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Measuring meaning in life following cancer

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Abstract

Meaning in life is a multi-faceted construct that has been conceptualized in diverse ways. It refers broadly to the value and purpose of life, important life goals, and for some, spirituality. We developed a measure of meaning in life derived from this conceptualization and designed to be a synthesis of relevant theoretical and empirical traditions. Two samples, all cancer patients, provided data for scale development and psychometric study. From exploratory and confirmatory factor analyses the Meaning in Life Scale (MiLS) emerged, and includes four aspects: Harmony and Peace, Life Perspective, Purpose and Goals, Confusion and Lessened Meaning, and Benefits of Spirituality. Supporting data for reliability (internal consistency, test–retest) and construct validity (convergent, discriminant, individual differences) are provided. The MiLS offers a theoretically based and psychometrically sound assessment of meaning in life suitable for use with cancer patients.

Key words: Cancer, Meaning, Quality of life, Spirituality, Survivor

Introduction

According to theorists, human beings have a ''will to meaning'' [1], a fundamental need to seek meaning and fulfillment in life [2–6]. Meaning has been equated with purpose in life [7], life satisfaction, and positively valued life goals [8]. Others view meaning as a sense of purpose and coherence in one's life [9], an awareness of the value, fragility, and preciousness of life [10], or the personal significance of a particular life circumstance [11]. Yalom [6] suggests that meaning is the belief in a purposeful pattern of the universe, which, in turn, can be derived from religion and/or spirituality. Others have made similar suggestions (e.g., [12]). Reker [13] has come closest to synthesizing these diverse conceptualizations by defining meaning as ''the cognizance of order, coherence and purpose in one's existence, the pursuit and attainment of worthwhile goals, and an accompanying sense of fulfillment'' (p. 41).

To explain how individuals find meaning, particularly in response to stressful events, Park and Folkman [14] offer a framework that differentiates between global and situational meaning. The former refers to ''people's basic goals and fundamental assumptions, beliefs, and expectations about the world'' ([14]; p. 116). Global meaning encompasses beliefs about the order of life or the universe as well as personal life goals and purpose. The authors cite religion and spirituality as prime examples of global meaning, as they provide a

philosophical orientation for understanding the world, adverse events, and life purpose. Situational meaning refers to the interaction of a person's global beliefs and goals and the immediate circumstances of a particular person–environment transaction. Park and Folkman propose that global meaning determines, to a large extent, the meaning given to a situation-specific life event. Indeed, the ability to find congruence between global meaning and the appraised situational meaning of a particular stressful event determines whether an individual subjectively feels stress. If such congruence is not found, attempts to cope with the resultant distress may involve "meaning-making," or the reappraisal of meaning to change global and/or situational meaning in order to arrive at congruence.

Many measures of meaning have been developed. Some focus on a single aspect of the construct. The Purpose in Life Test (PIL; [7]), one of the earliest attempts to test Frankl's [15] theory of noögenic neurosis (i.e., a psychopathological state characterized by lack of meaning), evaluates life goals, ambitions, and future plans. The Life Regard Index (LRI; [8]) was created as an alternative to the PIL. It assesses meaning in life independent of personal values, and is based on a conceptualization of meaning in life as a commitment to goals and, in turn, one's feelings of fulfillment [8]. Other measures assess meaning in the context of a negative life event: the Meaning in Suffering Test [16] assesses meaning in the context of unavoidable suffering; the Assumptive Worlds Scale [17] assesses fundamental beliefs about the self and world following a traumatic event; and, the Constructed Meaning Scale [18] assesses meaning in the context of life-threatening illness. Taken together, some measures include aspects that have been viewed as distinct from meaning (e.g., sources of meaning as assessed by the PIL), and it is unclear whether one measure offers more construct validity than others. In this context, many investigators have simply relied on their own strategies to measure meaning, including qualitative interviews or development of their own items (e.g., [11, 19]). While the latter is understandable in the short term, it magnifies the difficulty of finding empirical consensus and advancing theory.

Our aim was to synthesize diverse conceptualizations of meaning and, in turn, develop an empirically validated scale suitable for use with cancer patients. As a potentially life threatening disease, cancer is a significant psychological and physiological stressor [20]. Unfortunately, having to find meaning in the context of cancer is common, as the lifetime risk for the disease is 1 in 2 for men and 1 in 3 for women in the US [21]. Traumatic life events such as cancer may prompt changes in one's view of meaning [14, 17, 22, 23] and cause individuals to question previously held beliefs about meaning in life. As suggested by Park and Folkman, cancer patients may attempt to find situational meaning in the experience that is congruent with their global meaning. For individuals who are able to do so, meaning has been associated with better overall psychological adjustment and less psychological distress [24–26].

From our review of scholarly and empirical literatures and guidance from Reker's synthesis [13], we have come to conceptualize meaning as having multiple components and present when one has a sense of purpose, coherence, and fulfillment in life and holds the belief that life has value. For some individuals, meaning might include aspects of spirituality [5, 8, 27]. We saw spirituality as potentially important because patients report regular use of religion and spirituality as one strategy for coping with diagnosis and treatment [28, 29]. Particularly for those undergoing difficult circumstances, we considered that meaning would be facilitative for positive emotions, and serve as a counter for feelings of depression, despair, aimlessness, and hopelessness that might occur. Whether they are conscious of it or not, all individuals have meaning in their lives. Variation in degree among individuals would be expected and likely relate to differential levels of psychological distress [30, 31]. This view is consistent with (though not as strong as) those who have suggested that meaning, or more precisely the lack of meaning, is relevant to mental health, particularly mood disorders [1, 4, 31]. Drawing upon findings in the subjective well-being literature (e.g., [32]), we distinguish meaning from the behaviors and circumstances that are frequently sources of meaning, such as personal success, social relationships, and contributions to society. However, we do suspect that having more sources of meaning promotes greater overall meaning in life.

In developing a measure of meaning for the context of cancer, we choose to do so when, we assumed, sufficient time had passed for the situational meaning of cancer to be assimilated into global meaning. It is the case that for the majority of patients, moods improve and stabilize by one year following diagnosis [33–35]. Thus, two survivor samples were sought. One, used for the calibration of the measure, was homogenous – women previously treated for regional breast cancer and followed for 2 years. The other, used for validation of the internal structure of the measure, was heterogeneous – both male and female survivors with different disease sites, extent of disease, treatments, and times since diagnosis.

As recommended by Cronbach, Meehl, and others [36, 37] construct validity tests were conducted. Tests of convergent validity included measures of affect, as we hypothesized that negative emotions and meaning would be negatively related. Relatedly, we examined an individual difference, neuroticism, as individuals prone to negativity may report less meaning in their lives. To confirm our belief that sources of meaning are related to meaning, we tested the relationship between social variables and meaning. Helgeson and Cohen [38] have emphasized the importance of social interactions for cancer patients, noting "emotional support can lead to greater attention to and improvement of interpersonal relationships, thus providing some purpose or meaning for the disease experience" (p. 135). Discriminant validity is tested by examining sources of bias, including co variation with sociodemographics and social desirability. Finally, reliability – item interrelatedness, item homogeneity, and test–retest – is documented. In summary, we took an integrative, historical view and offer a discussion and operationalization of the meaning in life construct in the context of cancer.

Method

Participants and procedures

Sample I: Breast cancer survivors

Eligibility and accrual. Patients were consecutive cases at a university-affiliated National Cancer Institute designated Comprehensive Cancer Center or self- and physician-referred cases from the community. Women recently diagnosed with regional breast cancer, surgically treated and awaiting adjuvant therapy, were accrued to a parent project – a randomized clinical trial testing the efficacy of a psychological intervention. For the trial, exclusion criteria included having received a prior cancer diagnosis, refusal of cancer treatment, age ≤ 20 or > 85 years, residence > 90 miles from the research site, or diagnoses of mental retardation, severe or untreated psychopathology (e.g. schizophrenia), neurological disorders, dementia, or immunologic conditions/diseases. A total of 227 patients were enrolled.

Complete descriptions of patient accrual, stratification and randomization, and assessment procedures have been reported [20, 39]. To briefly summarize, there were no significant differences ($p > 0.10$) between participants vs. non-participants on sociodemographics, disease and prognostic characteristics, and cancer treatments received/planned. For those randomized to the intervention, sessions were completed by 12 months and the intervention was efficacious for biobehavioral outcomes [39]. Meaning was not a focus of the intervention nor an outcome [40]. After 12 months, patients are reassessed every 6 months for 5 years. The reassessments include psychological, behavioral, and biomedical measures, however the meaning items were not among them; meaning items were only administered at the 24 month assessment. The present study of meaning is based on data collected on or very near the 24-month (M = 26 months) assessment. [Please note: Following the development of the meaning scale, we compared the study arms (Intervention vs. Assessment) on the meaning assessment at 24 months and the groups did not differ ($p = 0.62$).]

Patients were eligible to participate in the meaning study if they had (1) completed all cancer therapies (all treatments had actually ended by 12 months), (2) been followed for at least 2 years, and (3) remained disease free. By the 24-month assessment for all patients (n = 227), 26 (11%) women had recurred or died, 29 (13%) women had dropped from the trial, and 5 (2%) women missed their 24-month assessment but remained in the trial, resulting in a sample of 167 (74%) patients completing the meaning items. Analyses compared

the latter patients to the remainder (26%; 60 of 227) with respect to baseline (initial assessment) characteristics using chi-square or analysis of variance (ANOVA) as appropriate. The groups did not significantly differ in age, race, study arm (intervention vs. assessment), employment, family income, spousal status, menopausal status, disease characteristics (stage, hormone receptor status, number of nodes), or cancer treatment received (surgery type, radiation, or hormonal or chemotherapy) (all $p > 0.06$). Only in education and months since diagnosis did the groups differ ($p = 0.003$). Both had some college, but the meaning study group had roughly 1 year more (15.07 vs. 13.85 years). Description of the sample appears in Table 1. The characteristics of this group are similar to those for breast patients in the Ohio Cancer Incidence Surveillance System [40] and SEER [41] databases in the United States.

Sample II: Cancer survivors with heterogeneous sites of disease

Cancer survivors with access to the Internet and between the ages of 20 and 85 were eligible for a web-based survey, labeled "Meaning of Life Survey," on a study web site (http://www.meaningoflifestudy.org). Information about the site was disseminated via print materials distributed locally, local and national television news stories, and cancer-related Internet sites (e.g., patient discussion groups). Participants were also urged to tell other survivors about the site. Upon entering the website, individuals viewed eligibility information, investigator contact information, and informed consent pages. Following consent, participants completed the survey. All responses were anonymous and sent encoded to a secure server/database.

Sample II characteristics are also reported in Table 1 along with results of ANOVAs or chi square comparisons of Samples I and II. The samples are comparable in age [mean approximately 50 years; $F(1,549) = 1.39$, $p = 0.19$], race [predominance of Caucasian participants, 92%; (1, n = 551) = 0.10, $p > 0.05$], and marital status [approximately 67% married; (1, n = 551) = 0.567, $p > 0.05$]. However, the samples significantly ($p < 0.05$) differ in the areas of male gender sampling [χ^2 (1, n = 544) = 36.17, $p < 0.001$], education level [χ^2 (2, n = 551) = 9.26, $p = 0.01$], and place of residence [χ^2 (1, n = 470) = 211.04, $p < 0.001$]. Most importantly, 67% of the Sample II survivors had cancers other than breast [Chi^2 (1, n = 551) = 207.95, $p < 0.001$]. Half (51%) of the Sample II participants were 24 months or less from treatment, 79% of the sample was < 5 years, and 93% was < 10 years post diagnosis. Not surprising, 20% of Sample II had recurred [χ^2 (1, n = 536) = 39.47, $p < 0.001$].

Table 1. Sociodemographic, geographic, and cancer characteristics of the study samples, using means and standard deviation values or percentages (in parenthesis)

Characteristic	Sample I (n = 167) n (%)	Sample II (n = 384) n (%)
Age M(SD)	51 (11)	50 (11)
*Gender**		
Female,%	167 (100)	306 (80)
Race		
Caucasian,%	153 (91)	357 (93)
African-American, %	13 (8)	9 (2)
Other, %	0 (1)	4 (5)
Marital status		
Married, %	113 (67)	253 (66)
*Years of education**		
12 or less	4 (26)	54 (14)
13 to 16	76 (46)	208 (54)
17 or more	48 (29)	121 (32)
*US Geographic location**		
East	0 (0)	84 (22)
Midwest	167 (100)	92 (24)
South	0 (0)	50 (13)
West	0 (0)	50 (13)
Other/Missing[a]	0 (0)	108 (28)
*Cancer site**		
Breast	167 (100)	128 (33)
Gynecologic	0 (0)	104 (27)
Colorectal	0 (0)	39 (10)
Lung	0 (0)	26 (7)
Prostate	0 (0)	23 (6)
Other	0 (0)	64 (17)
Months since diagnosis M (SD)	26 (5)	44 (61)
Recurrence*	0 (0)	85 (20)

*$p < 0.05$.
[a]Geographic item included late in study.

Measures

In addition to the meaning items, additional measures were administered to Sample I and then

used for validity analyses. Test–retest estimates are provided for intervals of 4–6 months unless otherwise noted.

Mental health

Quality of life – Mental health component. The Medical Outcomes Study – Short Form (SF-36; [42]) is a 36-item questionnaire used to assess psychological and physical quality of life. Because of extensive reliability, validity, and normative data [42, 43], it is frequently used with medical patients. The measure is multidimensional, having eight subscales: social functioning, role functioning related to emotional health, mental health, vitality, physical functioning, role functioning related to physical health, bodily pain, and general health. Mental and physical health component scores are computed by differentially weighting the subscales. The mental health component (SF-36 MCS) has higher weights for the following: mental health, role functioning related to emotional health, social functioning, and vitality. Based on U.S. population norms, the component scores are standardized with a mean of 50 and a standard deviation of 10 with higher scores indicating greater mental health/physical health. Sample I mean was 50 (SD = 9.5). Test–retest reliability for the MCS was 0.60 and internal consistency was 0.88.

Depressive symptoms. The Center for Epidemiology Studies of Depression Scale – Iowa Short Form (CES-D; [44, 45]) is an 11-item self-report inventory that identifies current symptoms of depression. Unlike other measures, the CES-D is relatively unaffected by physical symptoms and is commonly used in research with medical patients [46]. Total scores can range from 0 to 18, with higher scores reflecting greater depressive symptoms in the previous week. The Sample I mean was 4 (SD = 3.8), and 10.5% of the women scored 10 or greater, a score considered suggestive of clinical depression [47]. Test–retest and internal consistency were 0.60 and 0.87, respectively.

Distress. The Profile of Mood States (POMS; [48]) is a 65-item self-report inventory asking subjects to rate their feelings during the past week and yields six mood scales: Tension-Anxiety, Depression-Dejection, Anger-Hostility, Vigor-Activity, Fatigue-Inertia, and Confusion-Bewilderment. The Total Mood Disturbance Score is the sum of the Tension, Depression, Anger, Fatigue, and Confusion scales minus the Vigor scale. Total scores can range from −32 to 100, with a higher score indicating greater mood disturbance. Sample I mean was 19 (SD = 32). Test–retest for the Total Mood Disturbance Score was 0.78 and internal consistency was 0.92.

Social variables

Social support. The Perceived Support Scales for Family (PSS-Fa) and Friends (PSS-Fr) are two 20-item instruments designed to measure the degree to which participants' needs for support are fulfilled by their close relationships [49]. A sample item is "My friends are good at helping me solve problems." Total scores can range from 0 to 20 for both scales, with a higher score indicating greater perceived social support. For Sample I means were 17 (SD = 4.0) for PSS-Fa and 17 (SD = 3.5) for PSS-Fr. Test–retest was 0.79 and 0.80 and internal consistency was 0.89 and 0.84, respectively.

Social integration. The Social Network Index (SNI; [50]) is a 10-item measure that was used to assess social network size. The SNI assesses the number of people with whom the participant has contact on a regular basis, as well as the number of important social roles the participant fulfills (e.g., parent, spouse, neighbor). The SNI can range from 1 to 12, with a higher score indicating greater social integration. This measure is influenced less by mood than assessment of perceptions of support. The Sample I mean was 5.8 (SD = 3.0) and test–retest was 0.71.

Individual differences

Neuroticism. The Neurotism factor of the Goldberg [51] factor markers of personality was used. Participants were asked to describe themselves as they are generally using 18 unipolar trait adjectives (e.g. "moody" and "nervous") with each rated on a scale from 0 to 8. Scores can range from 0 to 144, with a higher score indicating greater neuroticism. The Sample I mean was 51.20 (SD = 20.85). One-year test–retest reliability was 0.82 and internal consistency was 0.91.

Social desirability. The 13-item short form [52] of the Marlowe-Crowne Social Desirability Scale (SDS; [53]) was used. The short form is correlated 0.93 with the 33-item Social Desirability Scale [52]. Scores can range from 0 to 13, with a higher score indicating greater social desirability. The Sample I mean score was 8.65 (SD = 2.84). Internal consistency was 0.72 and 1-year test–retest was 0.79.

Results

Part I: Definition and development

To briefly overview, the conceptualization of meaning offered above was the guiding principle for selection of an initial item pool. Thirty-nine items were identified. Exploratory factor analysis with data from Sample I was conducted to statistically clarify the dimensions of meaning assessed by the item set. Through a series of refinements, 21 items, representing four dimensions of meaning, were retained. The reliability of the solution was then tested using data from Sample II and confirmatory factor analysis.

Item content

As noted, conceptualizations of meaning in life vary, but for cancer patients we viewed it as including one's sense of purpose in life, the belief in the value of life, the coherent explanation of life events, well-being, and spirituality. Review of the current literature of measures revealed that these themes were represented and had received at least some empirical support. As such, items were selected from measures assessing one or more of these themes. For example, items were selected from two measures of spirituality. Similarly, items were selected from measures of purpose in life and well-being. Because our samples had been diagnosed with cancer, items were also selected from two measures of meaning in illness. Investigators (SR and DG-K) reviewed over 100 items. Each person made item nominations, attempting to eliminate those with poor wordings, redundancies, and varying from the content domain described above. Selections from each person were combined and together additional exclusions on these dimensions were made again. Collectively, 39 selections were made: one item from the 20 item Life Purpose Questionnaire [54], eight from the eight item Constructed Meaning Scale [18], three from the 28 item Life Regard Index [8], three from the 20 item Meaning in Suffering Test [16], 12 from the 12 item The Functional Assessment of Chronic Illness Therapy [27], two from the six item Satisfaction With Illness Scale [55], and nine from the 20 item Spiritual Well-Being Scale [56]. When administered, the item stem, "As a result of my cancer diagnosis and treatment..." was used to focus the respondent and take a developmental perspective and reflect on the significance of the cancer experience with respect to meaning.

Study of internal structure

Exploratory factor analysis

For the first examination of latent structure, exploratory factor analysis was performed with the 39 items administered to Sample I. The Kaiser–Meyer–Olkin measure of sampling adequacy (KMO = 0.846) exceeded the suggested 0.6 value [57], indicating that the 39 items represented a homogeneous collection of variables suitable for factor analysis. The Bartlett's test of sphericity [χ^2 (741) = 3644.80, $p < 0.001$] also implies that the correlations among the items are significantly different from zero. Oblique Crawford–Ferguson varimax rotation was selected (factors were expected to be correlated [58, 59]) and used with the Comprehensive Exploratory Factor Analysis program (CEFA; [60]). CEFA provides the Root Mean Square Error of Approximation (RMSEA; [61]) as a quantitative means of assessing goodness of the model fit per degree of freedom. The following descriptors of RMSEA values have been offered: close fit < 0.05; acceptable fit 0.05–0.10; and unsatisfactory fit > 0.10 [61]. Ninety percent confidence intervals (CI) are also provided. Other interpretive guidelines (scree plot, eigenvalues) were also examined.

Two, three, four, and five factor solutions were extracted to explore a range of underlying dimensions. The RMSEA values for the two and three factor solution were unsatisfactory (two factor RMSEA = 0.110, 90% CI = 0.105–0.116; three factor RMSEA = 0.092, 90% CI = 0.086–0.098). The RMSEA values for the four and five factor solutions were reasonably close (four factor

RMSEA = 0.079, 90% CI = 0.073–0.086; five factor RMSEA = 0.068, 90% CI = 0.061–0.075). Inspection of the fifth factor of the five-factor solution revealed that it was composed of three items with low loadings, which can indicate over factoring.

Inspection of the four-factor solution revealed that it offered the best conceptual fit, with themes of harmony/peace, perspective and purpose, spirituality, and a diminished meaning dimension. Further inspection revealed some item weaknesses, however. Sixteen items were eliminated due to low loadings (< 0.30) on one factor, adequate to low loadings on multiple factors, or poor specificity. As one factor included items suggesting diminished meaning, we evaluated the potential for significant overlap with depression. As the CES-D had also been administered to Sample I, a second exploratory factor analysis was then performed with the 11 CES-D items and the remaining 23 meaning items. A two-factor exploratory factor analysis (anticipating a CES-D and a meaning factor) with oblique target rotation was conducted, again using CEFA [60]. The RMSEA value suggested reasonable fit (RMSEA = 0.077, 90% CI = 0.061–0.092), with the solution being separate, but correlated factors, with the majority of the meaning items statistically distinct from the CES-D items. However, two meaning items displayed moderate loadings on both factors and these items were dropped from further analyses. Thus, 21 meaning items remained.

A reanalysis using the same statistical procedures with the 21 items, again with Sample I, was done. Examination of the eigenvalues of the correlation matrix revealed that five were greater than the suggested cutoff value of 1.0, although the last value was only barely so (1.1). Fabrigar and colleagues [59] suggest that selecting number of factors based on eigenvalues alone can lead to over factoring and that appeared to be the case with the five factor solution. Moreover, the four-factor solution again offered the best conceptual fit, and the RMSEA value was acceptable (0.08, 90% CI = 0.067–0.094). Table 2 provides the solution, and shows factor loadings that are, uniformly, moderately high to high across all items, typically from 0.50 to 0.90. Even the lowest values (0.45 and 0.43) are considerably higher than the 0.3 cutoff recommended [62]. This final solution included two items from the Life Regard Index (see Table 2; items 15 and 18; [8]), seven from the Rush Spiritual Belief Module (items 1–4, 19–21; [27]), two from the Satisfaction With Illness Scale (items 11 and 13; [55]), nine from Spiritual Well-Being Scale (items 5–9, 12, 14, and 16–17; [56]), and one from the Meaning in Suffering Test (item 10; [16]). In summary, the 21 item four-factor solution was statistically sound and maximized the conceptual fit with assessment of order, coherence, purpose, and goals; finding value and fulfillment; diminished meaning; and, a religious or spiritual perspective.

Confirmatory factor analysis

To test the generalizability of the solution, confirmatory factor analysis was performed with Sample II data (n = 384) using LISREL software. We specified that the 21 items would again load on four factors. Model estimation was carried out using the raw data as input, in which only 0.4% of values were missing. The covariance matrix was estimated using EM algorithm to obtain starting values for full information maximum likelihood (FIML) procedure. Although the chi-square was significant [χ^2 (183) = 631.03, $p < 0.001$], Root Mean Square Error of Approximation (RMSEA) measuring goodness of fit of the factor solution indicated that the four-factor solution had satisfactory statistical fit [0.080, 90% CI = 0.073–0.087]. Factor loadings and standard errors can be seen in Table 2 for Sample II. Thus, the four-factor structure and the item assignments to factors were successfully replicated with a second, more heterogeneous, sample.

Interpretation of internal structure and scoring of the Scale

Meaning is conceptualized as having multiple facets, and the four factors of the Meaning in Life Scale are concordant with the elements discussed above. Factor I, labeled Harmony and Peace, describes feelings indicative of well-being, including peace, harmony, and comfort. Factor II, labeled Life Perspective, Purpose, and Goals, indicates a settled sense of self and future. Factor III, labeled Confusion and Lessened Meaning, indicates diminished meaning in life. Factor IV,

Table 2. Final exploratory four factor solution for the meaning items with Sample I (n = 167) and confirmatory factor analysis (CFA) loadings and standard errors (SE) with Sample II (n = 384)

Factor	Factor				CFA loading (SE)
Item	I	II	III	IV	
I. Harmony and Peace					
I feel a sense of harmony within myself	**0.949**	0.003	0.006	0.052	0.884 (0.016)
I am able to reach deep down into myself for comfort	**0.697**	0.046	−0.126	0.092	0.795 (0.022)
I feel peaceful	**0.669**	0.061	0.008	0.069	0.798 (0.022)
I have trouble feeling peace of mind	**0.645**	0.054	−0.043	−0.015	0.709 (0.029)
II. Life Perspective, Purpose and Goals					
I am more fulfilled and satisfied with life	0.055	**0.848**	−0.011	0.047	0.603 (0.034)
I have a greater sense ....direction in which my life is headed	0.043	**0.752**	0.012	0.084	0.545 (0.037)
I am more settled about my future	0.167	**0.699**	0.038	−0.034	0.754 (0.024)
Life is a more positive experience	0.094	**0.647**	−0.202	0.036	0.867 (0.015)
I feel better about my future	0.060	**0.627**	−0.021	0.048	0.916 (0.011)
I have found new and more worthwhile goals	−0.086	**0.509**	−0.163	0.054	0.826 (0.018)
I have learned more about myself as a person	−0.109	**0.429**	−0.221	0.092	0.810 (0.020)
III. Confusion and Lessened Meaning					
Life has less meaning	0.011	−0.038	**0.768**	0.041	0.589 (0.037)
I do not value life as much as I used to	0.051	0.075	**0.664**	−0.068	0.646 (0.033)
I enjoy less in life	−0.056	−0.220	**0.591**	−0.008	0.725 (0.028)
I get completely confused when I try to understand my life	−0.168	0.029	**0.575**	−0.044	0.741 (0.027)
I don't know who I am, where I came from, or where I am going	0.143	−0.018	**0.575**	−0.032	0.614 (0.035)
Life is full of conflict and unhappiness	−0.167	−0.017	**0.569**	0.042	0.763 (0.026)
I spend most of my time doing things that are not really important	−0.114	−0.005	**0.450**	−0.107	0.587 (0.037)
IV. Benefits of Spirituality					
I find strength in my faith or spiritual beliefs	0.015	−0.043	−0.033	**0.979**	0.975 (0.007)
I find comfort in my faith or spiritual beliefs	0.080	0.001	0.050	**0.930**	0.978 (0.007)
My illness has strengthened my faith or spiritual beliefs	−0.089	0.209	−0.014	**0.606**	0.742 (0.024)

Loadings in bold indicate factor assignment.

labeled Benefits of Spirituality, indicates the strength or comfort gained from spiritual or religious beliefs.

To examine whether the use of a single composite score is appropriate to summarize these four factors, a LISREL hierarchical SEM model was tested. A second-order factor model was specified in which a single second-order factor explains the covariances among the four first-order factors. Second-order factor loadings were found to be substantial: 0.86 (R^2 = 0.74) for Harmony and Peace, 0.72 (R^2 = 0.52) for Life Perspective, Purpose, and Goals, −0.88 (R^2 = 0.78) for Confusion and Lessened Meaning, and 0.58 (R^2 = 0.33) for the Benefits of Spirituality, and there was reasonable model fit (RMSEA = 0.080). This indicates that a common second-order factor, Meaning in Life, influenced all 21 items through the first-order factor and was the main source of covariation among them.

Further, the second-order model is effective in explaining the covariation among the first-order factors, based on the target coefficient [63]. The target coefficient is the ratio of the chi-square of the first-order model to the chi-square of the more constrained, higher order model. The target coefficient has a maximum of one which implies all the covariances among the first-order factors are explained by the second-order factor model; it has been suggested that a target coefficient greater than 0.90 indicates that the higher model is effective in explaining the covariances among the first-order factors [63]. Our observed target coefficient was 0.99. In conclusion, considering the consistently high second-order factor loadings, reasonable model fit, and the very

large target coefficient, a single, second-order factor measurement model for the MiLS is supported.

These data provide empirical support for viewing the concept of meaning in life as a unitary construct, and in turn, to use a total score for the measure (MiLS; See Appendix A). To do so, scale scores derived from the factors are first calculated. First, items with values ranging from 0 to 4 (items 15–21) are rescaled to a 1–6 scale. Second, item 15, which is negatively worded, is reverse scored. Third, items for each scale are summed and a mean for the scale is calculated. Thus, all scales have a score range of 1–6. Higher scores indicate greater positive meaning, except for the Confusion and Lessened Meaning scale, for which higher scores indicate greater confusion and less meaning. The Total Meaning score is computed as the sum of the three 'positive' meaning scales minus the score for the Confusion and Lessened Meaning scale. Total Meaning scores range from −3 to 17, with a higher score indicating greater positive meaning.

Part II: Psychometric studies

Reliability

Internal consistency. Table 3 provides mean total and scale scores and intercorrelations. All scales are correlated similarly with the Total Score (range from 0.52 to 0.62). The scales' intercorrelations, provided below the diagonal in Table 3, are of moderate magnitude, with the values ranging from −0.38 (Lessened Meaning and Spirituality) to −0.63 (Lessened Meaning and Harmony and Peace). Cronbach's α values are provided on the diagonal. These data indicate high interrelatedness among the items, with values ranging from 0.84 to 0.91 across the scales and with a value of 0.93 for the total score. The precision of the total alpha coefficient was also tested. The Cortina [64] precision of alpha index was 0.01, indicating that the spread of interitem correlations was very small (this index is 0 when the spread of all interitem correlations is zero). Taken together, these data indicate that there is the high interitem relatedness. It is also the case that there is considerable homogeneity among the items, with these reliability data consistent with the second-order factor solution discussed above.

Test–retest. A random sample of 43 women from Sample I was selected. The measure was given as described above and then administered by mail 2 weeks later. There was an 88% return rate. Two-week test–retest reliability was 0.80 for the total measure. For scales, test–retest was 0.67 for Harmony and Peace, 0.79 for Life Perspective, Purpose, and Goals, 0.81 for Confusion and Lessened Meaning, and 0.74 for Benefits of Spirituality.

Validity

Content. Studies of internal structure reduced the item pool from 39 to 21. The four content domains are consistent with the theories of Frankl [1], Reker and Wong [5], and Yalom [6], indicating domains that include positive feelings ("I feel peaceful"), attitudes ("Life is a more positive experience"), and well-being ("I have a greater sense of well-being"). The negative dimension characterizes meaning losses, including less meaning, existential worries ("I don't know who I am..."), and the absence of important life tasks. The fourth factor endorses the view that spirituality plays a positive role in one's life. Lastly, the

Table 3. Means and standard deviations for Meaning in Life Scale, with total and scale score intercorrelations and internal consistencies using Sample I and II data (n = 551)

			Scale				
			Total	1	2	3	4
X. Total Score	10.80	3.66	(0.93)				
1. Harmony and Peace	4.32	1.17	0.61	(0.87)			
2. Life Persp., Purpose, and Goals	4.03	1.11	0.62	0.50	(0.90)		
3. Confusion and Lessened Meaning	1.89	0.86	−0.62	−0.63	−0.52	(0.84)	
4. Benefits of Spirituality	4.35	1.55	0.52	0.41	0.49	−0.38	(0.91)

The diagonal provides Cronbach's α internal consistency estimates.

item stem, "As a result of my cancer diagnosis and treatment..." focuses the respondent on the circumstances of meaning after cancer.

Construct

Convergent and discriminant. Validity was examined using Sample I data. As noted above, we hypothesized that both mental health and distress would be significantly associated with meaning. Frankl [1] suggests that an absence of meaning is detrimental to mental health. Cross-sectional studies lend support, documenting an inverse relationship between meaning and negative emotions, such as feelings of distress (e.g., [26, 65]), intrusive thoughts, [9], and depressive symptoms [19]. In this test, the Total MiLS score had a moderate, positive correlation with mental health aspects of quality of life (SF-36 MCS; $r = 0.58$) and negative correlations of similar magnitude with depressive symptoms (CES-D; −0.58) and negative mood (POMS; −0.62).

We explored the association of meaning in life with social variables. As briefly noted above, theorists have suggested that social interaction is important in the development of meaning [6, 66, 67]; Helgeson and Cohen [38] emphasized its importance for cancer patients. We anticipated that, if related, the correlations would be lower than those with mental health, as social variables, while important, would not be expected to be as influential. Further, we anticipated higher correlations with the support measures, due in part, to the stronger relationships found between mental health and perceived social support than is found with social network measures [68]. These general patterns were observed. The magnitudes of all social variable correlations were lower than those for mental health; moreover PSS-Fa and PSS-Fr correlations and meaning (0.43 and 0.38, respectively) were higher than that for the SNI and the MiLS (0.21).

Regarding discriminant relationships, the MiLS was uncorrelated with sociodemographic variables, including age (−0.03), education (0.09), income (0.02), race (−0.07), and marital status (0.06). Finally, the correlation of Total Meaning and social desirability was low (0.28), but significant.

Concurrent. Hierarchical multiple regression (HMR) analyses tested the MiLS as a 'predictor' of concurrent mental health and social variables. We anticipated findings similar to the correlations. As a preliminary step, sociodemographic, disease, and treatment variables were tested for their correlation with each outcome variable, along with social desirability. When significant correlations were found, the variables were included and entered into the regressions in the following order: (a) sociodemographic, disease, treatment, or social desirability variables, with one step for each variable; and, (b) the total meaning score.

Table 4. Summary of regression models showing that high Meaning in Life Scale (MiLS) scores are associated with fewer concurrent psychological symptoms, larger social networks, and higher levels of social support

Model statistics				MiLS statistics			
Outcome	Control Variables	Total R^2	Adjusted R^2	Beta	t(df)	p	sr^2
SF-36 MCS	Age,[a] Chemotherapy,[b]SDS	0.445	0.427	0.585	8.407 (124)	< 0.001	0.317
CES-D	SDS	0.418	0.409	−0.555	−7.901 (127)	< 0.001	0.286
POMS	SDS	0.471	0.463	−0.618	−9.225 (127)	< 0.001	0.354
Social Network (SNI)	Income,[c] Partner status[d]	0.247	0.228	0.226	2.826 (119)	0.006	0.051
PSS-Friends	Race,[e] Employment,[f] Education,[g] Age, Partner status, Study arm[h]	0.276	0.234	0.371	4.662 (120)	< 0.001	0.131
PSS-Family	Race, SDS	0.267	0.249	0.438	5.517 (126)	< 0.001	0.177

SF-36 MCS = The Medical Outcomes Study 36-item – Short Form, Mental Component Summary; SDS = Marlowe-Crowne Social Desirability Scale; CES-D = Center for Epidemiology Studies of Depression Scale; POMS = Profile of Mood States; SNI = Social Network Index; PSS = Perceived Social Support Scale for Friends or Family.

[a]Age in years; [b] 0 = No chemotherapy, 1 = chemotherapy received; [c]Income in dollars; [d]1 = No partner, 2 = partner; [e]1 = Caucasian, 2 = non Caucasian; [f]1 = Not employed, 2 = employed; [g]Education in years; [h]1 = Assessment only group, 2 = intervention group.

Results are summarized in Table 4. All regression models were significant, and accounted for at least 41% of the total variance for the mental health measures and 23–25% for the social variables. The MiLS step was significant for all models, accounting for the following percent of variance in the psychological variables: 32% for the SF-36 (MCS), 35% for the POMS, and 29% for the CES-D, and social variables: 13% for PS-Friends, 18% for PS-Family, and 5% for the SNI. These analyses are, of course, consistent with the correlation data, but offer a more rigorous test of the concurrent relationships.

Personality. Neuroticism is the central negative aspect of personality. Individuals high in neuroticism tend to experience greater anxiety, emotional lability, depressive symptoms, guilt, and self-blame than individuals low in neuroticism [69], and so we hypothesized that low meaning might accompany this trait and its characteristics. Indeed, total meaning was moderately correlated with neuroticism, −0.47.

Discussion

Considering prior theories of meaning, we conceptualized meaning as having multiple, related dimensions, which each contributing uniquely to the construct of meaning. Meaning is present when one has a sense of purpose, coherence, and fulfillment in life, and holds the belief that life has value; spirituality may also be included for some. Content best reflecting these themes was sampled. The factor structure that emerged was reliable and revealed feelings of harmony and peace, perspectives on life purpose, goals, and benefits of spirituality. Meaning is in contrast to meaninglessness, a state of discord and confusion in which the value of life is diminished or questioned.

The resulting scale contributes to the assessment of meaning in life in cancer patients in several ways. It offers a reliable measure of meaning, validated in two samples of cancer patients. This is a significant improvement over several existing measures, which have little psychometric data. In addition, the MiLS was developed to synthesize the rich, theoretical tradition of the construct. Thus, the MiLS offers a more comprehensive approach than existing measures, which may only assess a single conceptualization of the construct. We discuss conceptual issues after reviewing the psychometric findings for the measure.

Reliability and validity of the Meaning in Life Scale (MiLS)

Meaning in the context of cancer is operationalized in the Meaning in Life Scale, and at this early stage the scale has promising support. High inter item relatedness, homogeneity of the inter item correlations, and good fit for a single factor model support 'meaning' as the overarching conceptual and measurement model for the items. The intent of the measure is to assess four dimensions as they relate to meaning in life, rather than independently. Consequently, we recommend examining MiLS scales in relation to one another and use of the aggregate meaning score.

We assessed meaning among cancer patients at a time when we anticipated it would be stable. The test–retest values for a 2-week interval were high, but future research will need to test stability across longer intervals. The measure evidenced expected patterns of convergent validity with depressive symptoms and negative moods. Future research is needed to determine the measure's predictive validity. A relevant context might be to test the clinical utility of the MiLS in identification of patients who struggle with cancer's impact on their lives. Social variables, oftentimes sources of meaning, were also related to meaning; correlations were stronger with measures of perceived support than a structural (network) measure, consistent with related findings (e.g., [68]).

We are unaware of previous data examining the relationship between meaning and personality. Those vulnerable to negative affect through their dispositional characteristics (i.e., neuroticism) reported lower levels of meaning in their lives. Unfortunately, if an absence of meaning is as stable as the disposition of neuroticism, this may be yet another circumstance which impedes the successful treatment of neurotic individuals for their affective distress. While depressive symptoms may lift, individuals still need to find meaning in their lives. Instilling the belief that life has meaning and that meaning will continue in the future may

provide a foundation for combating fleeting negativity, low moods, and discouraging thoughts.

The opportunity to use the Internet enabled rapid data collection from individuals other than those commonly accrued through a health care system. They were geographically dispersed and had different disease and treatment experiences. Meaning scores were found to be unrelated to sociodemographic variables, but both samples had minimal variation in educational level or racial group membership. Data is needed to document the generalizability of the measure, as differences among ethnic groups have been reported, for example, in the importance of spirituality [70].

MiLS and facets of meaning

The measure is a composite of four dimensions of meaning, which together form a single, cohesive construct. The dimension of Harmony and Peace is composed of positive emotions and thoughts connoting a sense of tranquility, serenity, and comfort. The emergence of this factor is consistent with Csikszentmihalyi [71] theory that harmony results from the intense pursuit of goals. He defines inner harmony as the ''congruence of thoughts, emotions, and actions'' that often occurs when absorbed in the pursuit of meaningful goals ([71], p. 217). Indeed, this scale is moderately correlated with scores on the Life Perspective, Purpose, and Goals scale ($r = 0.50$, $p < 0.01$). Harmony appears to be linked to meaning in life through activity, but it may also be linked through cognitions. Fredrickson [72] notes that contentment may prompt individuals to ''savor current life circumstances and recent successes, experience 'oneness' with the world around them, and integrate recent events and achievements into their overall self-concept and world view'' (p. 306).

Life Perspective, Purpose, and Goals is that aspect of meaning assigned to oneself and one's own life. In addition to engagement in activities, it reflects an understanding of the self and optimism about one's future. This is consistent with Reker and Wong's [5] assertion that the process of pursuing and attaining goals is an important aspect of meaning. Frankl's conceptualizations of meaning also fit this facet. He suggested that meaning in life comes from what one uniquely accomplishes and creates as well as from interactions with the immediate world.

Confusion and Lessened Meaning reflects a decreased sense of value to life and a belief that life is a negative experience. Items include a lack of motivation for important goals and a sense of confusion about oneself and life in general. Meaning and meaninglessness have been traditionally viewed on a continuum (e.g., [1, 6]). Yet, cancer patients may experience periods of meaningfulness and also periods of meaninglessness, and can be manifest in patients' day-to-day struggles. The negative sequelae of cancer are well documented [73], but patients commonly relate positive outcomes, such as closer ties with friends and family and the repeated demonstrations of love and caring that many people provided during the diagnostic and treatment ordeal. A similar phenomenon is found among individuals struggling with other negative life events. In a study of HIV/AIDS caregivers, they endorsed high levels of negative affect, but they also endorsed high levels of positive affect [74]. As such, patients may experience both meaning and the loss of meaning simultaneously.

A final facet of the MiLS is that reflecting the Benefits of Spirituality. Previous research notes that when meaning is viewed as spirituality alone, it can exist independent of religious faith or traditional systems of belief [75]. For example, among our sample 18% of the breast cancer survivors reporting more Benefits of Spirituality did not regularly attend church. (We used a simple median split procedure with the Spirituality scale and examined church attendance reported on the SNI.) While some investigators have focused entirely on the importance of spirituality for cancer patients [27], our conceptualization includes it as one aspect in viewing life as meaningful.

A distinct advantage to the current measure is that it takes an inclusive approach to the conceptualization of meaning. The inclusion of multiple facets for the MiLS is relevant in light of the evidence that responses to stressful or traumatic situations are, indeed, complex and multifaceted (and not exclusively negative). As the positive psychology zeitgeist suggests, there are a host of human strengths that allow individuals to learn from, and remain resilient through, trying times.

We suggest that meaning is among those strengths, and that the conceptualization offered in the MiLS, which includes satisfactions and positives along with losses, can aid in its measurement. Elsewhere [76] we have reported that various styles of coping differentially predict meaning as an outcome for women diagnosed with breast cancer, and that the social and physical sequelae of cancer associated with heightened distress appear to be accounted for, in part, by patients' loss of meaning in their lives [77]. Thus, some investigators may wish to also examine the individual scales in relation to psychological or behavioral outcomes of cancer. Using the individual component scores could be reasonable for some research questions, because there may sometimes be associations of particular interest or ones not observed through the use of the Total Meaning score.

Meaning in relation to other constructs

Positive emotion is an inextricable part of meaning in life. Philosophers, such as Aristotle described eudaimonic happiness, or "the feelings accompanying behavior in the direction of and consistent with one's true potential." This was contrasted with hedonic happiness, or the gratification of basic drives (e.g., hunger, sex, or relaxation; [78, 79]). Reference to eudaimonic feelings of satisfaction, peace, and fulfillment pervade the theoretical literature on meaning in life and the items from which we sampled (e.g., Life Regard Index [8]). Indeed, others have included an affective component in the assessment of meaning (e.g., [5]). Positive emotions may also give rise to a sense of value to or engagement with life. Fredrickson [72] suggests that positive emotion expands individuals' repertoire of thoughts and actions, prompting engagement in life experiences that are novel and creative. Receptiveness to new ideas, exploration, and social interaction may be thus enhanced. In short, positive emotion may allow individuals to see coherence in life events, even difficult ones such as a cancer diagnosis, and foster a belief in the meaningfulness of life.

Conversely, we found that less meaning in life is associated with negative emotions. Meaninglessness may contribute to decreased motivation in depressed individuals. Maddi [80] defined meaninglessness as "a chronic inability to believe in the truth, importance, usefulness, or interest value of any of the things that one is engaged in or can imagine doing" (p. 140). Cognitive theories of depression suggest that depression results from maladaptive cognitive structures that give meaning (or the lack of meaning) to internal and external stimuli [81]. These structures are often negative beliefs about the self, environment, and future that result in decreased motivation. Beliefs such as "life is hopeless" or "my efforts are futile" reflect a fundamental lack of meaning to structure one's activities. Dykman [82] suggests that negative beliefs cause restricted goal-directedness and loss of pleasure in activities. These findings corroborate clinical observations of meaninglessness described by theorists [1, 6].

The relationship of positive emotion and meaning in life prompts the question of how to explore the relationship empirically. As discussed above, there are important conceptual reasons why a significant relationship between the constructs would be expected. In addition to the valence meaning and emotion share, our tests of the relationship used measures that also shared a common method (i.e., self report), thus adding method variance to the observed correlations. Albeit a context with limitations, our studies of concurrent validity showed that the meaning score could account for roughly 30% of the variance in mental health scores.

In a related vein, meaning in life can be considered in relationship to perceived benefits. For example, Tedeschi and Calhoun [83] cite "a changed philosophy of life" that can result from a negative experience, including increased appreciation for one's existence and enhanced spiritual and religious faith. Alternatively, meaning in life may be the overarching construct, and perceived benefits occur in service of maintaining or enhancing meaning. Park and Folkman [14] note that the coping process may facilitate the integration of a negative life event with previous beliefs about meaning in life through cognitive reappraisal. Individuals may consciously or unconsciously search for benefits from the negative life event to reappraise the event as less negative and integrate it with fundamentally positive, prior beliefs about global meaning.

Thus, it is not surprising that similar content can be found in measures of both constructs. Items

assessing goals and priorities, the value of life, and purpose in life occur in measures of meaning (e.g., [7, 8]) as well as measures of perceived benefits (e.g., [83, 84]). Indeed, some theorists have simply equated the meaning of a negative event to the perception of benefits from it (e.g., [85]). However, we suggest that the perception of life as meaningful after a negative life event such as cancer encompasses more than mere benefits. It encompasses beliefs in the purpose and value of life, spirituality, the coherent explanation of life events, and a sense of well-being.

Conclusion

As interest in positive psychology has grown, many researchers have turned their attention to the role of meaning in life in psychological processes and adjustment. Other investigators have provided evidence for the relationship between meaning and distress (e.g., [26, 65]) and even favorable biologic responses [10, 86]. As researchers explore the effects of meaning across multiple domains of life, a reliable, valid measure is needed. Until now, researchers wishing to measure meaning in life were forced to choose between piecemeal measures, each assessing a different conceptualization of meaning in life and few having strong psychometric properties. The Meaning in Life Scale was developed as an alternative to these fragmented options, integrating conceptualizations of meaning in life and having both reliability and validity. Ultimately, construct validity is a process, emerging as a measure is used by investigators sampling different groups, times, and circumstances [87], and thus, the nomological net surrounding the meaning of life construct will be elaborated and clarified. For the present, we offer a faceted representation of meaning upon which studies of construct validity can follow.

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Appendix 1

Directions: The statements below concern the possible impact of your cancer on your life. Indicate how much you agree or disagree with the statements about you and your life at this time.

1	2	3	4	5	6
Strongly Disagree	Moderately Disagree	Disagree	Agree	Moderately Agree	Strongly Agree

As a result of my cancer diagnosis and treatment, I am more fulfilled and satisfied with life.
As a result of my cancer diagnosis and treatment, life has less meaning.
As a result of my cancer diagnosis and treatment, I have a greater sense of well being about the direction in which my life is headed.
As a result of my cancer diagnosis and treatment, I do not value life as much as I used to.
As a result of my cancer diagnosis and treatment, I enjoy less in life.
As a result of my cancer diagnosis and treatment, I am more settled about my future.
As a result of my cancer diagnosis and treatment, life is a more positive experience.
As a result of my cancer diagnosis and treatment, I get completely confused when I try to understand my life.
As a result of my cancer diagnosis and treatment, I feel better about my future.
As a result of my cancer diagnosis and treatment, I don't know who I am, where I came from, or where I am going.
As a result of my cancer diagnosis and treatment, I have found new and more worthwhile goals.
As a result of my cancer diagnosis and treatment, life is full of conflict and unhappiness.
As a result of my cancer diagnosis and treatment, I have learned more about myself as a person.
As a result of my cancer diagnosis and treatment, I spend most of my time doing things that are not really important to me.

Appendix 1. (continued)

Directions:Please indicate how true each statement is for you.				
0	1	2	3	4
Not at all	A little bit	Somewhat	Quite a bit	Very much

I have trouble feeling peace of mind.
I am able to reach deep down into myself for comfort.
I feel a sense of harmony within myself.
I find comfort in my faith or spiritual beliefs.
I find strength in my faith or spiritual beliefs.
I feel peaceful.
My illness has strengthened my faith or spiritual beliefs.

Item 15 is reverse scored. Items 15–21 are rescaled: 0 = 1.00, 1 = 2.25, 2 = 3.5, 3 = 4.75, and 4 = 6.00.

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