospital-sponsored discount based on their income. This discount is not health insurance per se, but covers most of the cost of CR: they were charged a US$10 co-pay per month for CR. Other forms of insurance included the following: 23.5 percent with Medicare, 12.6 percent with Medicaid, and 16.8 percent with private insurance. Most were European American (57.9%), and 35.5 percent self-identified as African American. A majority of the sample was single, divorced, or widowed (54.6%), whereas 39.6 percent were married or living with a partner. Participants ranged in education: 21.0 percent reported up to some high school, 29.4 percent completed high school/GED, 34.5 percent reported some college/technical school, and 14.3 percent completed college or beyond. The most common diagnoses were MI and PCI together (53.8%), PCI alone (38.6%), and MI alone (5.9%).

Final exploratory factor analysis

The final CSBA scale items are listed in Appendix Table 1. PAF using an oblimin rotation yielded an 11-item,

two-factor structure explaining 65.0 percent of the variance. The final factor solution yielded primary pattern coefficients ranging from .49 to .91, with no cross-loadings greater than .27. These two factors represented BSB (six items) and CSB (five items) and were strongly correlated ($r = .62$, $p < .05$). Internal consistency for the subscales formed in accord with the two factors was good to excellent ($\alpha = .93$ and .87, respectively), as well as excellent reliability for the total CSBA scale ($\alpha = .93$). There was also good evidence for discriminant validity of CSBA total, BSB, and CSB subscale scores in the form of weak, nonsignificant associations with exercise self-efficacy ($r = -.13$, $r = -.10$, $r = -.14$, $ps > .05$, respectively). Items 1–6 loaded on Factor 1 (reflecting BSB) and Items 7–11 on Factor 2 (reflecting CSB). Appendix Table 1 shows the item pattern and structure coefficients, and Appendix Table 2 lists inter-item correlations.

Discussion

This study developed and evaluated the reliability and validity of the CSBA scale, aimed to measure self-blame attributions in patients following a cardiac event. Results indicated good reliability and validity of the CSBA scale in patients with CVD. The final model yielded a two-factor solution representing BSB (Factor 1) and CSB (Factor 2). As predicted, this two-factor solution suggests there is a practical difference between making cardiac attributions to one's past behaviors compared to one's personality or character traits. Thus, both factors provide face validity to the original, single-item conceptualizations of self-blame used by Glinder and Compas (1999). This new scale also encompasses a broader range of questions about behavioral and cognitive components of how one might make a cardiac attribution. Furthermore, the two factors were strongly related, suggesting that there may be two components to the overarching, latent construct of self-blame.

The use of a validated self-blame attribution scale within a CR setting is warranted given research suggesting that most patients embark on a causal search following a stressful event (Taylor, 1983); a CVD diagnosis is a prime example of such a stressor (Roger et al., 2011). If patients readily search for a cause, CR staff can better understand the psychosocial effects of those casual attributions by measuring them. Already, qualitative research suggests that creating a behavioral attribution can elicit positive behavior change following MI (Martin et al., 2005). Furthermore, one study reported that patients who created a behavioral attribution for their CVD were more likely to attend CR than their counterparts who did not create a behavioral attribution (Blair et al., 2014). In addition, prior research with the single-item measure of CSB links it to poor outcomes in non-CVD samples (Bennett et al., 2005; Glinder and Compas, 1999; Plaufcan et al., 2012), but only two studies of which we are aware examine linkages between CSB and outcomes in cardiac samples, yielding mixed findings (Bennett et al., 2013; Clark and Watson, 1995). Given the theoretical basis of Janoff-Bulman's (1979) ideas, and the conceptual similarity of CSB with learned helplessness (Abramson et al., 1978), research is needed to test whether blaming one's character is associated with poor outcomes and psychological distress.

The use of the BSB subscale in a CR setting can begin to test whether the qualitative results discussed above of the protective effects of BSB on outcomes can be replicated by quantitatively collected cardiac attributions. In addition, research is needed to clarify how CSB affects patients in CR and their outcomes. Using a short scale with strong psychometric evidence of validity, like the CSBA, is less labor-intensive for CR staff than qualitatively analyzing open-ended questions assessing cardiac attributions. In fact, the CSBA takes approximately 5 minutes to administer and score, making it possible to incorporate it into existing screening measures that are included in routine CR intake sessions. In addition, using multiple items as indicators of the latent constructs of BSB and CSB should enhance the reliability of their measurements, which in turn will reduce measurement error and increase the accuracy of estimates of their associations with other constructs.

Limitations and future directions

Although, to our knowledge, this is the first multiple-item scale to measure cardiac attributions, limitations are worth noting. First, we recruited participants from a single hospital, so broadening the sample of patients with CVD is warranted to protect against site-specific idiosyncrasies that may affect associations. Second, we did not assess the predictive validity of the scale over time, so this is the next logical step for future research. Ideally, subsequent investigations would use objective measures of physical and mental health outcomes to protect against shared method variance, which can inflate statistical estimates. Third, as a self-report measure, the CSBA scale shares the limitations common to all such measures, namely response bias arising from a lack of honesty or image management, respondents' introspective and intellectual abilities, and variance in the interpretation of rating scale anchor points.

Conclusion

Data presented here support the reliability and validity of the CSBA scale among patients with CVD. It may be used within a CR setting to assist providers in understanding the causal mechanisms that patients assume underlie their diagnoses. Evidence already suggests positive health outcomes following the creation of a behavioral cardiac attribution; the CSBA can be used to capture the extent to which patients look to their behaviors as the cause of their cardiac events. Furthermore, this scale may be used to identify patients who make characterological attributions in order to design interventions to ameliorate any potential negative effects.

Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) disclosed receipt of the following financial support for the research, authorship, and/or publication of this article: This research was supported by funds from (1) the University of Missouri Research Board awarded to K.K.B., (2) the University of Missouri-Kansas City School of Graduate Studies Research Grant awarded to K.M.H., and (3) the University of Missouri-Kansas City Women's Council Graduate Assistance Fund awarded to K.M.H.. These funding source sponsors were not involved with the study design, implementation, or dissemination of this article.

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Appendix 1

Table 1. CSBA descriptives and factor pattern/factor matrix rotated to oblimin criterion.

Item stem	*M* (*SD*)	Factors		
		1	2	h^2
1. How much do you blame yourself for past behaviors that may have caused your cardiac event?	2.07 (1.44)	**.87 (.78)**	−.05 (–.31)	.70
2. To what extent do you accept fault for behaviors that may have caused your cardiac event?	2.17 (1.48)	**.91 (.80)**	−.07 (–.33)	.75
3. How much do you think your past behaviors contributed to your cardiac event?	2.24 (1.33)	**.87 (.81)**	−.02 (–.30)	.74
4. To what extent do you believe that a change in your behavior could have prevented your cardiac event?	2.27 (1.39)	**.70 (.73)**	.08 (–.19)	.56
5. To what extent do you feel accountable when thinking about past behaviors that may have caused your cardiac event?	2.26 (1.37)	**.84 (.81)**	.02 (–.26)	.73
6. When discussing possible causes of your cardiac event with important people in your life, to what extent have you blamed your past behavior?	1.86 (1.49)	**.71 (.83)**	.19 (–.13)	.70
7. How much do you blame the type of person you are for your cardiac event?	1.17 (1.34)	.26 (.66)	**.49 (.17)**	.45
8. To what extent do you believe that a change in the type of person you are could have prevented your cardiac event?	1.38 (1.40)	.15 (.72)	**.69 (.32)**	.62
9. How much do you blame your personality for your cardiac event?	0.99 (1.34)	.01 (.71)	**.84 (.44)**	.70
10. How much do you blame yourself for being the type of person who has bad things, like a cardiac event, happen to them?	0.97 (1.34)	−.02 (.57)	**.69 (.38)**	.46
11. When discussing possible causes of your cardiac event with important people in your life, to what extent have you blame your personality?	0.96 (1.33)	−.09 (.68)	**.90 (.51)**	.71

CSBA: Cardiac Self-Blame Attributions; SD: standard deviation.
Factor 1 = Behavioral self-blame. Factor 2 = Characterological self-blame. Bold indicates items retained on each factor. Pattern coefficients followed by factor coefficients in parentheses. h^2 are the communalities. The two factors were related, $r = .62$, $p < .05$.

Table 2. Inter-item correlations of the 11 CSBA items.

Item	1	2	3	4	5	6	7	8	9	10
1	–									
2	.75*	–								
3	.74*	.75*	–							
4	.59*	.61*	.63*	–						
5	.68*	.75*	.73*	.70*	–					
6	.72*	.70*	.71*	.61*	.69*	–				
7	.42*	.48*	.44*	.47*	.48*	.55*	–			
8	.48*	.46*	.45*	.57*	.45*	.52*	.57*	–		
9	.42*	.42*	.49*	.40*	.44*	.54*	.56*	.68*	–	
10	.31*	.33*	.33*	.29*	.43*	.43*	.40*	.53*	.50*	–
11	.38*	.38*	.43*	.38*	.42*	.48*	.50*	.58*	.73*	.65*

CSBA: Cardiac Self-Blame Attributions.
*$p < .01$.