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Development of the State Optimism Measure

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Abstract

Background: Optimism, or positive expectations about the future, is associated with better health. It is commonly assessed as a trait, but it may change over time and circumstance. Accordingly, we developed a measure of state optimism.

Methods: An initial 29-item pool was generated based on literature reviews and expert consultations. It was administered to three samples: sample 1 was a general healthy population (n=136), sample 2 was people with cardiac disease (n=96), and sample 3 was persons recovering from problematic substance use (n=265). Exploratory factor analysis and item-level descriptive statistics were used to select items to form a unidimensional state optimism measure (SOM). Confirmatory factor analysis (CFA) was performed to test fit.

Results: The selected seven SOM items demonstrated acceptable to high factor loadings on a single dominant factor (loadings: .64-.93). There was high internal reliability across samples (Cronbach's alphas: .92-.96), and strong convergent validity correlations in hypothesized directions. The SOM's correlations with other optimism measures indicate preliminary construct validity. CFA statistics indicated acceptable fit of the SOM model.

Conclusions: We developed a psychometrically-sound measure of state optimism that can be used in various settings. Predictive and criterion validity will be tested in future studies.

Keywords

optimism; state; measure development; factor analysis; validation; psychometric properties

Introduction

In the research literature, optimism typically refers to having generalized positive expectations about the future [1–3]. Optimism has cognitive and affective components [4]

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and is related to hope, self-efficacy, agency (i.e., one's subjective sense of control), and happiness [5–8]. Optimism is associated with improved physical and mental health by providing improved resilience, social support, coping strategies, self-rated health, subjective well-being, adherence to healthy behaviors, and confidence [1, 6, 9, 10]. Optimism appears to be protective across health outcomes including cardiovascular disease and mortality [10]. Given optimism's impact on health and its potential to change over time, measuring it as a state will allow researchers to better assess the effects of optimism interventions and its associations with modifiable health outcomes. Here we present the development of a measure of state optimism.

Optimism is particularly important in the context of cardiovascular disease, the primary cause of death in the United States [9–12]. In initially healthy participants, more optimistic people tend to have reduced risk for cardiovascular disease compared with less optimistic people [13–17]. In those with known cardiac disease, higher optimism is associated with better cardiac prognosis [9, 10, 18]. In studies of cardiac patients following an acute coronary syndrome (ACS: heart attack or unstable angina), optimism has been associated with fewer cardiac readmissions [19] and higher self-reported health behavior adherence [20, 21].

The beneficial effect of optimism on a variety of health behaviors may extend to alcohol and substance use. Optimism is a determinant of avoiding substance use, including alcohol and sedatives, among adolescents [22–24]. Optimism bias, or the tendency to overestimate the likelihood of future positive events, had previously been thought to contribute to health behaviors such as smoking, but more recently it has not been shown to play a major role [25]. More research is needed to determine how optimism may influence substance use or recovery.

Several pathways between optimism and health have been proposed. Optimists are more likely than pessimists to be proactive in goal pursuits like health behaviors and demonstrate better perseverance and coping with setbacks [6, 26]. Many studies have demonstrated that optimism is associated with greater adherence to health behaviors, including healthy diet [13, 27], physical activity [19, 28], medication adherence [29], and reduced smoking [6]. The pathways between optimism and cardiac health include lower blood pressure, lipids, and inflammatory markers [30, 31]. Given the importance of optimism across multiple mental and physical health domains, it is important to measure optimism meaningfully.

Optimism has most commonly been conceptualized and measured as a dispositional personality trait [1, 6], or "stable individual differences in the level of optimism generally experienced" [4]. Trait optimism has been studied in terms of expectancies, where positive expectations of the future lead to goal attainment [1, 6]. Optimists believe that life circumstances are going to get better or work out, so they handle challenges and adversity with more effort and flexibility [32]. Optimism has also been studied in terms of explanatory or attributional style [33], where experiences are judged as attributable to internal versus external factors, stable versus unstable likelihoods, and specific versus general life domains [26, 34, 35]. Optimists tend to see negative events as attributable to factors external to themselves, temporary, and specifically defined, allowing them to persist in the face of

adversity [36]. Though optimism has largely been considered to be a trait, it may be more changeable or "state-like" than previously thought [35, 37–40]; it can change over time based on outside influences and measurement style [40, 41]. State-like optimism is considered relatively modifiable, with expectancies about the future changing based on time, situation, context, and affect [4, 38, 40, 42].

The stability versus modifiability of measured optimism has been examined. Optimism's test-retest reliability measured using self-report instruments over weeks and years has been found to range from .58 to .79 [1], where .70 is generally considered to be acceptable reliability to determine stability [43]. In a longitudinal study of older adults, dispositional optimism decreased significantly over 15 years; within five-year increments, dispositional optimism's test- retest reliability coefficients ranged from .69 to .72 [44]. In another longitudinal study, optimism's 10-year test-retest reliability was .35 [45], demonstrating change over time. Fluctuations in optimism have been found based on levels of self-esteem, confidence, social resources, anticipation of negative outcomes, and controllable versus uncontrollable outcomes [1, 45, 46]. Further, interventions have shown that optimistic attributions can change with cognitive reappraisals and life transitions [6, 26, 39]. Given that optimism has been shown to change and is strongly related to health, it is important to measure it as a dynamic state. If optimism can be measured as a state, it can be a target of change in interventions to influence health behaviors and outcomes.

The most common ways of measuring dispositional or trait optimism have been asking about people's generalized expectancies via self-report questionnaires like the Life Orientation Test (LOT) [47] and the more commonly used 6-item Life Orientation Test-Revised (LOT-R) [48] that asks positively- and negatively-framed questions about one's general future expectancies [48, 49]. The Attributional Style Questionnaire (ASQ) [50, 51] is a less commonly used measure that assesses the stability of people's attributions of the causes of life events [52]. It is a longer, open-ended measure and is moderately correlated with the LOT-R [53].

Researchers measuring optimism as a state, often modify the LOT-R to reflect a shorter time frame, like "over the past week" or "currently," rather than "always" or "in general" [4]. However, since the LOT-R was conceptualized as a measure of trait optimism, simply changing the wording of items may not fully reflect change. Modified previously validated measures do not necessarily have acceptable psychometric properties [54], so a modified LOT-R may not adequately capture state optimism. In a recent analysis, the mean score of a modified "state" LOT-R did not change over time in a positive psychology intervention in a cardiac population and did not adequately capture optimism as a state [55]. State optimism using the modified LOT-R has been found to correlate with trait optimism, but state optimism relative to trait optimism, predicts additional variance in affect, distress, and task performance [4]. One proposed measure [49] of state optimism is the Optimism-Pessimism Scale (OPS) [56]. However, its psychometric properties have not been confirmed in the literature. It has been found to be multi-dimensional, complex, and difficult to interpret [57]. Despite the utility of measuring optimism as a state and its implications for changing health outcomes, there is no well-accepted, validated measure of state optimism.

Little is known about the role of state optimism, its potential for change, and its subsequent impact on health outcomes. Optimism interventions have been developed, but the LOT-R and other trait measures may not adequately capture changes from interventions [39]. Because there is currently no available instrument designed to measure change in optimism over time and context, we developed a brief, psychometrically-sound measure of state optimism in three diverse samples. Our hypotheses were that our newly-developed State Optimism Measure (SOM), would 1) represent a single factor across the three samples, 2) be positively associated with conceptually related measures, and 3) be negatively associated with conceptually dissimilar measures. Specifically, we expected the SOM to be most highly correlated with the other measures of optimism, the modified "state" LOT-R and the original trait LOT-R, and less strongly correlated with other related constructs.

Method

Participants and procedures

The SOM, a 7-item scale of state optimism (Table 2, Appendix 1), was tested as part of an online questionnaire in four different samples in the United States to maximize generalizability and target cardiac and substance use recovery populations. These four initial samples were condensed into three for analyses, as described below. Inclusion criteria were: people ages 18+ who had internet access, agreed to take the survey, and completed all SOM items. Additional inclusion criteria for the substance recovery population were correctly responding to two "check" items (e.g., "Please answer 'disagree' for this item.") to ensure that participants were responding accurately, as the SOM was embedded within a longer survey. 763 eligible participants across four different cohorts completed the survey. See Table 1 for demographics. Sample 1 consisted of 81 adults with no known cardiac disease, recruited online through Craigslist in New England and our healthcare system's research study volunteer website. Sample 2 was 55 undergraduate university students in Southern California who participated in exchange for research credit. Sample 3 consisted of 96 cardiac patients, indicated by answering affirmatively to the question, "Have you ever been told by a doctor that you have heart disease?" Of those, 85 were recruited from online sources (e.g., cardiac online forums, our healthcare system's research study volunteer website), and 11 were recruited on the cardiac inpatient floors of our hospital. The complete sample 4 consisted of 531 participants who identified as being in or seeking recovery from problematic substance use who agreed to take an online survey on the role of happiness in recovery. These participants were recruited from online recovery communities (approximately 85% of sample, e.g., SMART Recovery, LifeRing, InTheRooms), online advertising (approximately 5%, e.g., Recovery Research Institute, Craigslist) and word of mouth/other (approximately 10%). The recovery sample was divided into two randomly selected halves: one half was used for exploratory factor analysis (EFA), and the other half for confirmatory factor analysis (CFA). For the purposes of analysis, the samples were grouped as: healthy (college students plus online respondents, n=136), cardiac (n=96), and recovery (half sample, n=265). Sample sizes were adequate for factor analysis based on best practices in Worthington & Whitaker (2006) and using recommendations of widely cited literature indicating that acceptable sample sizes can be based on the ratio of subjects to

items, which can vary from 3 to 10 (e.g. [58–61]), and absolute number of subjects, which can range from 30 to > 500 [60, 62, 63].

All participants completed the SOM online through a secure website, and each sample received additional questionnaires to assess construct validity; additional questionnaires varied by sample. The SOM and additional questionnaires took between 15 and 45 minutes to vcomplete. There was no payment for participating. All study procedures were approved by relevant Institutional Review Boards (IRBs) prior to conducting any study-related activities.

Item Development

We wrote items broadly to encompass multiple hypothesized aspects of state optimism, with an original item pool of 29 (Appendix 2). Based on scale development best practices, the item pool was selected using theory, literature searches, surveys of related constructs, and expert input [64–66]. Items were included to cover state optimism as a broad construct, encompassing alternative theories found in the literature, including optimism about one's future, the world in general, optimism about the near vs. far future, and optimism that things will get better or stay positive [1, 35, 38]. The final scale includes items that reflect all but one of these themes (optimism about the world in general; Appendix 2). Prior scales that informed our items were the Herth Hope Index [67], the Optimism-Pessimism Scale-Revised [57], the Life Orientation Test-Revised [48], and the Generalized Expectancy for Success Scale (GESS) [68]. When an item from one of these scales approached our definition of state optimism, we modified the wording to best reflect state optimism. No items in the SOM item pool were the same as any items from previously published scales. We worded items to anchor people in the present moment in different ways (e.g., "I am feeling," "right now, I think that") to capture the temporal aspect of state optimism. Seven negatively worded items were included for the cardiac and healthy population surveys but were not included in the recovery survey, as it was launched before negatively worded items were added. Ultimately, the negatively worded items were cut because they did not perform well.

The items were pre-pilot tested among 40 undergraduate students and our research group to assess readability, comprehension, and time, and minor wording changes were made. Items were accompanied by instructions to consider their feelings at the present time ("right now") and accompanied by a five-point Likert-type scale from 1 (strongly disagree) to 5 (strongly agree) (Table 2). Negatively-worded items were reverse coded prior to analysis.

Other related measures

To assess the initial item pool for convergent validity, we included validated questionnaires similar and dissimilar to our target construct in the online surveys. There were some differences in the additional surveys included each sample, due to overall scale length and relevance of surveys to specific populations.

Convergent validity measures

Optimism measures.—We included the widely-used Life Orientation Test-Revised (LOT-R) [48] to measure dispositional optimism. Its 6 items encompass optimism and pessimism independently. The three pessimism items are reverse coded before summing the items. Higher scores indicate higher levels of dispositional optimism. The LOT-R was included for all three samples, with Cronbach's αs .86 (healthy), .88 (cardiac), and .87 (recovery). For the healthy and cardiac samples, we also included a modified "state" version of the LOT-R to create a state-like measure to compare with our item pool. This "state" LOT-R was created by changing the more general statements of the LOT-R (e.g., "Overall, I expect […]") to reflect more immediate thoughts (e.g., "Right now, I expect […]"). The Cronbach's αs were .90 in the healthy sample and .92 in the cardiac sample.

Other related measures.—To assess other positive emotional constructs expected to be related to state optimism (convergent validity), we included measures of gratitude, positive affect, hope, life satisfaction, and subjective happiness. For the healthy and cardiac samples, we included the following scales. The 6-item Gratitude Questionnaire (GQ-6) [69] reflects the degree to which one feels grateful about life circumstances (αs: .84 for both samples). The 10 positive items of the Positive and Negative Affect Schedule (PANAS) [70] were included to assess the relationship between optimism and positive affect (αs: .92 for the healthy sample and .94 for the cardiac sample). The 6-item Adult State Hope Scale (AHS) [8] was used to assess another positive motivational state (αs: .90 for the healthy sample and .94 for the cardiac sample).

In all three samples, non-cardiac, cardiac, and recovery, two additional scales were included: the 5-item Satisfaction with Life Scale (SWLS) [71] measuring global life satisfaction (αs: .92 [healthy], .90 [cardiac], and .89 [recovery]), and the 4-item Subjective Happiness Scale (SHS) [72] measuring global subjective happiness (e.g., whether one is a happy or an unhappy person) (αs: .93 [healthy], .91 [cardiac], and .88 [recovery]).

In the recovery sample, two additional related positive constructs were included: hedonic capacity and general self-efficacy. Hedonic capacity, the ability to experience pleasure, was measured using the 10-item Snaith-Hamilton Pleasure Scale [73] (α: .86). Self-efficacy was measured using the 10-item General Self-Efficacy Scale (GSE) [74] (α: .89).

To assess negative emotional states expected to be inversely related to state optimism (convergent validity with inverse relationships), we included measures of stress, hopelessness, negative affect, and depression for the healthy and cardiac samples. These measures were not included in the recovery sample due to survey length concerns. We included the 4-item Perceived Stress Scale (PSS-4) [75] (αs: .77 [healthy] and .88 [cardiac]) to assess how unpredictable or uncontrollable people felt over the past month. Hopelessness in the past 24 hours was assessed using two items from the Concise Health Risk Tracking Scale (CHRT) [76] (αs: .94 [healthy] and .88 [cardiac]). Negative affect was assessed using the 10 negative items of the Positive and Negative Affect Schedule (PANAS) [70] (αs: .88 [healthy and cardiac]). Past two week depressive symptoms were assessed for the cardiac and general adult populations using the 7-item depression subscale of the Hospital Anxiety and Depression Scale (HADS), which excludes physical symptoms [77] (αs: .79 [healthy]

and .86 [cardiac]). The 20-item Center for Epidemiologic Studies Depression Scale (CES-D) (α: .86) was included for the college student sample, which was designed to measure depressive symptoms in the general population [78].

Statistical analyses

The primary goal of this analysis was to identify items that loaded on a single factor of state optimism. To do this, we performed exploratory factor analyses (EFAs), with parallel analyses and scree plots to identify the number of factors to be extracted, per best-practice recommendations [79, 80], with Eigenvalues >1.0 as secondary check of number of factors to retain. Using only Eigenvalues >1.0 can over-extract factors [80]. Parallel analysis for factor analysis was conducted with Eigenvalues averaged over 10 replications. If the eigenvalue in the dataset of interest exceeded the average eigenvalue observed in the random (parallel) datasets, then the factor was retained. We also used factor loadings, item means and standard deviations, and theory [81], to select items to best represent this unidimensional construct of state optimism. EFAs using iterated principal factors, with varimax rotation were run separately in each sample (non-cardiac, cardiac, and recovery) to examine dimensionality. Varimax rotation was used because it is simple to understand and interpret, with relatively little impact on results [60].

Following the initial EFAs, the SOM items were screened separately in each sample to remove items based on criteria suggested in the literature: inadequate distributions, lowest factor loadings, cross-loadings on different factors, items that reduce internal consistency, and items that have the least conceptual agreement with the factor [64, 65, 81]. We identified poorly performing items based on restricted range of responses (e.g., not using the entire 1–5 response scale), limited distributions (SD<.80), and ceiling effects (mean >4.0). Items with the lowest factor loadings (<.60) and items with complex loadings (cross-loaded at ≥.40 on more than one factor) were removed. To further shorten the scale, we assessed for item redundancy and examined item means. If items had highly similar means or high semantic similarity, we retained the one with the highest variance and/or face validity. Items were also removed based on conceptual agreement with our iteratively developed model of state optimism. For example, we removed the two items that clearly reflected the affective component of optimism (e.g., “I think my life will be happy”), as we intended this measure to reflect state optimism as a stand- alone construct distinct from positive affect, and these items did not perform strongly.

The next analysis step focused on the selected remaining seven items, to assess their unidimensionality, internal reliability, and convergent validity separately in each sample. EFAs were re-run in each sample to confirm unidimensionality. Cronbach’s alphas were run to assess internal consistency of the seven items. Scale descriptive statistics were run on the seven-item SOM for each sample. We compared mean SOM scores across samples using one-way ANOVA, hypothesizing that there would be no significant differences between samples. For each sample, convergent validity was assessed using Pearson’s correlations between the SOM mean scores and mean scores on the measures hypothesized to be positively and negatively associated. We expected the SOM to be most highly correlated

with the other measures of optimism: the LOT-R and modified "state" LOT-R. *P*-values of <.05 were considered significant.

Finally, to determine whether the single factor structure of the selected seven items held, we conducted a CFA using maximum likelihood estimation, in the second randomly selected half of the recovery sample (n=266). In the CFA, for identifiability reasons, we fixed one loading at 1, but allowed all other loadings to vary freely. Model fit was determined using common recommendations including a χ^2 test to compare the model to the actual data, and descriptive fit indices to evaluate the performance of the factor structure: the comparative fit index (CFI; good fit considered > .90), root mean squared error of approximation (RMSEA; good fit considered <.08), standardized root mean residual (SRMR; good fit considered <.08), and the Tucker Lewis Index (TLI; good fit considered ≥.95) [82, 83]. Stata 15.0 was used for all analyses (StataCorp, College Station, TX).

Results

Demographics

Our samples were largely female, ranging from 61.9% in the recovery sample to 83.1% in the cardiac sample, and majority Caucasian, ranging from 71.8% in the healthy sample to 88.9% in the cardiac sample (Table 1). The cardiac and recovery samples were middle aged (mean ages 58.5 and 53.7, respectively), while the healthy sample was younger (mean age: 31.1), due to the students.

Factor structure and item selection

In the initial EFAs, one dominant factor emerged in each sample, which accounted for the majority of the variance: 74.8%, 71.8%, and 79.5% for the cardiac, healthy, and recovery samples, respectively. When examining Eigenvalues >1.0, three factors were suggested to be retained in the healthy (14.89, 1.47, 1.07) and cardiac samples (16.19, 1.95, 1.28), and two factors in the recovery sample (11.44, 1.07). Parallel analysis suggested retaining three factors in the healthy and cardiac samples, and up to six factors in the recovery sample.

We fit six-, five-, and four-factor models in the recovery sample and found that all were over-extracted, given numerous items with cross-loadings. We next examined three-factor models for each sample and found over-extraction, as evidenced by items loading on multiple factors and low factor loadings (e.g., factor splitting in the presence of a dominant factor) [84]. Further, parallel analysis may identify too many factors [85, 86]. For these reasons, we proceeded to examine two-factor solutions for each sample.

In examining the two-factor solution, a single dominant factor again emerged for all three samples. The first (dominant) factor contained items that our team determined to represent state optimism most clearly and distinctly, including items that expressed optimism as an individual's expectancy about positive things happening in the future. Across samples, the second factor contained items that described expecting changes, and related to optimism about the world broadly versus one's own future.

Thus, given this conceptual distinctness, we removed the items that loaded only on this second factor or loaded poorly across the samples (items from Appendix 2: 1, 3, 6, 14, 16, 17, 19, 20, 23, 24, and 26). After removing the complex loading items and items with loadings <.60 on either factor (items 5, 8, 12, and 15), we retained 14 items for further analysis that loaded uniquely on the one dominant factor, across all three samples.

The remaining 14 items were screened for conceptual redundancy and appropriateness, to identify items representing a range of means, and to maximize variability (SDs). The items removed at this stage were: 9, 10, 11, 21, 22, 25, and 28. Of note, this process of item reduction also removed all but one reverse-coded item (removed items: 3, 8, 9, 15, 16, 26; retained item 2: "At the moment, I expect more to go wrong than right when it comes to my future."). After applying these criteria, we identified seven items that met all inclusion criteria and performed the best across all three samples. We ran EFAs in each sample including all seven items to confirm unidimensionality, which was confirmed by parallel analyses. The Eigenvalues for the unidimensional solution were: healthy sample (4.50), cardiac sample (5.36), and recovery sample (4.85). All other Eigenvalues were <1.0 in each sample.

SOM item and scale descriptives and factor loadings

The seven items that were confirmed are recommended for use as a scale, as they display unidimensionality and high internal consistency. Cronbach's alphas in the three samples ranged from .92 to .96. Inter-item correlations were all between .48–.82, with one correlation of .86 in the substance recovery sample. Average inter-item correlations ranged from .60–.63. Table 2 presents the item and scale descriptive statistics by sample. All items represented the maximum response range of 1–5. None of the reverse coded items met full inclusion criteria, so they were not retained.

Table 3 presents the factor loadings for each of the SOM items. Factor loadings ranged from .64–.93 across all three samples. When comparing mean SOM scores across samples using one-way ANOVA, there were no significant group differences [$F(2, 627)=1.49$, $p=.22$].

Convergent validity

The validity scales' descriptive statistics are shown in Table 1. As shown in Table 4a&b, the SOM demonstrated convergent validity across samples, with significant ($p<.001$) positive Pearson's correlation coefficients with all of the hypothesized related constructs of optimism (state and trait LOT-R), gratitude, hope, positive affect, life satisfaction, subjective happiness, hedonic capacity, and self-efficacy (Table 4a&b). The SOM was most highly correlated with the modified "state" LOT-R. The SOM's correlation coefficients with the "state" LOT-R were .81 in the healthy and .86 in the cardiac samples. The SOM's correlations with the modified "state" LOT-R were observed to be higher than they were with trait LOT-R ($r=.67$ in the healthy sample, $r=.80$ in the cardiac sample, and $r=.65$ in the recovery sample), supporting the SOM's characteristics as a more state-based measure of optimism than the LOT-R. When examining the other theoretically related yet distinct measures, correlations were weaker but still positive. In the healthy sample, correlation coefficients ranged from .61 for the positive affect and life satisfaction, to .71 for gratitude.

In the cardiac sample, correlations ranged from .58 for gratitude to .80 for positive affect. In the recovery sample, correlations ranged from .48 for hedonic capacity to .64 for subjective happiness.

The SOM also demonstrated, in both the healthy and cardiac samples, inverse correlations with the hypothesized dissimilar constructs of perceived stress, hopelessness, negative affect, and depression (Table 4a&b). Dissimilar construct measures were not included for the recovery sample. Overall, these inverse correlations were weaker than those seen with the positive correlations, with some variables less significantly correlated (ps<.01). In the healthy sample, correlations ranged from −.70 for depression (HADS-D) to −.27 for negative affect. In the cardiac sample, correlations ranged from −.76 for perceived stress to −.56 for hopelessness.

Table 4 also shows the correlations between the “state” LOT-R (Table 4a), and the related and distinct convergent validity scales, as well as the LOT-R (Table 4b) and the validity scales. The modified “state” LOT-R was strongly correlated with the trait LOT-R in the healthy and cardiac samples (rs=.79 and .88, respectively), as was the SOM with the trait LOT-R (rs=.67 and .80, respectively). The correlations between the SOM and the validity scales and the “state” LOT-R and the validity scales were largely similar and both uniformly significant (ps<.001). In general, the LOT-R correlated the same or lower with the validity scales, compared to either the SOM or the “state” LOT-R, and all correlations were significant (ps<.001).

Confirmatory factor analysis

The results of the CFA indicated acceptable model fit of the seven SOM items based on the fit indices. The RMSEA was .079, SRMR was .022, CFI was .985, and TLI was .977. The χ^2 was 33.03 (p>.05).

Discussion

We present the development and initial validation process of the SOM, designed to assess optimism as a state-like construct that can be a target of clinical and research interventions. We included items to encompass optimism’s state-like qualities, to distinguish this measure from previously used measures of trait optimism. We tested the SOM in three samples: healthy adults, people with cardiac disease, and people in recovery from problematic substance use. We determined that there was an acceptable one-factor (unidimensional) solution that fit the data in all three samples and selected the seven most psychometrically sound and theoretically relevant items to form a scale. Across samples, we found that the SOM demonstrated high internal consistency and construct validity. It showed a strong positive relationship with the most theoretically relevant measure, the modified “state” LOT-R. It also showed positive relationships with measures of related constructs, namely trait optimism, hope, positive affect, and life satisfaction, and negative relationships with theoretically dissimilar constructs, such as stress, hopelessness, negative affect, and depression. The final 7-item SOM demonstrated broad applicability when tested across the three samples, with a consistent factor structure and mean scores. The SOM appears to be generalizable, having similar means and ranges, allowing for similar interpretations in

distinct populations. The SOM is expected to have the potential to capture the changeable, state-like nature of optimism that may vary by circumstance, health, time, or through psychological interventions. However, this psychometric paper does not address longitudinal changes in the SOM, which will be a focus of future studies. It is important to note that people can be optimistic about some aspects of situations and not others, for instance optimism about one's own future versus that of the world or society at large. While we wrote items with this distinction in mind, only one factor emerged and is reflected in the final SOM. Longitudinal studies will show the degree to which optimism is influenced by life events, interventions, or health conditions.

The SOM is the first scale to be specifically created from first principles to measure optimism as a dynamic construct, as opposed to trait measures or slight modifications of trait measure to attempt to measure state optimism. Optimism has been conceptualized as having state and trait components [37], and changes in dispositional optimism have been observed [45]. Mediators and pathways of change have been proposed [36, 87]. But there are no well-accepted stand-alone measures of state optimism that are easy to use or interpret. There are minimal longitudinal data supporting any measure's ability to capture changes in optimism over time or context. Research has attempted to capture state optimism by specifying a near-term timeframe for the LOT-R items. State optimism may explain additional variance above that of trait optimism in some domains [4], but a modified instrument may not be valid or enough to capture differences in state optimism [88]. A recent study compared the use of a timeframe modified "state" LOT-R to the original LOT-R and showed that the "state" LOT-R did not change more than the LOT-R, indicating that its use as a measure of changeable state optimism is not warranted [55]. Thus, a specific state optimism measure is needed, and changes over time and situation will be assessed in future validation studies. One related construct that has been studied is situational optimism, for which measures have been adapted for academic and cancer treatment settings [89–91]. Situational optimism has been shown to change over time and have divergent validity with the LOT-R [89]. Future studies can investigate the relationships between the SOM and measures of situational optimism, examining the degree of change that the different measures reflect across time and situations.

The importance of developing a measure of state optimism lies in the demonstrated role of optimism in pursuing and maintaining life goals, quality of life, emotional well-being, and physical health [1, 92]. The ability to capture changes in optimism is particularly important for understanding outcomes for medical, mental health, or recovery from addiction. Studies have demonstrated optimism's association with better cardiac prognosis [19], yet little is known about the role of state optimism and its potential for change in the case of medical illness and the subsequent impact on health. Similarly, while optimism has been found to play a role in alcohol and substance use, no research has examined whether modifying optimism would lead to increased health behaviors like abstinence or low-risk drinking. Use of the SOM may help clinicians and researchers understand the role of changes in optimism related to health and quality of life. Though the present measure development analyses do not explore the changeability of SOM scores over time, it was designed to reflect changes, and this will be the focus of future validation efforts.

The limitations of the present study include that the samples were largely White and female, from the United States, and generally positive, which may limit generalizability. However, in studying the SOM across three populations and finding no significant differences in mean scores, we hope to overcome questions of generalizability, and future studies using the SOM can attempt to recruit more diverse populations. Future studies should examine the SOM and changes in optimism in a variety of cultural settings, including larger and more diverse, less optimistic samples, such as people who are seeking mental health care. Cronbach's alphas were very high (.92–.96) across all 3 samples. While a majority of the inter-item correlations fell within the acceptable and non-redundant range (<.85), the average inter-item correlations were in the .60–.63 range, above the suggested threshold for redundancy (<.50) [93]. It is possible that some redundancy among items exists, and future studies could examine whether further shortening of the scale is possible. This fundamental step of developing the SOM specifically to measure state optimism is important to document because it presents the process of scale development and initial validation. However, it must be considered as a preliminary validation, as the SOM has not yet been tested longitudinally or in intervention studies to observe how life events, health states, or circumstances might change scores. Next steps will include studying the SOM against the LOT-R and measures of situational optimism, which will be important for validating the SOM's use as a measure of state optimism that demonstrates change.

Beyond testing the SOM for changes over time, next steps will involve confirming the factor structure across larger and more diverse populations, and in relation to the LOT-R. We believe that the usefulness of this brief measure has an important role in moving the study of optimism forward, and we encourage its use in future studies.

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Appendix 1.: The SOM 7-item scale.

Please answer the following items based on how you feel *right now, that is, at the present moment* using the scale below. Try to answer each item as accurately as possible based on your response to that item alone, without regard to your answers to any previous items.

1	2	3	4	5
Strongly disagree				Strongly agree
1. I am feeling optimistic about life's challenges.				_____
2. Right now, I expect things to work out for the best.				_____
3. I am feeling optimistic about my future.				_____
4. I feel that something good will happen today (in the next 24 hours).				_____

5. The future is looking bright to me. _____

6. At the moment, I expect more to go right than wrong when it comes to my future. _____

7. I am expecting things to turn out well. _____

Appendix 2.: All items tested in developing the SOM. Retained items are marked with an asterisk. Reverse coded items are indicated with (rev).

Please answer the following items based on how you feel *right now, that is, at the present moment* using the scale below. Try to answer each item as accurately as possible based on your response to that item alone, without regard to your answers to any previous items.

1	2	3	4	5
Strongly disagree				Strongly agree

1. I am expecting good things to happen.[b] _____

2. At the moment, I expect more to go wrong than right when it comes to my future. (rev)[b]

3. I believe that things will most likely get worse. (rev)[c] _____

4. I am feeling optimistic about life's challenges.*[c] _____

5. I'll be pleasantly surprised by something this week.[a] _____

6. Good things are in store for me.[e] _____

7. Right now, I expect things to work out for the best.*[b] _____

8. I expect more to go wrong than right when it comes to my future. (rev)[b] _____

9. I think something bad is going to happen today. (rev)[a] _____

10. I'm feeling good about today (in the next 24 hours).[a] _____

11. I can see things improving from here.[c] _____

12. I expect things will not get worse.[d] _____

13. I am feeling optimistic about my future.*[e] _____

14. I am thinking there will be more good than bad in my life.[e] _____

15. I think that each day has pitfalls. (rev)[d] _____

16. Times are getting worse. (rev)[f] _____

17. I think my life will be happy.[e] _____

18. I feel that something good will happen today (in the next 24 hours).*[a] _____

19. Times are getting better.[f] _____

20. I feel that things will most likely get better.[c] _____

21. Things will work out today (in the next 24 hours).[a] _____

22. I think that each day something good can happen.[d] _____

23. When I think of the world, things might get better.[f] _____

24. When I think of the world, things are getting better.[f] _____

25. I am looking forward to good times ahead.[d] _____

26. Bad things are in store for me. (rev)[e] _____

27. The future is looking bright to me.*[d] _____

28. At the moment, I expect more to go right than wrong when it comes to my future.*[b] _____

29. I am expecting things to turn out well.*[b] _____

Note: Superscript letters indicate hypothesized aspects of state optimism

[a] State predicting near future

[b] State predicting far future

[c] Things getting better

[d] Things staying the same/already being good

[e] Optimism about oneself

[f] Optimism about the world

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Table 1

Demographics and validity scale descriptive statistics by sample

	Sample 1 (Healthy)		Sample 2 (Cardiac)		Sample 3 (Substance Recovery)	
Sample Characteristics						
Sample size	136		96		265	
Mean age (SD)	31.1 (16.6)		58.5 (12.5)		53.7 (11.9)	
Gender (% female)	83.1		71.7		61.9	
Race (% Caucasian)	71.8		88.9		76.6	
Married or cohabitating (%)	41.1		68.7		N/A	
Employed (% full or part-time)	50.0		51.0		60.2	
Convergent Validity Scales	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range
State Optimism (modified LOT-R)	23.0 (5.1)	6–30	23.3 (6.2)	6–30	N/A	
Trait Optimism (LOT-R)	21.6 (5.7)	6–30	22.8 (5.6)	9–30	21.9 (5.6)	6–30
Gratitude (GQ-6)	36.3 (5.4)	13–42	35.6 (6.1)	13–42	N/A	
Hope (AHS)	36.0 (7.4)	10–48	34.2 (10.6)	8–48	N/A	
Positive Affect (PANAS positive)	31.1 (9.1)	11–50	32.6 (9.7)	13–49	N/A	
Life Satisfaction (SWLS)	24.6 (7.3)	5–35	22.1 (8.3)	6–35	22.1 (7.3)	5–35
Subjective Happiness (SHS)	19.7 (5.7)	4–28	20.5 (5.8)	5–28	18.6 (5.3)	4–28
Hedonic Capacity	N/A		N/A		23.4 (4.5)	9–30
General Self-efficacy (GSE)	N/A		N/A		21.4 (4.6)	8–30
Perceived Stress (PSS-4)	6.0 (3.1)	0–14	6.2 (3.7)	0–15	N/A	
Hopelessness (CHRT)	3.8 (1.9)	2–10	3.6 (1.9)	2–9	N/A	
Negative (PANAS negative)	17.7 (7.0)	10–40	18.8 (7.7)	10–43	N/A	
Depression (HADS-D) (online and inpatient)	4.0 (3.5)	0–14	5.8 (4.3)	0–17	N/A	
Depression (CES-D) (university)	35.7 (8.4)	24–57	N/A		N/A	

N/A: not available in this sample

Note: LOT-R: Life Orientation Test-Revised, GQ-6: Gratitude Questionnaire, PANAS: Positive and Negative Affect Schedule, SWLS: Satisfaction with Life Scale, SHS: Subjective Happiness Scale, GSE: General Self-Efficacy Scale, PSS: Perceived Stress Scale, CHRT: Concise Health Risk Tracking Scale, HADS-D: Hospital Anxiety and Depression Scale-Depression subscale, CES-D: Center for Epidemiological Studies- Depression scale.

Table 2

The State Optimism Measure: Item and scale descriptive statistics by sample

SOM Items	Sample 1 (Healthy) (n=136)	Sample 2 (Cardiac) (n=96)	Sample 3 (Substance Recovery) (n=265)
	Mean (SD)	Mean (SD)	Mean (SD)
1. I am feeling optimistic about life's challenges.	3.68 (0.99)	3.68 (0.97)	3.84 (0.96)
2. Right now, I expect things to work out for the best.	3.99 (0.87)	3.72 (1.02)	3.90 (0.90)
3. I am feeling optimistic about my future.	3.96 (0.97)	3.62 (1.02)	3.84 (0.88)
4. I feel that something good will happen today (in the next 24 hours).	3.72 (0.92)	3.62 (0.91)	3.75 (0.93)
5. The future is looking bright to me.	3.86 (0.89)	3.7 (1.0)	3.74 (0.99)
6. At the moment, I expect more to go right than wrong when it comes to my future.	3.86 (0.90)	3.66 (1.04)	3.94 (0.96)
7. I am expecting things to turn out well.	3.97 (0.86)	3.69 (0.99)	3.87 (0.88)

	Sample 1 (Healthy)		Sample 2 (Cardiac)		Sample 3 (Recovery)	
	Mean (SD)	Range	Mean (SD)	Range	Mean (SD)	Range
SOM total score	27.07 (5.34)	7–35	25.78 (6.15)	8–35	26.91 (5.58)	8–35
Cronbach's alpha	0.92		0.96		0.94	

Note: The SOM was preceded by the following instructions and Likert scale:

"Please answer the following items based on how you feel *right now, that is, at the present moment* using the scale below. Try to answer each item as accurately as possible based on your response to that item alone, without regard to your answers to any previous items." (1: Strongly disagree to 5: Strongly agree)

Table 3

State Optimism Measure item factor loadings by sample

Items	Sample 1 (Healthy)	Sample 2 (Cardiac)	Sample 3 (Substance Recovery)
1. I am feeling optimistic about life's challenges.	.77	.83	.84
2. Right now, I expect things to work out for the best.	.76	.91	.86
3. I am feeling optimistic about my future.	.87	.90	.85
4. I feel that something good will happen today (in the next 24 hours).	.66	.73	.64
5. The future is looking bright to me.	.84	.89	.88
6. At the moment, I expect more to go right than wrong when it comes to my future.	.81	.91	.84
7. I am expecting things to turn out well.	.87	.93	.89

Table 4a

Convergent validity correlations between the State Optimism Measure and the modified "state" LOT-R with theoretically positively and negatively related measures.

	SOM			Modified "state" LOT-R		
Convergent Validity Scales	**Sample 1 (Healthy) *r***	**Sample 2 (Cardiac) *r***	**Sample 3 (Substance Recovery) *r***	**Sample 1 (Healthy) *r***	**Sample 2 (Cardiac) *r***	**Sample 3 (Substance Recovery) *r***
Positively related measures						
State Optimism (modified LOT-R)	.81***	.86***	N/A	N/A	N/A	N/A
Trait Optimism (LOT-R)	.67***	.80***	.65***	.79***	.88***	N/A
Gratitude (GQ-6)	.71***	.58***	N/A	.64***	.63***	N/A
Hope (AHS)	.69***	.76***	N/A	.72***	.72***	N/A
Positive Affect (PANAS positive)	.61***	.80***	N/A	.60***	.68***	N/A
Life Satisfaction (SWLS)	.61***	.72***	.60***	.66***	.75***	N/A
Subjective Happiness (SHS)	.68***	.71***	.64***	.61***	.76***	N/A
Hedonic Capacity	N/A	N/A	.48***	N/A	N/A	N/A
General Self-efficacy (GSE)	N/A	N/A	.51***	N/A	N/A	N/A
	SOM			**Modified "state" LOT-R**		
Negatively related measures	**Sample 1 (Healthy) *r***	**Sample 2 (Cardiac) *r***	**Sample 3 (Substance Recovery) *r***	**Sample 1 (Healthy) *r***	**Sample 2 (Cardiac) *r***	**Sample 3 (Substance Recovery) *r***
Perceived Stress (PSS-4)	−.57***	−.76***	N/A	−.67***	−.77***	N/A
Hopelessness (CHRT)	−.59***	−.56***	N/A	−.64***	−.65***	N/A
Negative Affect (PANAS negative)	−.27**	−.69***	N/A	−.42***	−.65***	N/A
Depression (HADS-D) (online and inpatient)	−.70***	−.74***	N/A	−.70***	−.74***	N/A
Depression (CES-D) (university)	−.38**	N/A	N/A	−.48***	N/A	N/A

** $p<.01$,

*** $p < .001$

N/A: not available in this sample

Note: LOT-R: Life Orientation Test-Revised, GQ-6: Gratitude Questionnaire, PANAS: Positive and Negative Affect Schedule, SWLS: Satisfaction with Life Scale, SHS: Subjective Happiness Scale, GSE: General Self-Efficacy Scale, PSS: Perceived Stress Scale, CHRT: Concise Health Risk Tracking Scale, HADS-D: Hospital Anxiety and Depression Scale-Depression subscale, CES-D: Center for Epidemiological Studies- Depression scale.

Table 4b:

Convergent validity correlations between the SOM and the LOT-R with theoretically positively and negatively related measures.

Convergent Validity Scales	SOM			LOT-R		
	Sample 1 (Healthy) *r*	**Sample 2 (Cardiac) *r***	**Sample 3 (Substance Recovery) *r***	**Sample 1 (Healthy) *r***	**Sample 2 (Cardiac) *r***	**Sample 3 (Substance Recovery) *r***
Positively related measures						
State Optimism (modified LOT-R)	.81***	.86***	N/A	.79***	.88***	N/A
Trait Optimism (LOT-R)	.67***	.80***	.65***	N/A	N/A	N/A
Gratitude (GQ-6)	.71***	.58***	N/A	.59***	.69***	N/A
Hope (AHS)	.69***	.76***	N/A	.67***	.71***	N/A
Positive Affect (PANAS positive)	.61***	.80***	N/A	.51***	.71***	N/A
Life Satisfaction (SWLS)	.61***	.72***	.60***	.63***	.78***	.53***
Subjective Happiness (SHS)	.68***	.71***	.64***	.70***	.76***	.64***
Hedonic Capacity	N/A	N/A	.48***	N/A	N/A	.43***
General Self-efficacy (GSE)	N/A	N/A	.51***	N/A	N/A	.58***
	SOM			**LOT-R**		
Negatively related measures	**Sample 1 (Healthy) *r***	**Sample 2 (Cardiac) *r***	**Sample 3 (Substance Recovery) *r***	**Sample 1 (Healthy) *r***	**Sample 2 (Cardiac) *r***	**Sample 3 (Substance Recovery) *r***
Perceived Stress (PSS-4)	−.57***	−.76***	N/A	−.64***	−.73***	N/A
Hopelessness (CHRT)	−.59***	−.56***	N/A	−.58***	−.68***	N/A
Negative Affect (PANAS negative)	−.27**	−.69***	N/A	−.36***	−.70***	N/A
Depression (HADS-D) (online and inpatient)	−.70***	−.74***	N/A	−.69***	−.79***	N/A
Depression (CES-D) (university)	−.38**	N/A	N/A	−.48***	N/A	N/A

** $p<.01$,

*** $p < .001$

N/A: not available in this sample

Note: LOT-R: Life Orientation Test-Revised, GQ-6: Gratitude Questionnaire, PANAS: Positive and Negative Affect Schedule, SWLS: Satisfaction with Life Scale, SHS: Subjective Happiness Scale, GSE: General Self-Efficacy Scale, PSS: Perceived Stress Scale, CHRT: Concise Health Risk Tracking Scale, HADS-D: Hospital Anxiety and Depression Scale-Depression subscale, CES-D: Center for Epidemiological Studies- Depression scale.