VALIDATION OF THE VALUING QUESTIONNAIRE (VQ) IN ADULTS WITH CARDIOVASCULAR DISEASE AND RISK

By

MINDY MICHELLE KIBBEY

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Samantha G. Farris
And approved by

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A common behavioral therapeutic target in the prevention and treatment of cardiovascular disease is activation of values-consistent living, which can facilitate positive lifestyle behavior change. However, the empirical study of values-consistent living has been limited by significant heterogeneity in measurement due to the absence of a ‘gold-standard’ assessment tool. The Valuing Questionnaire (VQ), a 10-item self-report measure that taps progress in and obstruction of values-consistent living, is well suited for use in research and clinical settings, yet its psychometric properties have been limitedly examined despite its frequent use. The current study utilized data from an anonymous online survey to evaluate the factor structure and psychometric properties of the VQ in adults (n = 252) with a self-reported history of cardiovascular disease or elevated disease risk. Results from confirmatory factor analyses provided support for the two-factor structure, reflecting progress towards values and obstruction of valued living. Additionally, the VQ factor scores evidenced internal consistency, convergent, concurrent, and incremental predictive validity. VQ factors scores also evidenced known groups validity, distinguishing between those with/without psychological distress. The VQ appears to be an adequate measure of progress and obstruction towards values-consistent living for use among adults at risk for or with cardiovascular disease. Findings support the use of the VQ in behavioral medicine research and practice.
Acknowledgement

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Introduction

Definition of Values

Personal values are defined as the self-determined guiding principles and desired qualities of life that intrinsically motivate behavior (Dahl, 2015). That is, values are personally chosen qualities of being that describe how we want to behave on an ongoing basis and give our lives meaning (Hayes, Luoma, Bond, Masuda, & Lillis, 2006). Values contribute to the formulation of an individual’s own ideal-self, the embodiment of all that one aspires, ideally, to be, (Higgins, 1989) and they form the basis for evaluations which inform a person’s attitudes and goals (Schwartz, 2012). Goals differ from values in that goals are specific outcomes or achievements, endpoints which can be attained, similar to a destination which can be reached; whereas values are tools for navigating the journey, desired ideals which will never be terminally satisfied but will continue to suggest new goals and provide a sense of fulfillment and satisfaction along the way (Harris, 2008). Values, then, are essential components of one’s self-concept and key motivators of behavior. As such, they are powerful determinants of behavior change (Hayes et al., 2006; Rokeach & McLellan, 1972).

Values in Theories of Health Behavior Change

Approximately five decades ago, Belloc and Breslow (1972) provided population-wide evidence on the linkages between certain lifestyle behaviors (i.e., getting sufficient hours of nightly sleep, eating regular meals, engaging in adequate physical activity and refraining from alcohol and tobacco use) and positive health outcomes, such as vitality and absence of chronic medical conditions or symptoms. Since then, numerous theoretical models of health behavior have been proposed to facilitate understanding of psychological processes underlying positive health behavior (Brewer & Rimer, 2008). A unifying theme of many health behavior theories is that cognitions (i.e., beliefs) about the perceived benefits of health-related actions influence behavioral intention or willingness,
and in turn *behavioral action* (Brewer & Rimer, 2008). For example, the Health Belief Model posits that the perceived benefits and barriers of health actions directly influence one’s health behaviors guided by intentions for preventing disease (Maiman & Becker, 1977; Rosenstock, 1974). The Theory of Planned Behavior identifies attitudes (i.e., favorable or unfavorable evaluations of the behavior in question) as one precursor to health behavior (in conjunction with social norms and perceived control) and, therefore, a putative target for health behavior change interventions (Ajzen, 1985, 1991).

Additionally, the Transtheoretical Model posits that movement over time between stages of readiness to engage in positive health behavior change, potentially culminating in sustained action, is accompanied by shifts in the decisional balance marked by perceived benefits and consequences of behavior change (Prochaska & Velicer, 1997).

Beliefs about the perceived benefits of health behaviors are especially powerful determinants of health behavior change when they are clearly linked to one’s personal values. Values inform attitudes and goals regarding health behaviors and affect whether an individual will accept or reject norms pertaining to health behaviors (Schwartz, 2012). Self-affirmation Theory contends that when individuals’ personal values are affirmed, they are less defensive in response to threatening health information (i.e., challenges to one’s self-view) and more receptive and willing to incorporate the health information into their self-concept, which can promote adaptive behavioral change (DiBello, Neighbors, & Ammar, 2015; Sherman & Cohen, 2006). In a similar vein, a meta-synthesis qualitative examination of 14 health behavior change studies (Kearney & O’Sullivan, 2003) found that conflict, or incongruence, between individuals’ well-established personal values and current lifestyle was a prominent motivator of initiation of health behavior change. These findings are consistent with Self-discrepancy Theory, which posits that individuals are motivated to bring their current state (actual-self) into line with some valued end-state (ideal-self) (Higgins, 1989).
Values in Evidence-Based Interventions for Health Behavior Change

In light of the theoretical role of personal values in motivating positive behavior change, many evidence-based interventions aim to enhance clarification of personal values (i.e., via exploration and discussion of individuals' personally-held values) and enactment of values in order to encourage and facilitate healthful behaviors. For example, Behavioral Activation, an evidence-based treatment for depression, employs the scheduling of positively reinforcing values-consistent activities to promote improved mood, and has also been utilized to address depression in the context of comorbid health behavior, including poor weight control, smoking and substance use (Lejuez, Hopko, Acierno, Daughters, & Pagoto, 2011). In addition, Motivational Interviewing (MI) is a therapeutic approach that capitalizes on values clarification as a tool to promote treatment engagement. A key process of MI is identifying and focusing on what is most important to the individual, evoking motivations for change, and planning paths towards change that are most consistent with the individual's values (Miller & Rollnick, 1991).

The process of identifying personal values and behavioral modifications that could facilitate greater consistency with stated values, can enhance one’s perceived importance of and readiness to engage in positive health behavior change (Miller & Rollnick, 1991). Moreover, evoking a discrepancy between an individual’s self-stated values and current lifestyle provides an opportunity to highlight dissonance, which can trigger behavior change (Festinger, 1957; Rokeach & McLellan, 1972).

Currently at the forefront of therapies which rely on values clarification and enactment to promote adaptive functioning and healthful behaviors is Acceptance and Commitment Therapy (ACT) (Hayes et al., 2006; Zhang et al., 2018). ACT addresses obstacles to values-consistent living, such as distressing thoughts, emotions and sensations that run contrary to one’s personal values, by targeting a core construct known as psychological inflexibility. Psychological inflexibility is characterized by rigid,
limiting patterns of responding and behavior that are often motivated by the desire to
avoid psychological pain or personal discomfort rather than the pursuit of what is
important and valued in one’s life (Bond et al., 2011; Hayes et al., 2006). It is a core
process implicated in various forms of psychopathology and poor adaptive functioning
and is a barrier to engaging in positive health behavior change (Hayes et al., 2006; Levin
et al., 2013; Zhang et al., 2018). Psychological inflexibility is posited to, in part, narrow
one’s repertoire of adaptive behaviors due to avoidance of uncomfortable internal
experiences (e.g., emotions, thoughts, sensations, memories). This narrowing process,
in turn, disrupts living in a way that is consistent with one’s personal values (Hayes et al.,
2006).

Avoidance of uncomfortable internal experiences (e.g., anxiety, shame, pain) is a
strong motivator of problematic health behavior, including medication non-adherence
and poor self-management (Dolezal & Lyons, 2017). For example, an individual with
type 2 diabetes may choose to not regularly test blood glucose in order to avoid thoughts
of failure and feelings of worry and shame if test results are not within healthy
parameters, while a person living with HIV may skip medical visits due to fear and
distressing thoughts about self-identity that are triggered by disease management
(Graham, Gouick, Krahé, & Gillanders, 2016). For these reasons, a core therapeutic
target in ACT is activation of values-consistent living by enhancing meaning and vitality
in life while increasing acceptance for distressing internal experiences (i.e., improving
psychological flexibility) (McCracken & Gutiérrez-Martínez, 2011), with the goal of
motivating positive health and lifestyle behavior change (Brassington et al., 2016;
Forman & Butryn, 2016; McCracken & Vowles, 2014; Mosher et al., 2017). Existing
empirical evidence indicates that ACT interventions produce improvements in
psychological flexibility and behavioral health outcomes, including diabetes management
(Gregg, Callaghan, Hayes, & Glenn-Lawson, 2007), smoking cessation (Gifford et al.,
2004), epilepsy severity (Lundgren, Dahl, & Hayes, 2008), and improved adaptive coping and valued living in patients with end-stage cancer (Branstetter, Wilson, Hildebrandt, & Mutch, 2004) and chronic pain (McCracken & Gutiérrez-Martínez, 2011; McCracken & Vowles, 2014).

**Values-Based Interventions for Cardiovascular Disease**

Cardiovascular disease (CVD) accounts for roughly 1 out of every 3 deaths globally (World Health Organization, 2017) and creates a greater public health burden than any other condition (Mozaffarian et al., 2015). Effectively reducing health risk in CVD involves addressing several comorbidities (hypertension, hyperlipidemia, type II diabetes, etc.) and requires long-term modification of multiple behaviors, such as embracing a more heart-healthy diet, engaging in exercise, stress management, and smoking cessation (Cobb, Brown, & Davis, 2006; Daly et al., 2002). This broad lifestyle change can be distressing and difficult to accept, initiate, and maintain. Therefore, increasing psychological flexibility, generally, and focusing on values-consistent living, specifically, may be particularly beneficial for overcoming obstacles to long-term positive behavior change relevant to cardiovascular health (Goodwin, Forman, Herbert, Butryn, & Ledley, 2012; Spatola et al., 2014; Zhang et al., 2018).

Indeed, a recent qualitative analysis of values and cardiopulmonary rehabilitation program engagement found that values are an important and salient factor related to clinical outcomes (Ellis et al., 2017). Although personal values identified via a qualitative interviewing methodology were highly individualized, six common themes that motivated program engagement were identified: being physically, socially and mentally active; family connectedness and engagement; independence and autonomy; possessing good physical health; self-care and self-exploration; and productive occupational engagement. Moreover, there is initial evidence that acceptance-based intervention including a
values-clarification component produces positive changes in diet and physical activity in patients attending cardiac rehabilitation (Spatola et al., 2014).

Measurement of Valued Living

Despite the promise of targeting values-consistent living in CVD, and health behavior change more broadly, the empirical study of values clarity and values-consistent living has been limited by significant heterogeneity in measurement in the absence of a ‘gold-standard’ assessment tool (Barrett, O’Connor, & McHugh, 2019). Two recent systematic reviews of values measures identified 18 different assessment tools that have been developed and utilized for the assessment of valued-living (Barrett et al., 2019; Reilly et al., 2019), which vary widely in scope (e.g., domain-specificity versus generality) and rater-informant (e.g., clinician-administered versus self-reported).

One measure in particular, the Valuing Questionnaire (VQ) (Smout, Davies, Burns, & Christie, 2013) was evaluated favorably by both review teams in terms of measure development (i.e., theoretically-grounded item selection and reduction, evaluation for readability/comprehensibility by laypersons), internal consistency, and construct validity. The VQ was the only measure considered by Reilly et al. which satisfied all criteria for measure quality and was one of two measures recommended by Barrett et al. for use in research, due to its short administration time, generalizability across domains and populations, and facility of comparing scores between individuals. Furthermore, the VQ satisfies best practice guidelines for psychological assessment in medical settings due to its ease of use (i.e., brevity and ability to be reliably completed by patients without assistance), availability in the public domain, and expeditiousness of scoring and interpretation (Porcerelli & Jones, 2017). The other measure that scored highly in these two review studies was the Engaged Living Scale (ELS), which is a process measure developed for assessing values in a specific population, individuals with chronic pain (Trompetter et al., 2013). There are two versions of the ELS: a longer, 16-item scale,
which contains several items that have been questioned due to redundancy, and a brief 9-item scale (ELS-9), which eliminates the items that demonstrated redundancy in the longer version (Trindade, Ferreira, Pinto-Gouveia, & Nooren, 2016). Though the brief version may hold promise for research and clinical use, its extant psychometric evaluation is limited, as only the Portuguese translation has been tested in a sample of young adult college students. Since the ELS-9 has not yet been tested in a broad sample, it was not selected for additional validation in the current behavioral medicine sample.

The VQ is a 10-item self-report measure created for use in clinical and research settings. The measure was developed from an initial pool of 70 items created by adapting excerpts from Acceptance and Commitment Therapy texts which were then rated for representativeness of the values construct by content experts as well as for readability by non-expert volunteers (Reilly et al., 2019; Smout et al., 2013). The original validation and psychometric examination of the VQ items (Smout et al., 2013) entailed testing and refinement in a sample of undergraduate students. Through item-reduction and exploratory factor analysis (EFA), a final 10 items were identified with a two-factor underlying structured, characterized by progress toward values (i.e., awareness and enactment of values-consistent behavior) and obstruction of values (i.e., failure to enact values-consistent behavior due to inattention or interference of negative internal experiences). The two-factor structure was confirmed using a confirmatory factor analysis (CFA) in a subsequent sample of treatment-seeking adults with anxiety and depression. The scale factors evidenced convergent validity, indicated by significant bivariate correlations of the factor scores with measures of values-consistent living (range VQ Progress: $r = .33-.48$; VQ Obstruction: $r = -.19-.33$), subjective well-being (range VQ Progress: $r = .36-.67$; VQ Obstruction: $r = -.44-.71$), psychological distress (range VQ Progress: $r = -.24-.55$; VQ Obstruction: $r = 52-.70$), psychological inflexibility
(VQ Progress: $r = -.40$; VQ Obstruction: $r = .65$), and mindfulness (VQ Progress: $r = .46$; VQ Obstruction: $r = -.49$). Predictive validity was also demonstrated as factor scores entered together in the final step of regression models accounted for unique variance above and beyond previously entered predictors (Valued Living Questionnaire, Acceptance and Action Questionnaire-II, and Positive and Negative Affect Scale) in scores on measures of subjective well-being and psychological distress (range: $\Delta R^2 = .01$-.09) (Smout et al., 2013).

**Current Study**

The psychometric properties of the VQ have been limitedly examined beyond the abovementioned samples, despite its frequent use across various types of patient populations. Only one additional study has evaluated the Portuguese translation of the VQ in women with chronic pain and found confirmatory support for a two-factor structure and measure invariance compared to a non-pain sample. Tests in these samples supported convergent validity of the VQ factor scores with related measures of values-consistent living, psychological inflexibility, mindfulness, acceptance, psychological distress and quality of life as well as incremental and test-retest validity (Carvalho, Palmeira, Pinto-Gouveia, Gillanders, & Castilho, 2018a).

Further psychometric examination of the VQ is needed to assess the validity and utility of this measure, especially among individuals with CVD and risk, given the therapeutic relevance of values-consistent living in this vulnerable population. Thus, the aim of the current study was to evaluate the psychometric properties of the VQ in a sample of adults with a self-reported history of CVD or with CVD risk. Specifically, this study examined the following aims:

**Aim 1.** Evaluate the factor structure of the VQ

**Aim 2.** Evaluate the reliability (internal consistency) of VQ items
**Aim 3.** Evaluate the validity of the VQ items, including (3a) concurrent validity, (3b) convergent validity, (3c) known-groups validity, and (3d) incremental predictive validity

**Method**

**Participants and Procedure**

Participants were recruited for a 30-minute anonymous online survey study on “health factors and behavior” through Amazon’s global Mturk platform. Survey participation was restricted to those individuals identified as “masters qualified” workers (i.e., those who “consistently submit high-quality results”). Participants were eligible if they met the following criteria: (a) $\geq 35$ years of age; (b) positive self-reported history of a form of CVD (i.e., acute myocardial infarction, coronary bypass surgery, heart valve repair or replacement, coronary angioplasty or coronary stenting, heart transplant, angina pectoris, heart failure, ICD) or presence of $\geq 2$ CVD risk factors (i.e, hypertension, hyperlipidemia, current/past cigarette use, type 2 diabetes, overweight or obesity [BMI $\geq 25$], or not meeting physical activity guidelines [150m/week of moderate-vigorous physical activity]). Participants were not excluded on the basis of any self-reported presence of additional physical or mental health conditions.

A total of 781 participants completed the eligibility screener, of which 368 (47.1%) met eligibility criteria. Eligible participants were provided a description of the study, including the voluntary and anonymous nature of participation, and were required to “opt in” in order to initiate the self-report survey. An additional 116 (31.5%) cases were excluded for failing either of two attentional check questions or for failure to complete the entire survey, resulting in a final sample of 252 valid cases with no missing data. All participants were compensated $3.00 through Amazon Mturk for survey completion. All study procedures were approved by the University Institutional Review Board.
Measures

Demographic factors (e.g. age, sex, race, education) were self-reported. Medical history, including CVD risk was assessed with a Medical History Form that included a broad checklist of psychiatric and physical health symptoms/disorders as well as ratings of subjective overall health and physical pain.

Values-Consistent Living (Table 1)

The Valuing Questionnaire (VQ) is a process measure that contains 10 items rated on a scale of 0 (Not at all true) to 6 (Completely true) to assess the extent to which respondents have engaged in values-consistent living in the past-two weeks. The VQ yields two subscales: Values Progress (5 items, e.g., “I made progress in the areas of my life I care most about”) and Values Obstruction (5 items, e.g., “Difficult thoughts, feelings or memories got in the way of what I really wanted to do”). Responses to the items for each subscale are summed such that possible scores range from 0 to 30 for each factor, with higher scores indicating greater Progress and Obstruction, respectively (Smout et al., 2013). Internal consistency of the factor scores in previous validation samples has ranged from $\alpha = .81$-$87$ for Progress and $\alpha = .79$-$89$ for Obstruction, with the two factor scores being moderately negatively inter-correlated ($r’s$ range = ¯.50 to ¯.66) (Carvalho, Palmeira, Pinto-Gouveia, Gillanders, & Castilho, 2018b; Smout et al., 2013).

The Comprehensive assessment of Acceptance and Commitment Therapy processes (CompACT) is a 23-item self-report assessment that yields a total score that reflects psychological flexibility, and three subscale scores that tap major processes of Acceptance and Commitment Therapy: openness to experience (e.g., “I can take thoughts and feelings as they come, without attempting to control or avoid them”), behavioral awareness (e.g., “Even when doing the things that matter to me, I find myself doing them without paying attention”), and valued action (e.g., “I can identify the things
that really matter to me in my life and pursue them”). Items are scored on a scale of 0 (strongly disagree) to 6 (strongly agree) and summed to derive a total and subscale scores, where higher scores indicate greater psychological flexibility and better functioning relevant to ACT processes. The CompACT has demonstrated reliability in terms of inter-item correlation as well as concurrent and convergent validity with theoretically-related measures (Francis, Dawson, & Golijani-Moghaddam, 2016). Internal consistency for the CompACT items in the current sample was $\alpha = .92$. The Valued Action subscale of the CompACT includes 8 items assessing clarity of values and values-consistent living, which was used as an index of concurrent validity. This test of validity compares two measures concurrently administered that purport to measure the same construct (i.e., values-consistent living) (Salkind, 2012).

**Psychological Distress**

Indices of psychological distress were used to document convergent validity. This test of validity reflects the extent to which two measures tap conceptually-related constructs (Carlson & Herdman, 2012). The *Acceptance and Action Questionnaire (AAQ-II)* is a 7-item self-report assessment of psychological inflexibility and experiential avoidance. Items (e.g., “My painful memories prevent me from having a fulfilling life”) are rated on a scale of 1 (never true) to 7 (always true) with higher scores indicating greater inflexibility and avoidance (Bond, 2011). Internal consistency for the AAQ-II items in the current sample was $\alpha = .94$. The *Patient Health Questionnaire-9 (PHQ-9)* depression scale is a psychometrically-validated, widely-used tool for the assessment of depressive symptom severity in both medical and research contexts (Gilbody, Richards, Brealey, & Hewitt, 2007). Respondents rate the frequency with which they have experienced 9 symptoms (e.g., “Little interest or pleasure in doing things”) on a scale of 0 (Not at all) to 3 (Nearly every day) during the past two weeks. Ratings for the items are summed, and total scores determine clinical cutpoints for severity of depressive symptoms (5 = mild,
10 = moderate, 15 = moderately severe, 20 = severe; with scores ≥ 10 indicating probable diagnosis of major depression). If any symptoms are endorsed, a single follow-up item assesses degree of difficulty with role functioning as a result of depressive symptoms on a scale of 0 (Not difficult at all) to 3 (Extremely difficult) (Kroenke, Spitzer, & Williams, 2001). Internal consistency for the PHQ-9 items in the current sample was α = .90. The General Anxiety Disorder-7 (GAD-7) is a 7-item self-report assessment of common anxiety/worry symptoms (e.g., “Feeling nervous, anxious or on edge”) experienced during the past two weeks, which are rated on a scale of 0 (Not at all) to 3 (Nearly every day). Clinical cut-points for the total of summed responses indicate severity of symptoms (5 = mild, 10 = moderate, 15 = severe; with scores ≥ 10 indicating probable diagnosis of generalized anxiety disorder). A follow-up question assesses degree of difficulty with role functioning as a result of anxiety symptoms on a scale of 0 (Not at all difficult) to 3 (Extremely difficult) (Spitzer, Kroenke, Williams, & Löwe, 2006). Internal consistency for the GAD-7 items in the current sample was α = .93. The Perceived Stress Scale (PSS) is a 10-item self-report assessment of one’s perception of experienced stress and the frequency with which stressful situations have been perceived as unpredictable, uncontrollable, and overwhelming during the last month on a scale of 0 (Never) to 4 (Very Often). Four positively stated items are reverse scored, and then responses are summed. Higher PSS scores (range = 0 to 40) indicate more perceived stress and are associated with poor health behaviors (Cohen, Kamarck, & Mermelstein, 1983; Cohen & Janicki-Deverts, 2012). Internal consistency for the PSS items in the current sample was α = .90. The Cardiac Anxiety Questionnaire (CAQ) contains 18 items rated on a scale of 0 (Never) to 4 (Always) yielding a total score indicating heart-focused anxiety. Items are summed and then divided by 18 yielding a score of 0 to 4, with a higher score indicating greater heart-focused anxiety and
avoidance (Eifert et al., 2000). Internal consistency for the CAQ items in the current sample was $\alpha = .89$.

**Quality of Life**

Quality of life is conventionally used as a proxy for values-consistent living and was surveyed for incremental validity. For purposes of this study, quality of life was assessed with the *RAND 36-Item Health Survey (RAND-36)*, a tool commonly used in medical clinical populations, which includes 36 items adapted from the Medical Outcomes Study and scored according to simplified guidelines from the RAND corporation, resulting in two composite scores based on eight subscales tapping various health concepts (i.e., *physical health* averaged from the following subscales: general health, physical functioning, bodily pain, role limitations due to physical health problems; and *mental health* averaged from the following subscales: emotional well-being, social functioning, vitality, role limitations due to emotional or personal problems). Most questions orient the participant to respond according to their experience *over the past four weeks*, but a single item measures perceived change in overall health *compared to one year ago*. Items are recoded for consistency of valence, such that higher scores indicate a more favorable health state, then rescored on a scale of 0 to 100. Items belonging to the same subscale are averaged, and the resulting subscale and composite scores represent a percentage of the total possible score achieved (Hays, Sherbourne, & Mazel, 1993). Internal consistency for the RAND-36 items (total scale) in the current sample was $\alpha = .95$.

**Data analysis**

All analyses were conducted in R version 3.6.1 (R Core Team, 2019) with R Studio software (RStudio Team, 2018) and in SPSS AMOS 26 software (Arbuckle, 2006; O'Connor, 2000). Data were screened for invalid responding (e.g., logical inconsistencies) and missingness.
Test of Aim 1 (Evaluate the factor structure of the VQ)

Confirmatory Factor Analysis. A confirmatory factor analysis was conducted with Maximum Likelihood (ML) estimation (Brown, 2006; Iacobucci, 2010; Kline, 2005; Schermelleh-Engel, Moosbrugger, & Müller, 2003), which assumes multivariate normality. The data were, therefore, assessed for univariate normality (i.e., skewness and kurtosis) and outliers as well as multivariate normality, and the Bollen-Stine bootstrapping technique was employed to address violation of the assumption of normality.

Multiple goodness of fit indices with corresponding recommended ranges of acceptable values were examined to generate a profile of model fit, including Chi-Square ($x^2$) and Normed Chi-Square ($x^2/df$), Comparative Fit Index (CFI ≥ 0.90, acceptable, and ≥ 0.95, desirable) (Hu & Bentler, 1999), Tucker-Lewis Index (TLI ≥ 0.90, acceptable, and ≥ 0.95, desirable) (Hu & Bentler, 1999), and Root Mean Square Error of Approximation (RMSEA ≤ 0.05, good fit; ≤ 0.08, acceptable fit; ≥ 0.10, poor fit) (Brown, 2006; Kline, 2005) using a 90% confidence interval. To evaluate local model fit, individual items’ standardized factor loadings ($\lambda$) and individual reliability ($R^2$) were assessed, with $\lambda \geq 0.50$ indicating the model has factorial validity, and $R^2 \geq 0.25$ indicating the items have internal reliability (Hair, Black, Babin, & Anderson, 2006). Average variance extracted (AVE) was calculated for each factor, with AVE ≥ 0.50 indicating factor validity (Critchley, Murtagh, & Heck, 1988; Fornell & Larcker, 1981).

Model Comparison. As an additional test of the factor structure, the validated two-factor structure was compared to a single-factor (superordinate) structure. Predictive fit indices were used to compare models including Aikake Information Criterion (AIC) and Bayesian Information Criterion (BIC). Lower AIC and BIC values reflect parsimony-adjusted indices which generally favor simpler models (Kline, 2005), indicating better fit.
**Post-Hoc Power Analysis.** Given that accepted conventions for factor analysis recommend a minimum sample size ≥ 200 and/or a ratio of participants (N) to the number of variables in the model (p), \( N/p \geq 10 \), or more conservatively, 20 cases per measured variable (Kyriazos, 2018), the current sample size complies with traditionally accepted rules of thumb for structural equation modeling. In addition, retrospective power analysis using a Monte Carlo simulation approach with pwrSEM (Wang & Rhemtulla, 2020) determined that the current study was adequately powered to detect all specified parameters \((\alpha = .05, 1 - \beta = 1.0)\).

**Test of Aim 2 (Evaluate the reliability of VQ items)**

Cronbach’s alpha was computed for internal consistency of factor items in the two subscales, with values from 0.70 to 0.95 indicating items within subscales have acceptable inter-relatedness without redundancy (Tavakol & Dennick, 2011).

**Test of Aim 3 (Evaluate the validity of the VQ items)**

**Aim 3a. Concurrent validity:** Bivariate correlations were used to assess the VQ factor scores in relation to another index of valued living, the Valued Action subscale of the CompACT. It was hypothesized that the CompACT Valued Action scores would demonstrate medium to large sized correlations with the VQ Progress (positive correlation) and Obstruction (negative correlation) factor scores.

**Aim 3b. Convergent validity:** Bivariate correlations between the VQ scores and measures of related constructs (e.g., psychological flexibility, experiential avoidance, psychological distress) were examined, with Pearson’s r values being interpreted for strength of association in terms of small-sized (.1 -.29), medium-sized (.3 -.49), and large-sized effects (≥.5) (Cohen, 1992) when p values suggest that results are significant (<.001). Though there are no broadly agreed upon cutpoints for r-values which indicate good or acceptable convergent validity, correlations with an absolute value closer to \( r = 1.0 \) suggest stronger convergent validity (Carlson & Herdman, 2012). VQ Progress
scores were expected to correlate negatively with measures of psychological inflexibility and distress and positively with measures of quality of life, while VQ Obstruction scores were expected to correlate in the opposite directions.

**Aim 3c. Known-groups validity:** Independent sample t-tests were used to examine mean-group differences in VQ scores between groups, including sex (biological male vs female), CVD status (CVD vs. at-risk), and probable diagnosis of depressive and anxiety disorders, with greater magnitude t-values indicating higher likelihood that mean differences are not due to chance. To the author’s knowledge, known-group differences for biological sex or for the presence of a chronic medical condition have not been reported in prior studies of values-consistent living, so these tests in the current study were exploratory in nature. Previous studies have found sex differences in value priorities (Schwartz & Rubel, 2005) and intrinsic and purposeful goal-striving (Morgan & Robinson, 2013), which suggests that cultural and role norms may differently impact perceptions and behaviors linked to values for men and women. It was hypothesized that participants in the current sample who reported a positive diagnosis of CVD might endorse greater Obstruction of values-consistent living relative to those with risk factors who did not yet report a specific diagnosis (i.e., acute myocardial infarction, coronary bypass surgery, heart valve repair or replacement, coronary angioplasty or coronary stenting, heart transplant, angina pectoris, heart failure, ICD), given that more advanced disease states are often associated with greater functional impairment (Afilalo, Karunananthan, Eisenberg, Alexander, & Bergman, 2009), which might, in turn, interfere with engagement in valued activities. Similarly, participants meeting criteria for probable diagnosis of depression or anxiety were expected to score lower in VQ Progress and higher in VQ Obstruction, consistent with previous findings in individuals seeking mental health treatment (Smout et al., 2013).
Aim 3d. Incremental predictive validity: Four two-step linear regression models were used to examine the VQ scores in terms of a relevant clinical endpoint, quality of life (per the RAND-36 composite scores and two representative subscale scores), above and beyond that of the CompACT Valued Action subscale, with change in $R^2$ indicating the percentage of unique variance accounted for by VQ scores.

Results

Sample Characteristics

Demographics

Participants included adults aged 35 to 81 ($M = 47.87$, $SD = 10.08$), and they were 53% female. The sample was predominantly White (73.4%) and Asian (19.0%), with a small minority self-identified as Black (5.2%), Native American (0.8%) or Other (1.6%), and 3.2% of the sample identified as Hispanic. Marital status was reported as married (59.1%), widowed (4.0%), divorced/separated (13.1), and never married (23.4%). Educational attainment was reported as not completing high school (1.2%), high school diploma or equivalent (15.9%), some college (18.3%), associate’s degree (13.9%), bachelor’s degree (34.9%), master’s degree (12.7%), and professional or doctoral degree (3.2%).

Cardiovascular Disease (CVD) and Risk Factors

Almost one quarter of participants ($n = 59$, 23.4%) endorsed a history of CVD, with 14.3% reporting a previous referral to cardiac rehabilitation. Prevalence of CVD risk factors were as follows: hypertension (51.2%), hyperlipidemia (26.2%), type II diabetes (17.5%), current/former smoker (66.3%), overweight/obesity (66.3%), and physical inactivity (73.4%).

Psychological Distress

The average score on the PHQ-9 was 5.63 ($SD = 5.68$), which reflects mild depressive symptom severity; 23.8% met criteria for a probable depression diagnosis.
The average score on the GAD-7 was 4.67 ($SD = 5.09$), which reflects mild anxiety; 16.3% met criteria for probable generalized anxiety disorder. Average scores on the PSS reflected elevated levels of perceived stress ($M = 14.79$, $SD = 8.58$) in the sample. The mean score on the CAQ was 1.21 ($SD = 0.63$), which is consistent with scores seen in other CVD samples.

**Aim 1: Evaluate the factor structure of the VQ**

**Confirmatory Test of Two-factor Model (Figure 1)**

Consistent with the initial validation paper (Smout et al., 2013) and a subsequent validation in a chronic pain sample (Carvalho et al., 2018), a two-factor model was fit to the data. The model was statistically significant, ($\chi^2(34, n = 252) = 94.828$, $p < .001$), though chi-square is sensitive to sample size and tends to be significant in large samples (Schermelleh-Engel et al., 2003). An inflated chi-square can also result from multivariate non-normality in the data (Byrne, 2013). A less conservative and more utilitarian approach recommends dividing the chi-square value by the degrees of freedom in the model, resulting in the normed chi-square ($\chi^2/df$), with resultant values of less than three being considered acceptable (Kline, 2005). In the current sample, the normed chi-square was 2.789, meeting criteria for acceptability of the model.

**Test of multivariate normality.** Because ML assumes multivariate normality and violations of this assumption can cause inflations in the chi-square leading to Type II error (Byrne, 2013), data were assessed for univariate skewness and kurtosis as well as multivariate non-normality (see Table 1 for statistics). Significant skewness (absolute value of the critical ratio > 3.0; (Kline, 2005)) was demonstrated for all five items contributing to the Obstruction factor, as well as for item nine, which loads onto the Progress factor. While kurtosis for the individual items did not reach a critical level (absolute value of the critical ratio > 7.0; (Kline, 2005)), significant multivariate kurtosis was present in the sample (absolute value of the critical ratio > 5.0; (Kline, 2005)). As a
result, Bollen-Stine bootstrapping, as recommended by Kline, was conducted with 2000 bootstrapped samples. The resulting mean chi-square from the distribution of bootstrapped samples was much lower than that of the observed data ($\chi^2 = 43.429$) but remained significant. Again, the Bollen-Stine chi-square, like the ML chi-square, is sensitive to sample size, so while this is not ideal, rejection of the model is not recommended based on this parameter alone (Bentler & Bonett, 1980).

**Model Summary.** Overall, based on multiple parameters assessing goodness of model fit, the two-factor model (see Fig. 1) indicated reasonable fit (CFI = .952; TLI = .937; RMSEA = .084 [90%CI = .065-.105], $p = .003$). All items presented good local model fit, with statistically significant ($p < .001$) standardized factor loadings ranging from $\lambda = 0.48$ (item 3) to $\lambda = 0.87$ (item 4). Also, squared multiple correlations ranged from $R^2 = .23$ (item 3) to $R^2 = .76$ (item 4). The two factors, putatively measuring oppositely-valenced facets of valued living, were moderately and negatively correlated ($r = -0.60$, $p < .001$), with the Progress factor explaining 61% of the average variance in relevant item scores (AVE = 0.61) and the Obstruction factor explaining 51% of the average variance in relevant item scores (AVE = 0.51).

**Model Comparison to Single-Factor Model (Figure 2)**

A single-factor model was fit to the data and compared to the previously-validated two-factor model.

The previously-validated two-factor model demonstrated better fit to the data, with considerably lower values for the model chi-square (difference in $\chi^2 = 254.628$, $p < .001$), Aikake Information Criterion (AIC single-factor: 389.456; AIC two-factor: 210.946) and Bayesian Information Criterion (BIC single-factor: 460.045; BIC two-factor: 136.828) (**Table 2**). These lower values are especially noteworthy given that AIC and BIC are parsimony-adjusted indices that generally favor simpler models (Kline, 2005). In this case, however, the fit advantage of the more complex model was enough to offset the
penalty imposed for having more free parameters, supporting the notion that the two factors do, in fact, reflect distinct facets of values-consistent living rather than oppositely-valenced subcomponents of a single factor.

**Aim 2: Evaluate the reliability of VQ items**

Both factors’ items demonstrated good internal consistency (VQ Progress: \( \alpha = .88 \); VQ Obstruction: \( \alpha = .84 \)). Additional results from internal consistency analyses are presented in Table 3. Results from corrected item-total correlations demonstrated that all items had correlations above 0.30 (range 0.46-0.80). Given the strong correlations among VQ items, multicollinearity was evaluated via 10 individual regression models in which each item’s scores were predicted by the other nine items being simultaneously entered in the regression models. \( R^2 \geq 0.90 \) indicates extreme multivariate collinearity, and regression results indicated collinearity was not present in the sample data (range 0.26-0.69). Finally, Cronbach’s alpha if item deleted demonstrated that all items improved the consistency of their relative factors, except for item 3, which was maintained due to good local model fit.

**Aim 3: Evaluate the validity of the VQ items**

All descriptive statistics (mean, standard deviation) and correlations for study variables are presented in Table 4.

**Aim 3a. Concurrent validity**

The CompACT total score displayed a large-sized negative correlation with the VQ Obstruction scale (\( r = -0.79 \)) and positive correlation with the VQ Progress scale (\( r = 0.59 \)). The Valued Action subscale of the CompACT, examined for concurrent validity, also showed a large-sized positive correlation with the VQ Progress scale (\( r = 0.72 \)) and negative correlation with the VQ Obstruction scale (\( r = -0.56 \)). All correlations were significant (\( p < .001 \)).
Aim 3b. Convergent validity

Psychological Inflexibility as measured by the AAQ-II showed a large-sized positive correlation with the VQ Obstruction scale \( r = 0.76 \) and negative correlation with the VQ Progress scale \( r = -0.51 \). Analyses revealed large-sized positive associations between the VQ Obstruction scale and depression, anxiety, and stress (range: \( r = 0.67 - 0.78 \)), and a medium-sized \( (r = 0.45) \) positive association with cardiac anxiety as well as medium to large-sized (range: \( r = -0.47 - -0.64 \)) negative associations between the VQ Progress Scale and depression, anxiety and stress. Results were significant \( (p < .001) \) for all relationships between the VQ scales and measures of psychological distress except for Cardiac Anxiety and VQ Progress.

Aim 3c. Known-groups validity

There were no significant differences in mean scores for either the Values Obstruction or Values Progress subscales of the Valuing Questionnaire between groups based on biological sex or the presence of CVD diagnosis (see Table 5). However, consistent with previous findings, those whose PHQ-9 scores indicated a probable depressive disorder scored lower than the non-depressed group on VQ Progress \( M = 11.12 \) \( (SD = 7.01) \) vs. \( M = 19.07 \) \( (SD = 6.85) \), \( t[96.72] = 7.71, p < .001 \) and higher on VQ Obstruction \( M = 16.02 \) \( (SD = 6.49) \) vs. \( M = 6.75 \) \( (SD = 5.75) \), \( t[89.86] = -9.91, p < .001 \). Similarly, those whose GAD-7 scores indicated a probable anxiety disorder scored lower than the non-anxious group on VQ Progress \( M = 11.61 \) \( (SD = 6.95) \) vs. \( M = 18.26 \) \( (SD = 7.33) \), \( t[58.65] = 5.55, p < .001 \) and higher on VQ Obstruction \( M = 17.48 \) \( (SD = 6.33) \) vs. \( M = 7.30 \) \( (SD = 6.00) \), \( t[54.90] = -9.51, p < .001 \).

Aim 3d. Incremental predictive validity (Tables 6 and 7)

To examine the incremental predictive validity of the VQ scales on quality of life, stepwise linear regression was conducted with the CompACT Valued Action subscale being entered as a covariate at step 1 and the VQ scales being entered simultaneously
at step 2. Variables were evaluated for multicollinearity. The variance inflation factor (VIF) was within the recommended range (VIF CompACT Valued Action = 2.33; VIF VQ Progress = 2.12; VIF VQ Obstruction = 1.50) (Goldstein, Cohen, & Cohen, 1976), suggesting that severe multicollinearity was not present in the regression analyses.

The full model significantly accounted for more than half of the variance in SF-36 Mental Health composite scores ($F[3, 248] = 111.1, p < .001; R^2 = .573$). In step 1, the CompACT Values scale accounted for 32.6% of variance ($F[1, 250] = 120.6, p < .001$). In step 2, the VQ scale scores accounted for 24.8% of unique variance in overall mental health-related quality of life above and beyond the CompACT values scale, such that higher VQ Progress and lower VQ Obstruction were associated with better mental health.

The full model significantly accounted for more than two-thirds of the variance in SF-36 Emotional Wellbeing subscale scores ($F[3, 248] = 180.6, p < .001; R^2 = .686$). In step 1, the CompACT Values scale accounted for 38.4% of variance ($F[1, 250] = 155.7, p < .001$). In step 2, the VQ scale scores accounted for 30.2% of unique variance in emotional wellbeing above and beyond the CompACT values scale, such that higher VQ Progress and lower VQ Obstruction were associated with greater emotional well-being.

The full model significantly accounted for approximately 15% of the variance in SF-36 Physical Health composite scores ($F[3, 248] = 15.2, p < .001; R^2 = .155$). In step 1, the CompACT Values scale accounted for 9.7% of variance ($F[1, 250] = 26.7, p < .001$). In step 2, the VQ scale scores accounted for 5.9% of unique variance in overall physical health-related quality of life above and beyond the CompACT values scale, such that higher VQ Progress and lower VQ Obstruction were associated with better physical health.

The full model significantly accounted for almost one quarter of the variance in SF-36 General Health subscale scores ($F[3, 248] = 24.6, p < .001; R^2 = .230$). In step 1,
the CompACT Values scale accounted for 12.7% of variance ($F[1, 250] = 36.4, p < .001$). In step 2, the VQ scale scores accounted for 10.3% of unique variance in general health above and beyond the CompACT values scale, such that higher VQ Progress and lower VQ Obstruction were associated with better general health.

**Discussion**

The ability to behave in a values-driven manner, even when it is difficult or uncomfortable to do so, is an important therapeutic target for promotion of positive health behavior change to prevent disease or improve outcomes in patient populations with modifiable medical risk factors (Graham et al., 2016; McCracken & Gutiérrez-Martínez, 2011), including CVD. Findings here support the use of the VQ, a brief self-report measure of value progress and obstruction, in adults with self-reported CVD or risk. The confirmatory factor analysis indicated a relatively good fit for the 2-factor model (Smout et al., 2013) in this sample, which was also supported in a recent study of women with chronic pain (Carvalho et al., 2018). Though in the current sample the upper limit of the RMSEA confidence interval was slightly above recommendations for acceptable fit (Brown, 2006; Kline, 2005), the overall profile of fit parameters was acceptable, and the factors performed similarly in this sample as in prior validation studies (Carvalho et al., 2018; Smout et al., 2013). As previously reported, individual reliability was lowest for item 3, but it still provided a good fit to the model.

Findings also support the concurrent validity of the VQ factor scores in terms of other values indices. Specifically, the VQ Progress scale, which reflects both clear awareness of one’s personal values as well as perseverance in behaving in a manner that is consistent with those values, demonstrated positive, large-sized associations with CompACT Valued Action subscale scores. In contrast, the VQ Obstruction scale, which reflects disruption of valued living due to avoidance of aversive experiences, was, as expected, negatively associated with the CompACT Valued Action scores. In terms of
convergent validity, VQ factors were generally associated with theoretically relevant indices such that scores on the VQ Obstruction factor were positively associated with greater experiential avoidance, anxiety and depressive symptoms, perceived stress, and cardiac anxiety. Scores on the VQ Progress factor tended to show slightly lower magnitude associations than the Obstruction factor, but all relationships were in the expected (negative) direction. Evidence also provides support for the incremental predictive validity of VQ factor scores in terms of quality of life, above and beyond the CompACT Valued Action subscale. Thus, while the VQ and CompACT Values subscales are correlated, the VQ factor scores are not simply redundant and do evidence unique predictive ability.

Interestingly, there were no significant differences observed in mean scores for either the VQ Obstruction or VQ Progress between groups based on biological sex or based on CVD risk status. This may indicate that the measure performs similarly across sex and in both the presence or absence of medical disorders and associated patient profiles. While this brief measure is well-suited to use in medical settings because it is short and can be comprehended and completed by patients and research participants without clinician assistance or prior exposure to expert language, it seems to have the added benefit of comparable utility among both medical and healthy populations.

There are some study limitations to be acknowledged. This study utilized an online sample which was predominantly white and Asian and relatively well-educated. Though the presence of medical comorbidities was prioritized and is a strength of the sample, greater heterogeneity in terms of racial and socioeconomic diversity would support the generalizability of findings. Another limitation of the online sample is the self-reported nature of medical history and CVD diagnosis. Further study in a sample with physician-confirmed medical diagnoses would bolster the strength of present findings. Additionally, the study was cross-sectional in nature, which is a common convention in
assessment validation, but a prospective study design which measures outcomes over time in terms of quality of life and psychiatric symptoms relevant to progress and obstruction of values-consistent living would make a good future contribution to the literature. Finally, analysis of non-normally distributed data in the current sample presents unique difficulties in AMOS, which uses an ML method which is not robust to non-normal data. Although this limitation can be addressed via Bollen-Stine bootstrapping, the resultant chi square statistic remains sensitive to large sample size and does not provide a definitive marker of model fit.

Despite these limitations, this study provides support for the use of the VQ in adults with or at risk for CVD. The VQ is brief, easy to comprehend, well suited for research and medical settings, and appears to provide valid and reliable assessment of valued living – thus it is a promising tool for use in process-based and intervention research, in addition to clinical practice to motivate and enable positive health behavior change among medically vulnerable populations.

Future studies may assess the utility and sensitivity of the VQ for assessing change over time as values-consistent behavior change is targeted in treatment. Additionally, multi-modal assessment including assessment of values-consistent behavior via daily diaries and experimental behavioral tasks as well as in-the-moment assessment of the reinforcing properties of values-consistent behavior may complement the use of the VQ in research and clinical practice (Barney, Lillis, Haynos, Forman, & Juarascio, 2019). Behavioral assessment may also offset the effect of social desirability response bias, which can affect results in studies using only self-report measures. One compelling study used a novel approach to measure persistence in values-consistent behavior. The aim of the study was to evaluate the effect of a personalized values exercise in an acceptance-based treatment for pain (Branstetter-Rost, Cushing, & Douleh, 2009). After a two-minute imagery exercise involving endurance of physical pain...
for the purpose of participants’ stated personal values (e.g., swimming in ice cold water to rescue a family member), participants submerged their hands in icy water and attempted to withstand the discomfort for as long as possible past the point of their personal pain thresholds. A similar paradigm might be used in patients with cardiovascular disease and risk. After a values clarification exercise, timed persistence in challenging physical exercise or making a choice to select and eat heart-healthy foods from among a variety of options could be evaluated. Correlations between self-reported VQ scores and values-consistent behaviors would provide additional support for the validity of the VQ measure as well as meaningful contributions to the literature demonstrating the role of personal values in promoting positive health behaviors.
References


**Appendix**

*Table 1. Assessment of Univariate and Multivariate Normality*

<table>
<thead>
<tr>
<th>Valuing Questionnaire Item</th>
<th>Skewness</th>
<th>Critical Ratio</th>
<th>Kurtosis</th>
<th>Critical Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>-.537</td>
<td>-3.480</td>
<td>-.915</td>
<td>-2.964</td>
</tr>
<tr>
<td>7</td>
<td>-.298</td>
<td>-1.934</td>
<td>-.965</td>
<td>-3.127</td>
</tr>
<tr>
<td>5</td>
<td>-.299</td>
<td>-1.935</td>
<td>-.955</td>
<td>-3.093</td>
</tr>
<tr>
<td>4</td>
<td>-.314</td>
<td>-2.038</td>
<td>-1.066</td>
<td>-3.455</td>
</tr>
<tr>
<td>3</td>
<td>-.304</td>
<td>-1.973</td>
<td>-.778</td>
<td>-2.521</td>
</tr>
<tr>
<td>1</td>
<td>.477</td>
<td>3.090</td>
<td>-.790</td>
<td>-2.559</td>
</tr>
<tr>
<td>2</td>
<td>.778</td>
<td>5.044</td>
<td>-.531</td>
<td>-1.720</td>
</tr>
<tr>
<td>6</td>
<td>.710</td>
<td>4.599</td>
<td>-.750</td>
<td>-2.430</td>
</tr>
<tr>
<td>8</td>
<td>.873</td>
<td>5.656</td>
<td>-.382</td>
<td>-1.237</td>
</tr>
<tr>
<td>10</td>
<td>.515</td>
<td>3.340</td>
<td>-1.045</td>
<td>-3.387</td>
</tr>
<tr>
<td><strong>Multivariate</strong></td>
<td></td>
<td><strong>26.442</strong></td>
<td></td>
<td><strong>13.548</strong></td>
</tr>
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Table 2. Comparison of Model Fit Indices for Single- and Two-Factor Models

<table>
<thead>
<tr>
<th></th>
<th>Chi square</th>
<th>Degrees of freedom</th>
<th>AIC</th>
<th>BIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single-factor model</td>
<td>349.456</td>
<td>35</td>
<td>389.456</td>
<td>460.045</td>
</tr>
<tr>
<td>Two-factor model</td>
<td>94.828</td>
<td>34</td>
<td>210.946</td>
<td>136.828</td>
</tr>
<tr>
<td>Difference in $\chi^2$</td>
<td>254.628***</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. *** = p < .001; $\chi^2$ = chi square; AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion
Table 3. Means, Standard Deviations, Item-total Correlations, Test of Multi-collinearity, and Cronbach’s Alpha if Item Removed

<table>
<thead>
<tr>
<th></th>
<th>Mean (SD)</th>
<th>Corrected item-total r</th>
<th>$R^2$ item predictions</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Valuing Questionnaire-Progress</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3. I worked toward my goals even if I didn’t feel motivated to</td>
<td>3.5 (1.7)</td>
<td>0.46</td>
<td>.261</td>
<td>0.90</td>
</tr>
<tr>
<td>4. I was proud about how I lived my life</td>
<td>3.3 (1.9)</td>
<td>0.80</td>
<td>.686</td>
<td>0.83</td>
</tr>
<tr>
<td>5. I made progress in the areas of my life I care most about</td>
<td>3.3 (1.8)</td>
<td>0.81</td>
<td>.690</td>
<td>0.83</td>
</tr>
<tr>
<td>7. I continued to get better at being the kind of person I want to be</td>
<td>3.4 (1.9)</td>
<td>0.72</td>
<td>.545</td>
<td>0.85</td>
</tr>
<tr>
<td>9. I felt like I had a purpose in life</td>
<td>3.7 (2.0)</td>
<td>0.76</td>
<td>.662</td>
<td>0.84</td>
</tr>
<tr>
<td><strong>Valuing-Questionnaire-Obstruction</strong></td>
<td></td>
<td></td>
<td></td>
<td>0.84</td>
</tr>
<tr>
<td>1. I spent a lot of time thinking about the past or future, rather than being engaged in activities that mattered to me.</td>
<td>2.0 (1.8)</td>
<td>0.60</td>
<td>.465</td>
<td>0.82</td>
</tr>
<tr>
<td>2. I was basically on ‘auto-pilot’ most of the time</td>
<td>1.5 (1.7)</td>
<td>0.60</td>
<td>.412</td>
<td>0.82</td>
</tr>
<tr>
<td>6. Difficult thought, feelings, or memories got in the way of what I really wanted to do</td>
<td>1.8 (1.9)</td>
<td>0.71</td>
<td>.560</td>
<td>0.78</td>
</tr>
<tr>
<td>8. When things didn’t go according to plan, I gave up easily</td>
<td>1.6 (1.8)</td>
<td>0.58</td>
<td>.410</td>
<td>0.82</td>
</tr>
<tr>
<td>10. It seemed like I was just ‘going through the motions,’ rather than focusing on what was important to me</td>
<td>2.0 (2.0)</td>
<td>0.71</td>
<td>.589</td>
<td>0.79</td>
</tr>
</tbody>
</table>

*Note. SD = standard deviation*
Table 4. Descriptive Statistics and Correlations Between Valuing Questionnaire Subscales and Related Constructs, Psychological Symptoms, and Quality of Life Indicators

|                                | Mean (SD) | VQ Progress | VQ Obstruction |
|--------------------------------|-----------|-------------|               |
| **Concurrent Validity**        |           |             |               |
| CompACT: Valued Action         | 35.2 (9.73) | .718***     | -.562***      |
| **Convergent Validity**        |           |             |               |
| CompACT: Total Score           | 91.67 (24.16) | .588***     | -.789***      |
| Psychological Inflexibility    | 19.21 (10.41) | -.511***    | .759***       |
| Depression                     | 5.63 (5.68)  | -.536***    | .678***       |
| Anxiety                        | 4.67 (5.09)  | -.474***    | .671***       |
| Perceived Stress               | 14.79 (8.58) | -.643***    | .778***       |
| Cardiac Anxiety                | 1.21 (0.63)  | -.106       | .446***       |
| Physical Health Quality of Life Composite | 63.46 (22.75) | .244***    | -.375***      |
| General Health                 | 55.0 (21.36) | .417***     | -.413***      |
| Physical Functioning           | 75.75 (24.97) | .123        | -.134*        |
| Bodily Pain                    | 73.09 (20.78) | .158*       | -.308***      |
| Role limitations Due to Physical Health | 50.0 (44.58) | .155*       | -.349***      |
| Mental Health Quality of Life Composite | 61.80 (22.36) | .520***    | -.727***      |
| Emotional Wellbeing            | 61.51 (18.81) | .651***     | -.766***      |
| Social Functioning             | 76.24 (24.66) | .366***     | -.547***      |
| Vitality                       | 51.37 (17.75) | .565***     | -.565***      |
| Role Limitations Due to Emotional Problems | 58.07 (44.54) | .342***    | -.608***      |

Note. *p < .05, **p < .01, ***p < .001; CompACT = Comprehensive assessment of ACT processes, SD = standard deviation
**Table 5.** Known Groups Differences: Biological Sex and Cardiovascular Disease Status

<table>
<thead>
<tr>
<th></th>
<th>Valuing Questionnaire Progress</th>
<th>Valuing Questionnaire Obstruction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean (SD)</td>
<td>t value</td>
</tr>
<tr>
<td><strong>Biological Sex</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male (n = 105)</td>
<td>16.98 (7.72)</td>
<td>8.96 (6.99)</td>
</tr>
<tr>
<td>Female (n = 119)</td>
<td>17.48 (7.60)</td>
<td>9.33 (7.36)</td>
</tr>
<tr>
<td><strong>CVD Status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CVD Diagnosis (n = 59)</td>
<td>18.03 (6.58)</td>
<td>9.68 (7.20)</td>
</tr>
<tr>
<td>CVD Risk (n = 193)</td>
<td>16.92 (7.97)</td>
<td>8.74 (7.11)</td>
</tr>
</tbody>
</table>

*Note. t values were not significant; *Missing data were present for 28 cases on sex due to data collection error*
Table 6. Hierarchical Multiple Regression: Incremental Analyses Prediction of Health-related Quality of Life—Mental (SF-36) from CompACT Valued Action and Valuing Questionnaire Scales

<table>
<thead>
<tr>
<th></th>
<th>Mental Health</th>
<th></th>
<th>Emotional Well-being Subscale</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ΔR²</td>
<td>β</td>
<td>sr²</td>
<td>ΔR²</td>
</tr>
<tr>
<td>Step 1</td>
<td>.326***</td>
<td>.571***</td>
<td>.326</td>
<td>.384***</td>
</tr>
<tr>
<td>CompACT VA</td>
<td>.571***</td>
<td>.326</td>
<td>.620***</td>
<td>.384</td>
</tr>
<tr>
<td>Step 2</td>
<td>.248***</td>
<td>.162*</td>
<td>.011</td>
<td>.302***</td>
</tr>
<tr>
<td>CompACT VA</td>
<td>.162*</td>
<td>.011</td>
<td>.074</td>
<td>.002</td>
</tr>
<tr>
<td>VQ Progress</td>
<td>.117</td>
<td>.006</td>
<td>.316***</td>
<td>.047</td>
</tr>
<tr>
<td>VQ Obstruction</td>
<td>-.578***</td>
<td>.223</td>
<td>-.567***</td>
<td>.214</td>
</tr>
<tr>
<td>Total R²</td>
<td>.573***</td>
<td>.686***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 7. Hierarchical Multiple Regression: Incremental Analyses Prediction of Health-related Quality of Life—Physical (SF-36) from CompACT Valued Action and Valuing Questionnaire Scales

<table>
<thead>
<tr>
<th></th>
<th>Physical Health</th>
<th></th>
<th>General Health Subscale</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ΔR²</td>
<td>β</td>
<td>sr²</td>
<td>ΔR²</td>
</tr>
<tr>
<td>Step 1</td>
<td>.097***</td>
<td>.127***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CompACT VA</td>
<td>.311***</td>
<td>.097</td>
<td>.357***</td>
<td>.127</td>
</tr>
<tr>
<td>Step 2</td>
<td>.059***</td>
<td>.103***</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CompACT VA</td>
<td>.155</td>
<td>.010</td>
<td>.003</td>
<td>.000</td>
</tr>
<tr>
<td>VQ Progress</td>
<td>-.014</td>
<td>.000</td>
<td>.279**</td>
<td>.036</td>
</tr>
<tr>
<td>VQ Obstruction</td>
<td>-.295***</td>
<td>.058</td>
<td>-.272***</td>
<td>.049</td>
</tr>
<tr>
<td>Total R²</td>
<td>.155***</td>
<td>.230***</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. *p < .05, **p < .01, ***p < .001; SF-36 = RAND 36-Item Health Survey; CompACT VA = Comprehensive Assessment of ACT Processes, Valued Action subscale; VQ = Valuing Questionnaire
Figure 1. Two-Factor Model of the Valuing Questionnaire

Note. Confirmatory Factor Analysis (N = 252; $\chi^2$(34) = 94.828, $p < .001$; AIC = 136.828; BIC = 210.946; CFI = .952; TLI = .937; RMSEA = .084, $p = .003$). Standardized coefficients and squared multiple correlations are shown; all paths are statistically significant ($p < .001$).
Figure 2. Evaluation of Single Factor (Superordinate) Model of the Valuing Questionnaire

Note. Confirmatory Factor Analysis ($N = 252; \chi^2(35) = 349.456, p < .001$; AIC = 389.456; BIC = 460.045; CFI = .684; TLI = .754; RMSEA = .189, $p < .001$). Standardized coefficients and squared multiple correlations are shown; all paths are statistically significant ($p < .001$).