Martela, Frank; Steger, Michael F.

The role of significance relative to the other dimensions of meaning in life – an examination utilizing the three dimensional meaning in life scale (3DM)

Published in:
Journal of Positive Psychology

DOI:
10.1080/17439760.2022.2070528

Published: 01/01/2023

Document Version
Publisher's PDF, also known as Version of record

Routledge
Taylor & Francis Group

The Journal of Positive Psychology

Dedicated to furthering research and promoting good practice

ISSN: (Print) (Online) Journal homepage: https://www.tandfonline.com/loi/rpos20

The role of significance relative to the other dimensions of meaning in life – an examination utilizing the three dimensional meaning in life scale (3DM)

Frank Martela & Michael F. Steger

To cite this article: Frank Martela & Michael F. Steger (2023) The role of significance relative to the other dimensions of meaning in life – an examination utilizing the three dimensional meaning in life scale (3DM), The Journal of Positive Psychology, 18:4, 606-626, DOI: 10.1080/17439760.2022.2070528

To link to this article: https://doi.org/10.1080/17439760.2022.2070528

Published online: 18 May 2022.

THE JOURNAL OF POSITIVE PSYCHOLOGY
2023, VOL. 18, NO. 4, 606–626
https://doi.org/10.1080/17439760.2022.2070528

Routledge
Taylor & Francis Group

The role of significance relative to the other dimensions of meaning in life – an examination utilizing the three dimensional meaning in life scale (3DM)

Frank Martela [a] and Michael F. Steger [b,c]

[a]Department of Industrial Engineering and Management, Aalto University, Aalto, Finland; [b]Department of Psychology, Colorado State University, Fort Collins, Colorado, USA; [c]Optentia Research Programme, North-West University, Vanderbijlpark, South Africa

ABSTRACT

Following calls for multidimensional conceptualizations of meaning in life, the tripartite view where meaning is seen to consist of significance, purpose, and coherence has gained in popularity. To operationalize it, we developed the Three Dimensional Meaning in Life Scale (3DM), confirming its factor structure, psychometric properties, and validity in Studies 1 (n = 301), 2 (n = 300), and 3 (n's = 171 & 161). Study 4 (n = 241) was experimental inviting participants to read vignettes in three conditions, each emphasizing one dimension of meaning in life, demonstrating that people can discriminate between lives high on each specific dimension. Study 5 (n = 336) investigated the separateness of significance and mattering, finding both overlap and distinctiveness, suggesting that they could be sub-facets of the same overarching dimension. The results thus provide empirical and experimental support for the tripartite view of meaning in life, while providing new nuance to it.

ARTICLE HISTORY
Received 20 October 2020
Accepted 6 April 2022

KEYWORDS
Coherence; meaning in life; purpose in life; significance; well-being

Introduction

Meaning in life (MIL) has become established as an increasingly important research topic within psychology, health research, psychotherapy, and across the social sciences, with research showing its predictive power as regards well-being, health, and mortality (Cohen et al., 2016; Roepke et al., 2014; Steger, 2012; Wong, 2010). Such is its theoretical and empirical importance that many have argued that MIL should be considered a fundamental component of wellbeing or flourishing (e.g., Diener et al., 2010; Ryff, 1989; Seligman, 2011; Steger et al., 2013). Although the number of empirical studies on MIL keeps expanding, concerns have been raised that this research body rests on generic measures of 'meaning' or 'purpose' as abstract concepts, leading to calls for greater clarification of the key dimensions of the construct (George & Park, 2013; Heintzelman & King, 2014; Leontiev, 2013). Consequently, scholars have argued that a next important phase in MIL research is to develop measures that better align with the theoretical multidimensional structure of MIL.

Over the decades, several definitions of MIL have appeared referring to various multifaceted conceptualizations (e.g., Battista & Almond, 1973; George & Park, 2014; King et al., 2006; Reker & Wong, 1988; Steger et al., 2006). While there was considerable overlap, the accelerating pace of empirical research created urgency around working to resolve conceptualization. An integrative analysis of meaning in life theory proposed that a highly useful consensus converged on a three-dimensional view of MIL consisting of *significance, purpose*, and *coherence* (Martela & Steger, 2016), a trichotomy of dimensions acknowledged by several meaning in life scholars (e.g., Heintzelman & King, 2014; King et al., 2006; Leontiev, 2017; Van Tongeren et al., 2018; Womick et al., 2019). Coherence is defined as the 'sense of comprehensibility and one's life making sense,' purpose is defined as the 'sense of core goals, aims, and direction in life,' and significance is defined as the 'sense of life's inherent value and having a life worth living' (Martela & Steger, 2016, p. 534). Coherence can thus be seen as a cognitive component of meaning, purpose as a motivational component, and significance as an evaluative component.

Interestingly, a mostly similar trichotomy of meaning in life was proposed by George and Park (2016, 2017), consisting of comprehension, purpose, and mattering. While the two trichotomies define coherence/comprehension and purpose identically, it remains an open question whether significance and mattering should be treated as the same construct. Mattering, according to George and Park (2016, p. 206 emphasis added), is defined as "the degree to which individuals feel that

CONTACT Frank Martela frank.martela@aalto.fi Department of Industrial Engineering and Management, Aalto University, Aalto, Finland

their existence is of significance, importance, and value *in the world*", while Costin and Vignoles (2020 emphasis added) define it as feeling "that one's actions make a difference *in the world* and that life is worth living." Both thus see mattering as being about *mattering to the world*, while Martela and Steger (2016) focused more on the personal scale of significance, and the subjective sense of life's inherent value *to the individual* living that life. Mattering thus is in essence about mattering from the point of view of something beyond the individual, whereas significance points more towards a positive attachment and a sense of value the individual has towards their own life.

Both mattering and significance thus focus on the value of one's life, but the former emphasizes the value of one's life to the world, the latter the value of one's life to the individual. The difference may seem subtle but it becomes more visible when looking at the items George and Park (2017) as well as Costin and Vignoles (2020) used to operationalize mattering: They emphasize one's perceptions that one's life matters in a quite cosmic sense, as exemplified by items, such as 'Even a thousand years from now, it would still matter whether I existed or not' and 'Even considering how big the universe is, I can say that my life matters' (George & Park, 2017, p. 620) and similarly all items in the scale by Costin and Vignoles referring to 'the vastness of the universe "how big the universe is", "the grand scheme of the universe", and "the grand scheme of things" (Costin & Vignoles, 2020, p. 869). While confronting the disparity of scale in time and size between an individual life and the vastness of the universe is a captivating point of view, evaluating whether one's life matters from *the point of view of the universe and cosmic timescales* is clearly a different evaluation than whether a person feels that their own life feels significant and worth living *from their own point of view*. Mattering is an evaluation about the relation of one's life to something larger, significance is an evaluation about one's own relation to one's life. A person might conclude that even though their life probably doesn't matter a thousand years from now, it still feels significant to them personally (see, Martela, 2020). Thus, while research has tended to treat the two trichotomies as the same, we argue that there is a potentially important distinction between mattering as conceptualized by George and Park (2017) as well as Costin and Vignoles (2020) and significance as conceptualized by Martela and Steger (2016). Perhaps the overarching dimension of significance/mattering, which is about the value and importance of one's life, could involve two facets, one focusing on the value of one's life for oneself (significance), the other focusing on the value of one's life for the world (mattering).

Although the dimensions of meaning proposed by the trichotomies can arguably be distinguished theoretically, it remains an open question whether they can be distinguished empirically. The first psychological measure to attempt to capture these separate dimensions of meaning was published by George and Park (2017), followed by a second measure by Costin and Vignoles (2020). Both of these efforts examined comprehension, purpose, and *mattering* as the three dimensions of meaning and yielded some support for a distinction among the dimensions. Specifically, George and Park (2017) found factor analytic support and differentiation among the strength of correlations of subscales with sensible constructs. Costin and Vignoles (2020) found factor analytic support for keeping their three dimensions separate, an encouraging pattern of stronger correlations among retests of the same subscale versus other subscale, and some indication that mattering was more important than the other two dimensions for predicting meaning in life over a one-month period. However, besides these two studies, there is still very little research on the three-dimensional model of meaning, and especially more experimental examinations of their distinctiveness would be welcome. Furthermore, significance as a potentially separate dimension of meaning remains unmeasured, and its relations to other dimensions of meaning remain empirically unexamined.

Accordingly, besides additional empirical investigations of three-dimensional models of meaning, the field is in need of a scale for significance and an examination of how it relates to purpose, coherence, and mattering. First, given the theoretical proposal that coherence, purpose, and significance are the three dimensions of meaning in life (Martela & Steger, 2016), it is crucially important to provide empirical evidence that these three dimensions can be separated from each other. This is the first task of the present article. Second, given the proposals for significance (Martela & Steger, 2016) and mattering (George & Park, 2016) as the 'third' dimension of meaning, it is important to examine whether they can be distinguished from each other empirically or whether they should be treated as two labels for the same underlying construct. This is the second task of the present article. Third, there is a critical need for empirical research exploring the degree to which the various proposed dimensions of meaning are distinguishable and separate. The previous examinations of coherence and purpose, despite demonstrating some evidence of their separateness, have found the latent factors to have intercorrelations of .70 or above in a confirmatory factor analysis (George & Park, 2017), and zero-order correlations ranging from

.72 (Costin & Vignoles, 2020, Study 1) to .51–.65 (Studies 2 and 3), making it important to further examine how empirically separable coherence and purpose are as dimensions of meaning, and in particular making some efforts to use experimental methods to probe distinctions. In this spirit, to further the empirical examination of potential dimensions and facets of meaning in life, the present study has three aims:

(1) To construct a scale for significance, purpose, and coherence that allows for the empirical examination of these key dimensions of meaning in life.
(2) To examine whether significance, purpose, and coherence can be empirically separated from each other into independent constructs or whether they are better construed as sub-dimensions of one overarching construct of meaning.
(3) To examine whether significance and mattering can be empirically separated from each other into independent dimensions, whether they are better construed as two labels for the same underlying dimension, or whether they may reflect two distinct sub-facets of a broader significance/mattering dimension.

Present research

A series of five studies were conducted to address the research needs of developing a scale to assess significance, purpose, and coherence (Studies 1, 2 & 3), to examine the separateness of significance, purpose, and coherence as dimensions of meaning (Studies 3 & 4), and to examine the degree of separateness of significance and mattering (Studies 3 & 5). The first study tested and refined an item pool using exploratory factor analysis, the second study used confirmatory factor analysis to determine the basic psychometric properties of the new measure, the third study examined convergent, divergent, and criterion validity, the fourth study randomly assigned participants in three conditions to examine whether participants could identify differences in coherence, purpose, and significance between fictional life scenarios, and the fifth study focused on the separateness of significance and mattering utilizing factor analytic and regression analytic methods.

Study 1

In order to test the distinctiveness of the three proposed dimensions of meaning in life, an effective measure is necessary. While few scales to measure coherence, purpose, and mattering exist (Costin & Vignoles, 2020; George & Park, 2017) no scales existed that would aim to measure significance as such, or along with purpose and coherence as conceptualized by Martela and Steger (2016). Accordingly, the aim of this first study was to generate a pool of items to measure the three dimensions of meaning, and examine their psychometric properties to work toward a final scale.

Participants and procedures

The questionnaire was administrated through Amazon Mechanical Turk (Mturk), which has in recent years become increasingly popular source of study participants in behavioral sciences (see, Buhrmester et al., 2018; Mason & Suri, 2012; Paolacci & Chandler, 2014). The sample was gathered in accordance with the recommendations of the Research Ethics Committee of the Aalto University. In accordance with the Declaration of Helsinki, we sought informed consent from all study participants, and they gave their consent anonymously in the online form. Of the 301 participants from US who completed the survey, 55% reported being male, 45% female, with one participant reporting being other. Participants were predominantly Caucasian (76%), with 13% reporting being Black or African American, 6% Asian or Asian American, 4% Hispanic or Latino, and 1% other. The age range was from 19 to 70 with the average age being 34.

Measures

Significance, purpose, and coherence. Based on a review of the relevant literature, we generated a pool of items for each of the three dimensions of meaningfulness. These items aimed to be face valid and consistent with the definition of the three dimensions. In the first phase, both authors generated their own lists of items, which were then discussed to make a judgment about their clarity and consistency with the constructs. Finally, we had 14 items for coherence, 19 items for purpose, and 19 items for significance that were judged to be clear in item content and correspond with the definitions of the constructs. These items were used in the survey. All items were rated on a Likert scale ranging from 1 (not at all true) to 7 (very true).

Results

To examine the structure of the items, we ran an exploratory factor analysis with maximum likelihood and direct oblimin rotation using all 52 items for the three factors. Both the examination of the screen plot and using the

rule of eigenvalue >1 recommended a three-factor solution (eigenvalue for 3rd factor 2.41 vs. eigenvalue for 4th factor .899), and it turned out that all coherence items had their strongest primary loadings on one factor, all purpose items on another factor, and all significance items on a third factor. Thus, the exploratory factor analysis seemed to recommend the expected factor structure with three factors.

To refine distinctions among the factors, we eliminated any items that had a primary loading < .60 or a secondary loading > .30. This led to the discarding of three purpose items and three coherence items. An exploratory factor analysis using the remaining 11 items for coherence, 16 items for purpose, and 19 items for significance is displayed in Table 1 and demonstrates again a clear three-factor structure. For reader's interest, the four items for each of the three dimensions that were chosen for the final scales in subsequent studies have been highlighted.

Brief discussion

The aim of this study was to generate a number of face-valid items based on the construct definitions, examine the psychometric properties of individual items and discard those performing poorly, and test the factor structure of the remaining items using exploratory factor analysis. The EFA clearly suggested that the items split into three factors as expected, and the individual items loaded strongly on their expected factors, thus providing initial support for the empirical separateness of the three dimensions of meaning.

Study 2

The aim of the second study was to finalize the scale structure for measuring significance, purpose, and coherence, and to explore initial psychometric properties. Given that we had a predetermined theoretical model for the three factors, we used confirmatory factor analysis in this study to test how well this a priori structure fit to the data.

Participants and procedures

The questionnaire was administrated through Mturk to US participants, and the sample was gathered in accordance with the recommendations of the Research Ethics Committee of Aalto University, with the participants giving their informed consent anonymously in the online form. Of the 300 participants who completed the survey (52% male, 48% female), 77% were Caucasian, 11% Black or African American, 8% Asian or Asian American, 3% Hispanic or Latino, and 1% other. The age range was from 18 to 69 with the average age being 36.

Table 1. Loadings from exploratory factor analysis for the intended significance, purpose, and coherence items.

	Factor				Factor		
	1	2	3		1	2	3
Significance1	.731	.053	.118	Purpose8	.071	.642	.239
Significance2	.750	.023	.150	Purpose9	.060	.689	.194
Significance3	.765	.103	.093	Purpose10	.222	.720	−.018
Significance4	.800	−.069	.211	Purpose11	.038	.682	.238
Significance5	.882	.019	.066	Purpose12	−.082	.983	−.038
Significance6	.771	.156	−.007	Purpose13	−.036	.934	−.032
Significance7	.922	−.074	.084	Purpose14	−.070	.920	.015
Significance8	.894	−.113	.100	Purpose15	.127	.637	.161
Significance9	.934	−.057	.042	Purpose16	.140	.613	.229
Significance10	.948	.080	−.128	**Purpose17**	**.159**	**.696**	**.085**
Significance11	**.924**	**.032**	**−.011**	Purpose18	.174	.785	−.066
Significance12	**.922**	**.044**	**−.092**	**Purpose19**	**.150**	**.740**	**−.015**
Significance13	.872	.047	.022	Coherence1	.155	.032	.720
Significance14	.982	−.050	−.016	Coherence2	.091	−.074	.799
Significance15	.853	.001	.059	Coherence3	−.012	−.040	.838
Significance16	**.849**	**.074**	**.013**	**Coherence4**	**.043**	**−.042**	**.823**
Significance17	.839	.148	−.071	**Coherence5**	**−.084**	**.088**	**.795**
Significance18	.861	.095	−.076	Coherence6	−.054	.106	.829
Significance19	.924	−.017	.001	**Coherence8**	**.086**	**.011**	**.802**
Purpose4	.288	.588	.074	**Coherence9**	**.100**	**.086**	**.753**
Purpose5	.010	.834	−.022	Coherence12	.069	.247	.617
Purpose6	**−.038**	**.867**	**.021**	Coherence13	.078	.217	.601
Purpose7	**.027**	**.746**	**.138**	Coherence14	.060	.119	.759

Extraction: Maximum likelihood. Rotation: Direct oblimin.
The final items identified in subsequent studies in bold.

Measures

Significance, purpose, and coherence. The 11 items for coherence, 16 items for purpose, and 19 items for significance that were retained after Study 1 were administrated to the participants. The items were rated on a Likert scale ranging from 1 (not at all true) to 7 (very true).

Results

Item selection. Confirmatory factor analysis (CFA) was used to test the theoretically derived three-factor structure, implemented with lavaan 0.5–22 in RStudio 1.0.136, in accordance with previous recommendations (see, Floyd & Widaman, 1995). The initial fit of the three-factor model in CFA was poor (based on usual criteria Hu & Bentler, 1999; Marsh et al., 2004), χ^2 (df = 986) = 3142.6, p < .001, CFI = .872, TLI = .865, RMSEA = .092 [90% CI = .089, .096], SRMR = .054. Five items with high cross-loading modification indices (MI; >20.0) were discarded, slightly improving fit (χ^2 (df = 776) = 2273.7, p < .001, CFI = .900, TLI = .894, RMSEA = .086 [90% CI = .081, .090]), SRMR = .036. Subsequent rounds of item pruning focused on improving the item-level quality of the scale by eliminating items with MIs above 15 (five items) and residuals with other items greater than .120 (four items). Following this, efforts were made to improve scale-level psychometric properties (e.g., avoiding ceiling effects, reducing skewness, kurtosis, and within-factor intercorrelations) and coverage of the theoretical space by items. Sixteen items were eliminated according to these criteria. The remaining 16 items did not have substantial psychometric differences, and final item elimination decisions were made based on a theoretical examination to ensure that all aspects of each dimension were represented, resulting in the final scale with 11 items, 4 for coherence, 4 for purpose, and 3 for significance.

Psychometric properties of the final scale. A CFA of the final model of three independent scales fit the data well (χ^2 (df = 41) = 73.6, p < .001, CFI = .988, TLI = .984, RMSEA = .052 [90% CI = .032, .071]), SRMR = .022. All MIs were less than 14 and all residuals were less than .08. The standardized regression weights are displayed in Table 2 and show that all items loaded strongly (all loadings < .700) on their respective factors. This model compared favorably to a model where all 11 items were set to be part of one overall factor, χ^2 (df = 44) = 339.3, p < .001, CFI = .890, TLI = .862, RMSEA = .152 [90% CI = .130, .157], SRMR = .054.

The internal consistency for the three subscales were also good (coherence α = .90, purpose α = .90, significance α = .90). However, the intercorrelations between the three subscales were high: coherence – purpose r = .73, coherence – significance r = .75, and purpose – significance r = .79. A post-hoc examination of this final model using data from Study 1 also demonstrated adequate fit, χ^2 (df = 41) = 95.7, p < .001, CFI = .981, TLI = .975, RMSEA = .069 [90% CI = .051, .087], SRMR = .023.

Brief discussion

With this study, our aim was to arrive at a final scale. A CFA performed on final items showed that it had good fit, and a post-hoc replication of the same CFA using data from Study 1 had also adequate fit. Internal consistency for each of the three subscales was good ($\alpha \geq .90$) and all the retained individual items had average participant ratings below 5.5, skewness values below 1.5, and kurtosis values below 1.0. Thus, it was concluded that the resulting scale was a good instrument for assessing the three dimensions of meaning in life. The items of the final scale can be found in *Appendix 1*.

However, it must be noted that despite our careful efforts to choose those items that are most representative of their respective dimensions and had the least overlapping variance with the other dimensions, the zero-order correlations between the three subscales remained high, above .70. This is in line with previous efforts to provide separate scales for coherence and purpose that have similarly produced high correlations. For example, in the CFA performed on the Multidimensional Existential

Table 2. Standardized loadings from confirmatory factor analysis with three separate factors for significance, purpose, and coherence.

	Significance	Purpose	Coherence
My life is full of value	.890	–	–
My personal existence is significant	.879	–	–
Every day I experience the sense that life is worth living	.852	–	–
I pursue one or more big purposes in my life	–	.847	–
I am highly committed to certain core goals in my life	–	.914	–
I have a set of core goals that give my life a sense of direction	–	.867	–
My daily activities are consistent with a broader life purpose	–	.708	–
Most things happening in my life do make sense	–	–	.845
By and large, I am able to understand the world around me	–	–	.719
I can comprehend what my life is all about	–	–	.889
I can easily make sense of my life	–	–	.873

Meaning Scale, the latent factors for comprehension, purpose, and mattering had intercorrelations that were all .70 or above (George & Park, 2017), and coherence and purpose correlated at .72 in Meaning in Life Judgments Scale (Costin & Vignoles, 2020). Nevertheless, when comparing a CFA with three separate factors to a CFA where all items were part of the same overarching factor, the latter demonstrated poorer fit. Thus, continuing the examination of these three constructs as separate factors appeared warranted.

Study 3

Having finalized the Three Dimensional Meaning in Life Scale (3DM) in study 2, the aim of study 3 was to assess the convergent, divergent, and criterion validity of this scale in a new sample. We wanted to see how the three scales we developed relate to existing meaning in life scales, especially to mattering, and to other theoretically relevant constructs.

Participants and procedures

Study 3 combines data collection from two samples, each of which completed the new 3DM scale, and different batteries of scales for related constructs. This approach was used to keep the number of questionnaires manageable, reduce participant burden, and increase fidelity and attentiveness during survey completion. Both samples were gathered from a pool of US participants through MTurk in accordance with the recommendations of the Research Ethics Committee of the Aalto University. In accordance with the Declaration of Helsinki, we sought informed consent from all study participants, and they gave their consent anonymously in the online form.

Sample A initially consisted of 178 participants, but prior to any other analysis we excluded seven participants for scoring too high score on the three inattention check questions (Maniaci & Rogge, 2014), for a final sample size of 171 (60% male, 39% female, 1% other; 75% Caucasian, 11% Asian or Asian American, and 4% Black or African American; 19–63 years of age, with average of 34 years). Sample B initially consisted of 175 participants from the US; 12 participants were excluded for scoring too high scores on the inattention check and 2 participants were excluded for answering the survey in less than 2 min, for a final sample size of 161 (57% male, 42% female, 1% other; 73% Caucasian, 14% Black or African American, 6% Hispanic or Latino, 6% Asian or Asian American, and 1% American Indian or Alaska Native, 20–71 years of age with average of 34).

Measures

The measures in this study consisted of the new scale under development, other measures of meaning in life, wellbeing scales, and a number of scales that we a priori hypothesized would display patterns of correlation that would differentiate among the three subscales of the meaning measure.

Significance, purpose, and coherence. The scale developed in this study, the Three Dimensional Meaning in Life Scale (3DM), consisting of four items for coherence, four items for purpose, and three items for significance were administrated to the participants in both samples. The items were rated on a Likert scale ranging from 1 (not at all true) to 7 (very true). Psychometric properties are discussed in results.

Scales in sample A.

Presence of meaning was measured with Presence of meaning subscale of the Meaning in Life Questionnaire (MLQ-P; Steger et al., 2006) that includes five items (e.g., 'My life has a clear sense of purpose.') evaluated on a scale from 1 (not at all true) to 7 (very true), α = .92.

Five Dimensions of Meaningful Life were measured with the five subscales of Meaningful Life Measure (MLM; Morgan & Farsides, 2009) that includes four items for Valued Life (e.g., I really value my life, α = .92), four items for Purposeful Life (e.g., In my life I have very clear goals and aims, α = .81), five items for Exciting Life (e.g., My life interests and excites me, α = .80), five items for Accomplished Life (e.g., I have been very successful in achieving certain things, α = .93), and five items for Principled Life (e.g., I have a system or framework that allows me to truly understand my being alive, α = .93) evaluated on a scale from 1 (not at all true) to 7 (very true). We also calculated General MLM by aggregating the scores of the five dimensions, α = .94.

Positive and negative affect were measured with Scale of Positive and Negative Experience (SPANE; Diener et al., 2010), which included six items for PA (α = .92), for example, 'Happy', and six items for NA (α = .92), for example, 'Sad', assessed on a scale from 1 (very rarely or never) to 5 (very often or always).

Satisfaction with life was measured with Satisfaction With Life Scale [SWLS] (Diener et al., 1985) that includes five items (e.g., 'I am satisfied with my life') rated on a scale from 1 (strongly disagree) to 7 (strongly agree), α = .93.

Autonomy, competence, and *relatedness* were measured with Basic Need Satisfaction and Frustration Scales (Chen et al., 2015) that includes four items for the satisfaction of each of the three needs, for example, 'I feel a sense of choice and freedom in the things

I undertake' for autonomy (α = .90), 'I feel confident that I can do things well' for competence (α = .91), and 'I feel that the people I care about also care about me' for relatedness (α = .86), rated on a scale ranging from 1 (not at all true) to 7 (very true). Note that relatedness was measured only with three questions due to a mistake in the survey leading to one question missing.

Beneficence was measured with Beneficence Satisfaction Scale (Martela & Ryan, 2016) that includes four items, for example, 'I have been able to improve the welfare of other people', rated on a scale ranging from 1 (not at all true) to 7 (very true), α = .86.

Self-esteem was measured with the 10 items of Rosenberg self-esteem scale (Rosenberg, 1965), for example, 'I take a positive attitude toward myself', rated on a scale ranging from 1 (strongly disagree) to 4 (strongly agree), α = .92.

Dogmatism was measured with the 20 items of DOG scale for dogmatism (Altemeyer, 2002), for example, 'The things I believe in are so completely true, I could never doubt them', evaluated on a scale from 1 (not at all true) to 7 (very true), α = .93.

Spirituality was measured with Daily Spiritual Experiences scale (Idler et al., 2003) that includes six questions, for example, I feel God's presence, answered on a scale from 1 (never or almost never) to 6 (many times a day), α = .97.

Calling was measured with the two items of Brief Calling Scale (Dik et al., 2012), for example, 'I have a calling to a particular kind of work', evaluated on a scale from 1 (not at all true) to 7 (very true), α = .82.

Willingness to sacrifice for one's country was measured with the three items from Routledge and Arndt (2008), for example, 'I would die for the United States of America', rated on a scale ranging from 1 (totally disagree) to 7 (totally agree), α = .72.

Scales in sample B.

Multidimensional Existential Meaning Scale (MEMS; George & Park, 2017) includes five items for comprehension (α = .95), for example, 'My life makes sense', five items for purpose (α = .91), for example, 'I have goals in life that are very important to me', and five items for mattering (α = .79), for example, 'Even a thousand years from now, it would still matter whether I existed or not', rated on a scale from 1 (not at all true) to 7 (very true). We also calculated a General MEMS variable through aggregating the scores on all three dimensions (α = .86).

Vitality was assessed with five items, for example, 'I feel alive and vital.' from *Subjective Vitality Scale* (SVS; Ryan & Frederick, 1997), rated on a scale from 1 (not at all true) to 7 (very true), α = .93.

Depression was assessed with the seven items from the depression subscale of DASS-21 (Lovibond & Lovibond, 1995), e.g., 'I felt down-hearted and blue', rated on a scale from 1 (not at all true) to 7 (very true), α = .95.

Stress was assessed with the seven items from the stress subscale of DASS-21 (Lovibond & Lovibond, 1995), for example, I find myself getting agitated, rated on a scale from 1 (not at all true) to 7 (very true), α = .90.

Self-concept clarity was assessed with the 12 items from Self-Concept Clarity Scale (Campbell et al., 1996), for example, 'In general, I have a clear sense of who I am and what I am', rated on a scale from 1 (not at all true) to 7 (very true), α = .94.

Authenticity was measured with the Authentic Living-subscale of the Authenticity Scale (Wood et al., 2008) that includes four items, for example, 'I always stand by what I believe in', rated on a scale from 1 (not at all true) to 7 (very true), α = .84.

Self-alienation was measured with the Self-Alienation -subscale of the Authenticity Scale (Wood et al., 2008) that includes four items, for exmaple, 'I feel alienated from myself', rated on a scale from 1 (not at all true) to 7 (very true), α = .91.

Purpose in life of Psychological Well-being was rated with seven items from PWB purpose in life subscale (Ryff, 1989), for example, 'Some people wander aimlessly through life, but I am not one of them', rated on a scale from 1 (not at all true) to 7 (very true), α = .80.

Behavioral activation was measured with the sum of the three activation subscales of BIS/BAS scale of behavioral activation (Carver & White, 1994) that included 13 items, for example, 'When I want something I usually go all-out to get it', evaluated on a scale from 1 (very true for me) 4 (very false for me), α = .91.

Reasons for living was assessed with The Brief Reasons for Living Inventory (Ivanoff et al., 1994) that included 12 items as reasons for not killing oneself, for example, 'I consider it morally wrong' rated on a scale from 1 (not at all important) to 6 (extremely important), α = .83.

Results

Psychometric properties of individual items of 3DM scale. In both samples, the means for all 12 items of 3DM scale were below 5.3, the standard deviations were above 1.4, and the skewness and kurtosis values were below 1.0. The Cronbach's alphas for the three factors in samples A/B were good: coherence *α* = .89/.89, purpose *α* = .91/.92, and significance *α* = .89/.91.

Confirming the factor structure. To confirm the separateness of the three dimensions of meaningfulness, we performed in both samples a confirmatory

factor analysis with maximum likelihood and three separate factors, using lavaan package in RStudio 1.0. In sample A, the fit indices of the model (χ^2 (df = 41) = 93.0, CFI = .967, TLI = .956, RMSEA = .086 [.063, .109], SRMR = .033) were acceptable (Marsh et al., 2004), and superior compared to a model where all 11 items loaded on a single factor (χ^2 (df = 44) = 183.1, CFI = .913, TLI = .891, RMSEA = .136 [.116, .157], SRMR = .050). In sample B, the fit indices of the model (χ^2 (df = 41) = 78.5, CFI = .977, TLI = .969, RMSEA = .075 [.050, .100], SRMR = .027) were also acceptable (Marsh et al., 2004), and superior compared to a single-factor model (χ^2 (df = 44) = 147.0, CFI = .937, TLI = .922, RMSEA = .121 [.099, .142], SRMR = .039). The zero-order intercorrelations were high in samples A/B (coherence – purpose r = .80/.80, coherence – significance r = .73/.87, purpose – significance r = .86/.85) signifying the closeness of the constructs.

Convergent validity. To assess convergent validity, we assessed how highly the three subscales correlate with existing measures of general meaning in life (see, Table 3). The three subscales had high correlations with presence of meaning from MLQ scale (Steger et al., 2006; coherence r = .83, purpose r = .85, significance r = .81), with the sum variable of the Meaningful Life Measure (Morgan & Farsides, 2009; coherence r = .81, purpose r = .89, significance r = .89), and with the sum variable of Multidimensional Existential Meaning Scale (George & Park, 2017; coherence r = .88, purpose r = .90, significance r = .92). The three subscales thus seem to tap into the same broad construct as these three scales of general presence of meaning in life.

To assess the unique contribution of each of the three dimensions to general evaluations of meaningfulness, we entered significance, purpose, and coherence subscale scores simultaneously into a regression analysis to predict meaning in life. When using presence of meaning as the dependent variable (F(3, 167) = 218.5, p < .001, R^2 = .793), all three subscales of meaningfulness were independently related to it (coherence β = .393, p < .001, purpose β = .314, p < .001, and significance β = .254, p < .001), demonstrating that despite their high intercorrelations, all three account for unique variance in the general experience of meaningfulness. Similarly, when the sum variable of MLM was used as the dependent variable (F(3, 167) = 357.8, p < .001, R^2 = .863), coherence (β = .214, p < .001), purpose (β = .351, p < .001) and significance (β = .429, p < .001) all had significant relations with it. When the sum variable of MEMS was used as the dependent variable (F(3, 157) = 519.8, p < .001,

Table 3. Means, standard deviations, and correlations of significance, purpose, and coherence with other meaning scales and other scales in study 3.

Sample A	M	SD	MLQ-P	MLM Gen	MLM Exc	MLM Acc	MLM Pri	MLM Pur	MLM Val
Significance	5.059	1.569	.811**	.887**	.698**	.782**	.898**	.725**	.864**
Purpose	5.021	1.461	.845**	.890**	.719**	.788**	.892**	.792**	.788**
Coherence	5.103	1.352	.829**	.808**	.634**	.752**	.784**	.738**	.704**
Sample B			PIL	MEMS Gen	MEMS Com	MEMS Mat	MEMS Pur		
Significance	4.990	1.662	.619**	.922**	.902**	.761**	.787**		
Purpose	5.022	1.486	.625**	.896**	.831**	.679**	.888**		
Coherence	5.016	1.418	.584**	.877**	.929**	.641**	.765**		
Well-being–related variables			PA	NA	LS	Autonomy	Competence	Relatedness	Beneficence
Significance			.725**	−.509**	.687**	.801**	.756**	.643**	.789**
Purpose			.693**	−.475**	.658**	.833**	.769**	.627**	.829**
Coherence			.648**	−.501**	.621**	.797**	.743**	.677**	.760**
Significance-related variables			Spirituality	Sacrifice	Self-esteem	Depression	Reasons to live		
Significance			.333**	.374**	.639**	−.519**	.541**		
Purpose			.298**	.388**	.584**	−.427**	.502**		
Coherence			.141	.295**	.567**	−.484**	.481**		
Purpose-related variables			Calling	Vitality	Behavioral activation				
Significance			.715**	.870**	.285**				
Purpose			.773**	.830**	.320**				
Coherence			.657**	.780**	.231**				
Coherence-related variables			Dogmatism	Stress	Self-clarity	Authenticity	Self-alienation		
Significance			.140*	−.330**	−.286**	.576**	−.246**		
Purpose			.144	−.202*	−.224**	.580**	−.191*		
Coherence			.171*	−.316**	−.333**	.610**	−.275**		

* Correlation is significant at the 0.05 level. ** Correlation is significant at the 0.01 level.
Note. MLQ-P = Presence of Meaning of Meaning in Life Questionnaire, MLM = Meaningful Life Measure
Gen = General, Exc = Exciting life, Acc = Accomplished life, Pri = Principled life, Pur = Purposeful life, Val = Valued life
MEMS = Multidimensional Existential Meaning Scale, Com = Comprension, Mat = Mattering, Pur = Purpose
PIL = Purpose in life from PWB, PA = Positive affect, NA = Negative affect, LS = Life satisfaction

R^2 = .907), coherence (β = .217, p < .001), purpose (β = .363, p < .001) and significance (β = .426, p < .001) all had significant relations with it.

The fact that the three subscales were able to together explain 79%, 86%, and 91% of variance in these three general measures of meaning in life demonstrates that these three dimensions of meaningfulness cover the topic relatively comprehensibly.

Divergent validity. To assess divergent validity, we assessed how highly the three subscales correlated with various well-being related factors given that meaning in life is , typically, closely related to well-being. Accordingly, we examined correlations with the three components of subjective well-being (life satisfaction, positive and negative affect), the three needs of self-determination theory, namely autonomy, competence, and relatedness, and with beneficence (see, Table 3). The results showed relatively high correlations with positive affect (.648 – .725), life satisfaction (.621 – .687), negative affect (–.475 – –.509), relatedness (.627 – .677) but the constructs were still discriminatory from each other. The correlations with autonomy (.797 – .833), competence (.743 – .769), and beneficence (.760 – .829) were surprisingly high given that the content of the constructs seem to be relatively separate. We examine this further in the brief discussion below.

Criterion validity and the separateness of the three dimensions. To examine the criterion validity and the separateness of the three dimensions as predictors of various factors, we hypothesized that each construct would be particularly strongly related to certain other scales. More particularly, we hypothesized that significance would have strongest relations with the valued life subscale of MLM, mattering from MEMS, spirituality, willingness to sacrifice for one's country, self-esteem, depression, and reasons to live. Purpose, in turn, would have the strongest relations with calling, purposeful life from MLM, purpose from MEMS, purpose in life from PWB, vitality, and behavioral activation. Finally, coherence would have the strongest relations with dogmatism, comprehension from MEMS, stress, and authenticity, and self-clarity, and self-alienation. To assess these hypotheses, we examined the correlations between these constructs (see, Table 3). This approach provided 19 instances where stronger correlations were predicted for one subscale than for the other two. Hypotheses were supported for 6/7 comparisons for significance, 5/6 for purpose, and 5/6 for coherence. Following these comparisons, we conducted more stringent analyses by regressing the three subscales simultaneously on these criterion variables in separate regression analyses to examine how much unique variance each of these constructs would predict when controlling for the influence of each other.

As regards constructs that we expected to be especially related to significance, *the valued life of MLM*, when used as a dependent variable ($F(3, 167) = 175.2$, p < .001) had its strongest relationship with significance (β = .690, p < .001), and no significant relations with coherence (β = .115, p = .073) or purpose (β = .104, p = .221). *Mattering* from MEMS, as a dependent variable, had its strongest relation with significance (β = .747, p < .001), and no relations with purpose (β = .146, p = .141) or coherence (β = –.126, p = .241). *Spirituality* as a dependent variable ($F(3, 167) = 9.49$, p < .001) similarly had its only positive and significant relation with significance (β = .351, p = .014), while having a non-significant relation with purpose (β = .245, p = .126) and a negative relation with coherence (β = –.311, p = .010). When *willingness to sacrifice for one's country* was used as a dependent variable, significance (β = .167, p = .236), coherence (β = –.062, p = .602), and purpose (β = .295, p = 064) all had non-significant relations. Using *self-esteem* as the dependent variable, ($F(3, 167) = 41.9$, p < .001), both significance (β = .483, p < .001) and coherence (β = .215, p = .030) were significantly related to it, but purpose wasn't (β = –.002, p = .987). *Depression*, as dependent variable, was negatively related to significance (β = –.451, p = .006), and not related to purpose (β = –.074, p = .570) or coherence (β = –.150, p = .291). *Reasons to live* as a dependent variable was only significantly related to significance (β = .409, p = .011), but not with purpose or coherence (p's > .230).

As regards constructs for which we expected purpose to be most highly related, using *calling* as the dependent variable ($F(3, 167) = 87.3$, p < .001), showed that it indeed had its strongest relation with purpose (β = .550, p < .001), but no significant relationships with significance (β = .179, p = .062) or coherence (β = .087, p = .286). When using *purposeful life* from MLM as the dependent variable ($F(3, 167) = 108.9$ p < .001), it also had its strongest relation with purpose (β = .470, p < .001), while having significant relation also with coherence (β = .275, p < .001) and no relation with significance (β = .119, p = .181). *Purpose* from MEMS, as a dependent variable, had its strongest relation with purpose (β = .752, p < .001), a positive relation also with coherence (β = .148, p = .049) but no relation with significance (p = .804). With purpose in life from PWB as the dependent variable ($F(3, 157) = 38.1$ p < .001), it was significantly related to purpose (β = .335, p = .005) but not with coherence (β = .106, p = .404) or significance (β = .243, p = .095). Using *vitality* as the dependent variable ($F(3, 157) = 194.2$, p < .001), it was significantly related to both purpose (β = .327, p < .001) and significance (β = .582, p < .001), but not

to coherence (β = .013, p = .863). *Behavioral activation*, as dependent variable, was only related to purpose (β = .308, p = .035) and not with coherence or significance (p's > .350).

For constructs that we expected to be especially related to coherence, it turned out that *dogmatism* ($F(3, 167) = 1.70$, p = .169) had no significant relations with any of the three dimensions (p's > .240), even though it's zero-order correlations with coherence (.171) and significance (.140) were significant. *Comprehension* from MEMS, when used as a dependent variable, had its strongest relation with coherence (β = .563, p < .001) but significant relations also with purpose (β = .121, p = .013) and significance (β = .310, p < .001). *Stress*, when used as a dependent variable ($F(3, 157) = 8.45$ p < .001), had a significant negative relation with significance (β = −.428, p = .016), no significant relations with coherence (p = .214), but a positive relation with purpose (β = .314 p = .029). *Authenticity*, when used as a dependent variable, had its strongest relation with coherence (β = .388, p = .003), while being significantly related also with purpose (β = .246, p = .041) but not with significance (p = .841). *Self-alienation* as a dependent variable was only marginally related to coherence (β = −.281, p = .081) and not with purpose or significance (p's > .40). *Self-clarity* similarly was only related to coherence (β = −.381, p = .016) and not with purpose or significance (p's > .30).

Significance and mattering as unified or separate dimensions?

Given our interest to examine whether significance and mattering should be conceptualized as separate dimensions or as part of the same overarching construct, we decided to compare two CFA models using the lavaan package in RStudio 1.4: One with a single overarching factor and the other with two separate factors for significance and mattering.

The fit indices of the model with two factors (χ^2 (df = 19) = 79.6, CFI = .940, TLI = .911, RMSEA = .141 [.110, .173], SRMR = .057) compared favorably with the model with one factor (χ^2 (df = 20) = 114.9, CFI = .906, TLI = .868, RMSEA = .172 [.142, .203], SRMR = .058). Given that the models are nested in each other, a direct comparison is also possible. A Chi square difference test demonstrated that the two-factor model had lower information criteria than the one-factor model (AIC = 4544 vs. 4578, BIC = 4597 vs. 4627) and the Chi Square difference (114.9–79.6 = 35.3, $p = .001$) was significant. The two-factor model thus fit the data significantly better than the one-factor model.

We replicated this comparison, while also including coherence and purpose, thus comparing three models: a three-factor model (coherence, purpose and significance/mattering), a four-factor model (coherence, purpose, significance, mattering), and a sub-facet model (coherence, purpose, significance/mattering, with the latter having two sub-factors: significance and mattering). The fit indices of four-factor model (χ^2 (df = 98) = 205.9, CFI = .954, TLI = .943, RMSEA = .083 [.067, .098], SRMR = .046) and sub-facet model (χ^2 (df = 99) = 210.7, CFI = .952, TLI = .942, RMSEA = .084 [.068, .099], SRMR = .048) were virtually identical, and both compared favorably with a three-factor model (χ^2 (df = 101) = 305.2, CFI = .912, TLI = .896, RMSEA = .112 [.098, .127], SRMR = .056). The Chi square difference test demonstrated that the four-factor model AIC = 8224, BIC = 8341) was superior to the three-factor model (AIC = 8317, BIC = 8425, Chi square = 305.2–205.8 = 99.3, $p = .001$) and slightly better than the sub-facet model (AIC = 8227, BIC = 8341, Chi square = 210.7–205.8 = 4.8, $p = .028$), although the latter difference was very small.

Brief discussion

This study replicated the psychometric properties of the individual items as well as the reliability and factor structure of the 3DM scale in two separate samples and also assessed relations between the new scale and a range of meaning, wellbeing, and conceptually important variables. As demonstration of convergent validity, the study showed that the correlations between each of the three dimensions and three existing meaning in life scales, MLQ-P, the General MLM, and the General MEMS, were all <.80. Furthermore, each dimension contributed unique variance in two separate regression analysis where the three dimensions were set to predict general meaning in life. Together, the three subscales were able to explain 79% of variance in MLQ-P, 86% of variance in the sum variable of MLM, and 91% of variance in the sum variable of MEMS, demonstrating that they cover most of the variance in these constructs, thus providing evidence of their convergent validity as regards measures of meaning in life.

The three subscales of the 3DM scale correlated as expected with life satisfaction, positive affect, negative affect, beneficence, and the three psychological needs for autonomy, competence, and relatedness, although the correlations were higher than expected, especially with autonomy, competence, and beneficence. Given such high correlations, we decided to investigate the correlations between autonomy, competence, and beneficence and established meaning-scales. It turned out

that MLQ Presence correlated with autonomy at .78, with competence at .72, and with beneficence at .78, while MLM General correlated with autonomy at .86, with competence at .80, and with beneficence at .80. It is also worth noting that the three dimensions of 3DM scale had correlations at .80 or above with both MLQ Presence, MLM General, and General MEMS, thus demonstrating highest correlations with the other meaning-specific scales. The high correlations with autonomy, competence, and beneficence were thus not artifacts of the specific items of 3DM scale but rather autonomy, competence, and beneficence had unusually high correlations in this study with meaning-related constructs in general. Autonomy, competence, and beneficence thus seem to be quite integral to the experience of meaning in life, as suggested by previous research (Martela & Riekki, 2018; Martela et al., 2018).

As regards criterion validity and the separateness of the three dimensions, we observed that a priori hypotheses were supported for 16 out of 19 planned comparisons of the strength of correlations among the three dimensions and selected variables. In addition, we regressed the three subscales of meaning on each of these variables for a more stringent test. The results of the regression analyses showed that for constructs hypothesized to be especially related to significance, significance indeed had the strongest relationship in 6/7 of the regressions, and in 5 cases (e.g., valued life, depression, and reasons to live) it was the only subscale having a significant relationship with the dependent variable. It is worth noting that in these regressions, coherence had a significant, yet negative relationship with spirituality, and purpose had a significant positive relation with stress, which are surprising findings, but may be the results of a suppression effect given the relatively high correlations between the subscales. For constructs hypothesized to be especially related to purpose, purpose had the strongest relationship in 5/6 of the regressions, and in 3 cases (purpose in life from PWB, calling, and behavioral activation) it was the only subscale having a significant relationship with the dependent variable. For constructs hypothesized to be especially related to coherence, it had the strongest relationship in 4/6 of the regressions, and in one case (self-clarity) it was the only subscale having a significant relationship with the dependent variable. Accordingly, given that a large majority of the predictions about which subscale of meaning would have the strongest relationship with which criterion variables turned out as expected, the pattern of results reported in Study 3 demonstrates that the three dimensions are separable and have expected and unique relationships with other variables.

Finally, when examining the potential separateness of significance and mattering, a comparison between two CFA models, one with two factors, the other with one factor, provided empirical support that the two dimensions are distinct. When examining significance and mattering along with coherence and purpose, the CFA favored a four-factor model and a sub-factor model over a three-factor model, with the differences between the four-factor and sub-factor model very marginal. The data thus supports seeing significance and mattering as highly correlated, yet to some degree separate dimensions, perhaps best seen as sub-facets of the same overarching factor. We continue this investigation in Study 5.

Study 4

The third study showed that the three subscales of the 3DM scale correlated in sensible ways with other constructs, demonstrating distinct patterns of relations when the three dimensions of significance, purpose, and coherence were competing for variance in a regression analysis. When taken into consideration the unanimous support for a three-factor structure across all samples, there were many indicators that the three dimensions could be distinguished. However, the high zero-order intercorrelations among the three dimensions prompted an interest in using experimental, rather than measurement, methods to explore their distinctiveness.

Participants and procedures

Participants were prompted to read brief vignettes of 'John Smith's' life and then answer a brief survey about the meaningfulness of his life, which included the items for the three dimensions of meaning. The study included three conditions, where the life details of John Smith had been altered to emphasize one of the three dimensions, with the hypothesis that participants rating John Smith's life in a condition where a certain dimension of meaning was especially high should rate the sense of that dimension of meaning higher compared to the two other condition, thus demonstrating that people use the three dimensions naturally and independently in evaluating life. A power analysis indicated that a sample size of 280 would be required to detect a small effect in an *F* test with three groups, desired power of .80, and alpha at .05. Accordingly, to account for potential errors in data collection, we aimed to recruit 100 participants per condition. The sample of US participants was gathered through Mturk in accordance with the

recommendations of the Research Ethics Committee of the Aalto University. In accordance with the Declaration of Helsinki, we sought informed consent from all study participants, and they gave their consent anonymously in the online form.

In total, 378 participants from US answered the whole survey. However, we had substantial attrition due to poor performance on two inattention check questions: 'John Smith has no kids', and 'John Smith works as a dentist.' Both statements were false, and data were deleted for participants who failed to answer 'not at all true' to either of them. This resulted in a final sample of 241, with 75 in the high significance condition, 79 in high purpose condition, and 87 in high coherence condition. Participants were 58% male, 42% female, and 0.4% other, with the ethnicity of the participants being predominantly (80%) Caucasian, with 10% Asian or Asian American, 4% Black or African American, 4% Hispanic or Latino, and 2% other. The age range was from 20 to 89 with the average age being 38.

Vignettes

All participants first read a brief general story about John Smith, telling that he is a 45-year-old accountant living in Minneapolis, living with his wife and two children. As regards the rest of John Smith's story, they were randomly assigned to one of three groups, with each group reading different stories. Each story featured three paragraphs, each paragraph focusing on one of the dimensions in the following orders: 1) Low coherence – Low purpose – High significance – story, 2) Low coherence – Low significance – High purpose – story, or 3) Low purpose – Low significance – High coherence – story. Low coherence paragraph emphasized, for example, how John Smith has 'had a hard time grasping what is happening around him', while high coherence paragraph explained how he 'feels that currently everything is under control in his life.' Low purpose paragraph talked about how he has 'a hard time to find any targets to strive for in his work', while high purpose paragraph explained how his 'work provides him with valuable and clear targets to pursue in life.' Low significance paragraph noted, for example, how recently he has had 'a harder time to understand what value his life ultimately has, if any', while high significance paragraph explained how there are several things in his life that 'makes his life good.' The full vignettes can be found in *Appendix 2*. After having read the story, participants in all three conditions were asked to think about John Smith's life, and answer the items based on how true they are as regards his life.

Measures

After having read the story, the participants were asked to think about John Smith's life, and answer the following items based on how true they are as regards his life. The items were modified to talk about John Smith, e.g., 'John Smith is highly committed to certain core goals in his life.'

Significance, purpose, and coherence. The 11 items of 3DM scale were administrated to the participants to measure significance, coherence, and purpose. The items were rated on a Likert scale ranging from 1 (not at all true) to 7 (very true). The reliabilities were .84 for coherence, .85 for purpose, and .71 for significance.

Presence of meaning in life. Participants were asked to rate four items of the Presence subscale of Meaning in Life Questionnaire (MLQ-P; Steger et al., 2006) as regards John Smith's life, evaluated on a scale from 1 (not at all true) to 7 (very true) $\alpha = .83$.

Life satisfaction. Participants were asked to rate the five items (e.g., 'I am satisfied with my life') of *Satisfaction with Life Scale* (SWLS; Diener et al., 1985) as regards John Smith's life, evaluated on a scale from 1 (not at all true) to 7 (very true), $\alpha = .83$.

Results

Examining the zero-order correlations across conditions (see, Table 4) demonstrated that the intercorrelations among the three subscales were lower in this study (between .45 and .57) than in the previous study, lending support for their separateness. All three subscales had relatively high correlations with MLQ Presence and life satisfaction, as expected.

To examine the differences in the three dimensions of meaning across conditions, we conducted one-way Analysis of Variance tests for all dependent variables, using Tukey's post-hoc test to identify any specific differences. The results demonstrated that there was no difference in life satisfaction between the conditions. However, for significance, purpose, and coherence, and MLQ-Presence, the ANOVA revealed a significant difference between conditions (see, Table 5).

Table 4. The zero-order intercorrelations among study variables across conditions in study 4.

	Significance	Purpose	Coherence	MLQ-P
Significance				
Purpose	.559**			
Coherence	.570**	.450**		
MLQ-Presence	.676**	.631**	.632**	
Life satisfaction	.648**	.501**	.644**	.556**

*** Correlation is significant at the 0.01 level (2-tailed).*

Table 5. The means in different conditions and the results of the analysis of variance in study 4.

	Condition			Anova			
Dependent variable	High Significance	High Purpose	High Coherence	*F*	df	p	η^2
	N = 75	N = 79	N = 87				
Sense of Significance	4.57a	4.08b	3.75b	9.19	(2, 238)	> .001	.072
Sense of Purpose	4.32a	4.71a	3.55b	18.05	(2, 238)	> .001	.132
Sense of Coherence	3.66a	3.15b	3.75a	5.18	(2, 238)	.006	.042
MLQ-Presence	3.85a	3.49a	2.81b	14.46	(2, 238)	> .001	.108
Life satisfaction	4.02	3.73	3.74	1.62	(2, 238)	.201	.013

Means with different subscripts are significantly different from each other

Tukey's post-hoc test revealed that coherence was significantly higher in high coherence condition (95% CI for mean difference [.1315, 1.071], p = .008) and high significance condition (CI [.0272, 1.002], p = .036) as compared to high purpose condition, with no significant difference between these two conditions (p = .904). Purpose was significantly higher in high purpose condition (CI [.6906, 1.6173], p < .001) and high significance condition (CI [.3018, 1.2414], p < .001) as compared to the high coherence condition, with no significant difference between these two conditions (p = .148). Significance was significantly higher in the high significance condition as compared to both coherence condition (CI [.3649, 1.1263], p < .001) and purpose condition (CI [.0333, .9526], p = .032), with no significant difference between high coherence and high purpose conditions (p = .204). MLQ-Presence was significantly higher in high purpose condition (CI [.2156, 1.1384], p = .002) and high significance condition (CI [.5752, 1.5108], p < .001) as compared to high coherence condition, with no significant difference between these two conditions (p = .171).

Brief discussion

The present study asked participants to read vignettes of John Smith's life in three separate conditions, where the description of that life was designed to be especially high on significance, purpose, and coherence, respectively. The results gave some support for these manipulations being successful in targeting the intended dimension of meaning. Evaluations of coherence were highest in the high coherence group, with that difference being significant as compared to the high purpose group. Evaluations of purpose were highest in the high purpose group, with that difference being significant as compared to the high coherence group. And evaluations of significance were highest in the high significance group, with that difference being significant as compared to both the high coherence and the high purpose groups.

There were unexpected significant results, including sense of purpose being higher in the high significance condition compared to the high coherence condition, and sense of coherence being higher in the high significance condition compared to the high purpose condition. This means that sense of purpose and sense of coherence emerged as clearly separated from each other, based on these manipulations. The significance condition, however, while increasing especially ratings of significance, appeared to influence also evaluations of coherence and purpose positively. It could be that the vignettes did not sufficiently eliminate information relevant to significance judgments, or it could be that significance is a stronger indicator of general meaningfulness than the other two dimensions. Perhaps sense of significance gives the strongest 'gut feeling' of life being meaningful, thus spilling over to higher evaluations of other meaning-related factors as well. Significance is examined further in Study 5.

Study 5

The fourth study examined whether significance is distinct from coherence and purpose. The aim of this study was to examine the other important distinction, whether significance is different from mattering. For this purpose, we measured both constructs as well as a number of variables that we a priori hypothesized would be differently related to significance and mattering, based on the theoretical understanding of these constructs. In particular, we hypothesized that mattering, in being about the human being having value in the world and the grand scale of things, would be particularly related to sense of belonging, greater good motivation, religiosity, lack of atheism, and belief in afterlife. Significance, in being more about personal significance attached to one's life, would be particularly related to satisfaction with life, self-esteem, and a sense of valued life.

Participants and procedures

The sample for this study was gathered from a pool of UK participants through Prolific, in accordance with the recommendations of the Research Ethics Committee of the Aalto University. We sought informed consent from all study participants, and they gave their consent anonymously in the online form. The sample consisted initially of 349 participants but prior to any analysis we excluded 13 participants who failed to provide the right answer to the inattention check question for a final sample size of 336 participants (74% female, 26% male; 90% White, 4% Black, 3% Asian, 2% Mixed; 18 to 69 years of age with average of 33).

Measures

Significance. Significance was measured with the three items of the Significance subscale of the 3DM. The items were rated on a scale ranging from 1 (very strongly disagree) to 7 (very strongly agree), α = .78.

Mattering, purpose, and comprehension. The Multidimensional Existential Meaning Scale (MEMS; George & Park, 2017) was used to measure mattering (5 items, α = .88), purpose (5 items, α = .88), and comprehension (5 items, α = .86). The items were rated on a scale ranging from 1 (very strongly disagree) to 7 (very strongly agree).

Valued Life. Valued life was measured with the Valued Life subscale of Meaningful Life Measure (MLM; Morgan & Farsides, 2009) that included four items (e.g., I really value my life) evaluated on a scale ranging from 1 (very strongly disagree) to 7 (very strongly agree), α = .89.

Self-esteem was measured with the five items of the Brief version of the Rosenberg self-esteem scale (Monteiro et al., 2022; Rosenberg, 1965), e.g., 'I take a positive attitude toward myself', rated on a scale ranging from 1 (strongly disagree) to 4 (strongly agree), α = .86.

Satisfaction with life was measured with Satisfaction With Life Scale [SWLS] (Diener et al., 1985) that includes five items (e.g., 'I am satisfied with my life') rated on a scale from 1 (strongly disagree) to 7 (strongly agree), α = .87.

Sense of Belonging. Sense of belonging was measured with the five items (e.g., 'I feel like there are many people with whom I belong') from Lambert et al. (2013) rated on a scale ranging from 1 (very strongly disagree) to 7 (very strongly agree), α = .84.

Greater Good Motivation. Greater good motivation was measured with the Greater Good Motivation subscale of the Work and Meaning Inventory (Steger et al., 2012) that included three items (e.g., 'I know my work makes a positive difference in the world') rated on a scale ranging from 1 (very strongly disagree) to 7 (very strongly agree), α = .86.

Religiosity, Atheism, and Afterlife. Religiosity was measured with the one-item religiosity scale ('I see myself as someone who is very religious') from Gebauer et al. (2014) and three items (e.g., 'My faith involves all of my life') from Hoge (1972), which were combined into one four-item scale (α = .52) evaluated on a scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). Atheism was measured with one item ('I don't believe in God or in anything supernatural'), and belief in afterlife was measured with two items ('Earthly existence is the only existence we have' and 'There must be an afterlife of some sort', α = .80) taken from Scott et al. (2021).

Results

We started by examining the zero-order correlations between significance, mattering, comprehension, and purpose (see, Table 6). Significance correlated .722 with mattering, .677 with comprehension, and .473 with purpose. Mattering correlated .504 with comprehension, and .360 with purpose. Comprehension and purpose correlated at .352. Significance thus had relatively high correlations with both mattering and comprehension.

Table 6. The zero-order intercorrelations among study variables in study 5.

	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.
(1) Significance											
(2) Mattering	.722**										
(3) Purpose	.473**	.360**									
(4) Comprehension	.677**	.504**	.352**								
(5) Satisfaction	.595**	.415**	.358**	.597**							
(6) Self-esteem	.705**	.505**	.399**	.662**	.628**						
(7) Valued life	.842**	.657**	.426**	.647**	.607**	.745**					
(8) Greater good	.540**	.610**	.409**	.437**	.377**	.434**	.517**				
(9) Belonging	.663**	.473**	.393**	.575**	.483**	.637**	.699**	.341**			
(10) Religiosity	.132*	.315**	.081	−.008	−.028	−.012	.094	.209**	.074		
(11) Atheism	−.049	−.256**	−.039	.145**	.031	.138*	.036	−.145**	.018	−.507**	
(12) Belief in afterlife	.127*	.364**	.124*	−.099	.017	−.070	.030	.257**	.057	.473**	−.760**

** Correlation is significant at the 0.05 level. ** Correlation is significant at the 0.01 level.*

Next, we examined the factor structure of significance and mattering by comparing two models using the lavaan package in RStudio 1.4: One with a single overarching factor and the other with two separate factors. The fit indices of the model with two factors (χ^2 (df = 19) = 109.3, CFI = .942, TLI = .915, RMSEA = .119 [.098, .141], SRMR = .049)[1] compared favorably with the model with one factor (χ^2 (df = 20) = 119.6, CFI = .936, TLI = .911, RMSEA = .122 [.101, .143], SRMR = .054), although the differences in fit were not large. The models are, however, nested in each other, allowing for a direct comparison. A Chi square difference test demonstrated that the two-factor model had lower information criteria than the one-factor model (AIC = 7978.7 vs. 7987.1, BIC = 109.3 vs. 119.6) and the Chi Square difference (119.6–109.3 = 10.4, p = .001) was significant. The two-factor model thus fit the data better than the one-factor model.

We replicated this analysis while also including comprehension and purpose. This time we compared a three-factor model with comprehension, purpose, and significance/mattering with a four-factor model with comprehension, purpose, significance, and mattering. This time, the fit indices of the model with four factors (χ^2 (df = 129) = 391.9, CFI = .926, TLI = .912, RMSEA = .078 [.069, .087], SRMR = .069)[2] compared favorably with the model with three factors (χ^2 (df = 132) = 465.7, CFI = .906, TLI = .891, RMSEA = .087 [.078, .095], SRMR = .084). However, we also tested a third model with three factors: comprehension, purpose, and significance/mattering, the latter comprising of two subfacets of significance and mattering, This model had virtually the same fit as the four-factor model: (χ^2 (df = 130) = 392.0, CFI = .926, TLI = .913, RMSEA = .077 [.069, .086], SRMR = .069). A Chi square difference test demonstrated that the sub-facet model (AIC = 16384, BIC = 16541) and the four-factor model (AIC = 16386 BIC = 16547) had lower information criteria than the three-factor model (AIC = 16454 BIC = 16603) and the Chi square difference (465.7–391.9 = 73.8, p < .001) between four-factor and three-factor models was significant. However, the Chi square difference (391.97–391.91 = .061, p = .805) between the four-factor and the sub-facet model was not significant. The four-factor model and the sub-facet model thus fit the data better than the three-factor model.

Comparing significance and mattering as predictors of other variables. A second way to examine the separateness of significance and mattering is to examine both as predictors of various target variables. Significance, as noted, was hypothesized to be particularly strongly related to life satisfaction, self-esteem, and a sense of valued life. Mattering, in turn, was hypothesized to be particularly strongly related to sense of belonging, greater good motivation, religiosity, lack of atheism, and belief in afterlife. To start examining these hypotheses, we observed the correlations between the constructs (see, Table 6). As can be seen, significance had higher correlations than mattering with life satisfaction, self-esteem, and valued life. Mattering, in turn, had higher correlations than significance with religiosity, lack of atheism, belief in afterlife, and greater good motivation. Sense of belonging, unlike we predicted, had higher correlation with significance.

As a more stringent analysis, and in order to assess the unique contribution of significance and mattering to these target variables, we entered both simultaneously into a regression analysis using different dependent variables to examine how much unique variance significance and mattering would predict when controlling for the influence of each other. When using life satisfaction as the dependent variable (F(2, 333) = 91.6, p < .001, R^2 = .351), significance was strongly related to it (β = .617, p < .001) but mattering was not (β = −.031, p = .632). Similarly, when using self-esteem as the dependent variable (F(2, 333) = 165.0, p < .001, R^2 = .495), significance was strongly related to it (β = .711, p < .001) but mattering was not (β = −.008, p = .893). As regards valued life (F(2, 333) = 416.4, p < .001, R^2 = .713), significance was strongly related to it (β = .768, p < .001) and mattering also had a weak positive relation with it (β = .102, p = .016).

Using religiosity as the dependent variable, (F(2, 333) = 22.3, p < .001, R^2 = .113), mattering was significantly related to it (β = .459, p < .001) but significance surprisingly had a negative relation to it (β = −.200, p = .008), which could indicate some kind of suppression effect, given the small, positive zero-order correlation between the variables 132. In similar vein, using atheism as the dependent variable (F(2, 333) = 19.3, p < .001, R^2 = .098), mattering was negatively related to it (β = −.460, p < .001) while significance was positively related to it (β = .283, p < .001), which again could be a suppression effect, given the non-significant (−.049) zero-order correlation between significance and atheism. Similarly, when using belief in afterlife as a dependent variable (F(2, 333) = 34.4, p < .001, R^2 = .166), mattering was quite strongly related to it (β = .568, p < .001), while significance had a negative relation with it (β = −.283, p < .001), again probably due to a suppression effect given the small positive correlation (.127) between the variables. Interestingly, when belonging was used as the dependent variable, (F(2, 333) = 130.6, p < .001, R^2 = .436), significance was strongly related to it (β = .671, p < .001) but mattering was not (β = −.011, p = .852). Finally, when greater good

motivation was used as the dependent variable ($F(2, 333) = 107.6$, $p < .001$, $R^2 = .389$), both mattering ($\beta = .460$, $p < .001$) and significance ($\beta = .208$, $p = .001$) were positively related to it.

Brief discussion

The aim of this study was to examine the potential separateness of significance and mattering. When comparing one unified factor with two separate factors utilizing CFA, the fit indices and the Chi square test clearly favored the two-factor solution. This was true both when just the two factors were included, and when including comprehension and purpose besides them. Factor analysis thus suggests that the two dimensions should be treated as separate. However, comparing the four-factor solution with a factor structure where significance and mattering were sub-facets of a more general factors, the fit indices were virtually identical. CFA thus lends empirical support for either treating the two as separate dimensions or as treating them as two sub-facets of a broader significance/mattering dimension.

When examining mattering and significance as competing predictors of various target variables of interest, we found additional support for their separateness. When both were set to predict life satisfaction, self-esteem, and valued life in regression analyses, significance had very strong relations with these three variables, while mattering had non-significant (life satisfaction, self-esteem) or very weak relations (valued life) to them. Significance thus seems to be more closely connected with these variables that indicate general satisfaction and valuing of life and oneself. In contrast, in predicting religiosity, (lack of) atheism, and belief in afterlife, mattering had a clear positive relation with them, while significance had mainly negative relations with them, probably due to a suppression effect. Mattering thus seemed to be more clearly related to these religion-related variables. Mattering was also more strongly related to greater good motivation, although significance also had an independent positive relation with it. As regards belonging, we got the opposite result from what we expected: Significance was positively related to it but mattering had no relation with it, when the influences of each other were controlled for. Perhaps belonging, in relating to one's close social relationships, is enough to imbue a sense of personal significance but not one of cosmic mattering.

All in all, although the zero-order correlation (.722) between significance and mattering indicates much similarity, the factor analysis and the regression analyses indicated that the two factors can be empirically separated, with meaningful predictive patterns. Interestingly, the correlation between significance and comprehension (.677) was almost at the same level as the above-cited correlation with mattering, while mattering and comprehension correlated at .504. Significance thus might capture something broader than mattering and comprehension, as it correlates highly with both of these dimensions. The relations among significance, comprehension, purpose, and mattering thus merit further investigation, with this study indicating much overlap but also a degree of separation between significance and mattering.

General discussion

To initiate an empirical examination of the three theoretically central dimensions of meaning – significance, purpose, and coherence (Heintzelman & King, 2014; Martela & Steger, 2016) – we developed new scales to measure these three dimensions and examined the scales' psychometric properties in the first two studies of the present paper. The exploratory factor analysis in Study 1 demonstrated that the items clearly split into three factors with the individual items loading strongly on their expected factors. In Study 2 the final scale was examined with confirmatory factor analysis, which fitted the data well, and compared favorably to a model where all items were part of one overall factor. Also, the internal consistency of all three dimensions was good, with Cronbach's Alpha's at .90 or above. Study 3 confirmed the good fit of the factor structure and demonstrated that all three dimensions correlated highly (typically above .80) with existing measures of meaning in life, and each predicted unique variance in these general measures of meaning in life, together predicting 79% or more of the variance in general measures of meaning in life. Thus, these three dimensions seem to cover the topic relatively comprehensibly. The three dimensions also had correlations in the expected direction with various indicators of ill-being and well-being. The Three Dimensional Meaning in Life Scale (3DM) was thus concluded to be a well-functioning measure to assess significance, purpose, and coherence.

As regards the separateness of significance, purpose, and coherence, besides the factor analytic evidence of separateness in Studies 1, 2, and 3, the unique predictive power of each of the three dimensions was demonstrated in Study 3, when they were pitted against each other as predictors of variables that were theoretically thought to be particularly related to one specific dimension of meaning. It was shown that all had mostly expected relations with these constructs, with significance being the only positive predictor of mattering, valued life, spirituality, depression, and reasons to live, purpose being the only positive predictor of calling, behavioral activation and purpose in life from PWB, and coherence being the only predictor of self-clarity. All in all, our a priori hypotheses were supported for 16 out of 19 planned correlational

comparisons and 15 out of 19 planned regression comparisons, thus demonstrating the separate predictive power of each of the three dimensions and that they were related to the expected factors.

Study 4 randomly assigned participants to read vignettes targeting different dimensions of meaning to examine whether participants would evaluate the vignette aiming to be high in a certain dimension of meaning as actually higher in that dimension of meaning. The evaluations of coherence were highest in the high coherence group, evaluations of purpose were highest in the high purpose group, and evaluations of significance were highest in the high significance group, and these differences were statistically significant against at least one other group, thus lending support for people's ability to separate life situations high in significance, coherence, and purpose. However, there were also some 'spill-over effects' in the sense that in the high significance condition sense of purpose was higher than in the coherence conditions, and sense of coherence was higher than in the purpose condition. While sense of purpose and coherence thus emerged as clearly separate, the significance condition appeared to increase not only significance evaluations but to a smaller degree also sense of coherence and purpose. Overall, our studies thus show experimental support for treating significance, purpose, and coherence as separate constructs that can be examined as independent dimensions of meaning in life.

As for our final research question as regards the separateness of significance and mattering, in Study 3 a comparison between a model where they were merged together with a model where the items for them were kept separate gave factor analytic support for seeing them as separate. When examining the two dimensions along with coherence and purpose, the three-factor solution where significance and mattering were merged together was inferior to both a four-factor solution and a sub-factor solution, where significance and mattering were modelled as two sub-facets of one overarching factor of significance/mattering. These results were replicated in Study 5, further confirming that in factor analysis significance and mattering are best seen as either separate factors or as sub-facets of one overarching factor. In this study, we also examined significance and mattering by pitting them against each other as predictors of various constructs theoretically thought to be particularly related to one of them. The results showed that while significance had strong relationships with life satisfaction, self-esteem, and valued life, mattering only had a weak relationship with valued life and no relationship with life satisfaction or self-esteem, when the influence of significance was controlled for. In contrast, mattering had clear relations with religiosity, lack of atheism, and belief in afterlife, while significance had small or non-significant zero-order correlations with them, and even negative relations with them when mattering was controlled for, probably due to suppression effects. Significance thus seems to be more related to constructs indicating general satisfaction and valuing of life and oneself, while mattering seems to be more related to constructs having to do with religiosity.

One way to interpret these results is to suggest that significance and mattering are two sub-facets of a more general dimension of significance/mattering. Following recent proposals for hierarchical models of well-being (Conway et al., 2019; Disabato et al., 2021; Goodman et al., 2021), and analogously to established hierarchical structures in personality (DeYoung et al., 2007) and intelligence (Carroll, 1993) literatures, one could thus propose that meaning in life consists of a single, higher-order concept of general MIL, currently divided to three dimensions of coherence, purpose, and significance/mattering, with the latter further being separated into two sub-facets of significance and mattering. Such a hierarchical structure would also fit with the fact that even the three dimensions of purpose, coherence, and significance/mattering are sometimes empirically quite close to each other, making their disentanglement difficult. In study 3, their zero-order inter-correlations were in some cases above .80, despite the scale items having been chosen based on not having too strong cross-loadings in the previous studies. In study 4, in contrast, examination of zero-order correlations among the three dimensions across conditions showed them to be below .60, better supporting their separateness. Personality research has identified five domains (the Big Five), each consisting of a number of facets, which further break down to various nuances (e.g., Mõttus et al., 2017; Soto & John, 2017), and we call for more research to examine the potentially hierarchical structure of meaning in life. We propose that the current research supports three dimensions – coherence, purpose, and significance/mattering – with the latter potentially separable into two sub-facets of significance and mattering. Nevertheless, given that this is the first study to examine empirically such a structure, more research is needed before firm conclusions about the dimensions and sub-facets of meaning in life can be made.

We acknowledge certain limitations of the present study. First, four samples were drawn from the US population utilizing Mturk, and the fifth from UK utilizing Prolific, elevating the importance of research in non-English cultural contexts and with other data collection methods to examine the generalizability of the present findings. Second, the vignettes might have signaled white, heterosexual culture, which might have reduced the ability for

some participants to take the perspective of John Smith. Third, while the study 4 randomly assigned the participants into three groups to read different vignettes, the other four studies were cross-sectional. Future research should examine the relations among the dimensions of meaning longitudinally to examine how they predict each other and a general sense of meaning over time. It would also be interesting to pit significance and mattering against each other as longitudinal predictors of general sense of meaning in life to see whether mattering would still emerge as the most important predictor of meaning (Costin & Vignoles, 2020). Fourth, the intercorrelations among the dimensions of meaning remained high, especially in some of the studies, calling for more research examining how well they can be separated. Here additional experiments are called for as well as studies with greater ecological validity to determine if any of the identified dimensions are more sensitive to daily life events. Fifth, while coherence, purpose, significance, and mattering have been much discussed lately, it is worth noting that other conceptualizations of meaning exist as well. For Wong (2010, 2012) proposes that there are four essential constituents of meaning in life: Purpose, understanding, responsibility, and enjoyment. The latter two don't find their correspondents among the trichotomies explored here, making it important for future research to explore how significance is related to responsibility and enjoyment. Finally, given how lack of meaning has been associated with depression and suicide ideation, future research should examine whether any specific dimension of meaning would be especially useful as a buffering factor against such negative outcomes in general and clinical settings.

Conclusion

The field is moving toward multidimensional, and particularly three-dimensional, understandings of meaning in life. Yet, empirical investigations of these models are quite new, and scarce. Significance has been suggested to be one of the key dimensions of meaning in life. In the first empirical examination of significance along with other dimensions of meaning, we constructed psychometrically sound scales to assess significance, purpose, and coherence, and demonstrated that they can be separated empirically, despite still having high inter-correlations and thus being relatively closely related empirically. The present results and the scales constructed open up the empirical inquiry around significance, and extend much needed research on the other potential dimensions of purpose, coherence, and mattering, and we look forward to further examinations of their separate predictive power as well as the complex organization and interrelations among them.

Notes

1. An examination of the modification indices suggested a strong link between two items for significance. Allowing their residual variances to correlate further improved the fit of the model (χ^2 (df = 18) = 37.6, CFI = .987, TLI = .980, RMSEA = .057 [.031, .083], SRMR = .024).
2. An examination of the modification indices suggested a strong link between two items for significance. Allowing their residual variances to correlate further improved the fit of the model (χ^2 (df = 128) = 351.2, CFI = .937, TLI = .925, RMSEA = .072 [.063, .081], SRMR = .070).

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

The author(s) reported there is no funding associated with the work featured in this article.

ORCID

Frank Martela http://orcid.org/0000-0001-8664-551X
Michael F. Steger http://orcid.org/0000-0003-4888-1153

Data availability statement

Data available on request from the authors.

References

Altemeyer, B. (2002). Dogmatic behavior among students: Testing a new measure of dogmatism. *The Journal of Social Psychology; Philadelphia*, *142*(6), 713–721. https://doi.org/10.1080/00224540209603931

Battista, J., & Almond, R. (1973). The development of meaning in life. *Psychiatry*, *36*(4), 409–427. https://doi.org/10.1080/00332747.1973.11023774

Buhrmester, M. D., Talaifar, S., & Gosling, S. D. (2018). An evaluation of Amazon's mechanical turk, its rapid rise, and its effective use. *Perspectives on Psychological Science*, *13*(2), 149–154. https://doi.org/10.1177/1745691617706516

Campbell, J. D., Trapnell, P. D., Heine, S. J., Katz, I. M., Lavallee, L. F., & Lehman, D. R. (1996). Self-concept clarity: Measurement, personality correlates, and cultural boundaries. *Journal of Personality and Social Psychology*, *70*(1), 141–156. https://doi.org/10.1037/0022-3514.70.1.141

Carroll, J. B. (1993). *Human cognitive abilities—A survey of factor-analytic studies*. Cambridge University Press.

Carver, C. S., & White, T. L. (1994). Behavioral inhibition, behavioral activation, and affective responses to impending reward and punishment: The BIS/BAS scales. *Journal of Personality and Social Psychology*, *67*(2), 319. https://doi.org/10.1037/0022-3514.67.2.319

Chen, B., Vansteenkiste, M., Beyers, W., Boone, L., Deci, E. L., Deeder, J., Ryan, R. M., Ryan, R. M., Ryan, R. M., Ryan, R. M., Sheldon, K. M., Verstuyf, J., Verstuyf, J., Verstuyf, J., & Verstuyf, J. (2015). Basic psychological need satisfaction, need frustration, and need strength across four cultures. *Motivation and Emotion*, *39*(2), 216–236. https://doi.org/10.1007/s11031-014-9450-1

Cohen, R., Bavishi, C., & Rozanski, A. (2016). Purpose in life and its relationship to all-cause mortality and cardiovascular events: A meta-analysis. *Psychosomatic Medicine*, *78*(2), 122–133. https://doi.org/10.1097/PSY.0000000000000274

Conway, C. C., Forbes, M. K., Forbush, K. T., Fried, E. I., Hallquist, M. N., Kotov, R., Mullins-Sweatt, S. N., Shackman, A. J., Skodol, A. E., South, S. C., Sunderland, M., Waszczuk, M. A., Zald, D. H., Afzali, M. H., Bornovalova, M. A., Carragher, N., Docherty, A. R., Jonas, K. G., Krueger, R. F., … Eaton, N. R. (2019). A hierarchical taxonomy of psychopathology can transform mental health research. *Perspectives on Psychological Science*, *14*(3), 419–436. https://doi.org/10.1177/1745691618810696

Costin, V., & Vignoles, V. L. (2020). Meaning is about mattering: Evaluating coherence, purpose, and existential mattering as precursors of meaning in life judgments. *Journal of Personality and Social Psychology*, *118*(4), 864–884. https://doi.org/10.1037/pspp0000225

DeYoung, C. G., Quilty, L. C., & Peterson, J. B. (2007). Between facets and domains: 10 aspects of the big five. *Journal of Personality and Social Psychology*, *93*(5), 880. https://doi.org/10.1037/0022-3514.93.5.880

Diener, E., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, *49*(1), 71–75. https://doi.org/10.1207/s15327752jpa4901_13

Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social Indicators Research*, *97*(2), 143–156. https://doi.org/10.1007/s11205-009-9493-y

Dik, B. J., Eldridge, B. M., Steger, M. F., & Duffy, R. D. (2012). Development and validation of the calling and vocation questionnaire (CVQ) and brief calling scale (BCS). *Journal of Career Assessment*, *20*(3), 242–263. https://doi.org/10.1177/1069072711434410

Disabato, D. J., Goodman, F., & Kashdan, T. B. (2021). A hierarchical framework for the measurement of well-being. *PsyArXiv Preprints*. https://doi.org/10.31234/osf.io/5rhqj

Floyd, F. J., & Widaman, K. F. (1995). Factor analysis in the development and refinement of clinical assessment instruments. *Psychological Assessment*, *7*(3), 286–299. https://doi.org/10.1037/1040-3590.7.3.286

Gebauer, J. E., Bleidorn, W., Gosling, S. D., Rentfrow, P. J., Lamb, M. E., & Potter, J. (2014). Cross-cultural variations in big five relationships with religiosity: A sociocultural motives perspective. *Journal of Personality and Social Psychology*, *107*(6), 1064–1091 https://doi.org/10.1037/a0037683 doi:.

George, L. S., & Park, C. L. (2013). Are meaning and purpose distinct? An examination of correlates and predictors. *The Journal of Positive Psychology*, *8*(5), 365–375. https://doi.org/10.1080/17439760.2013.805801

George, L. S., & Park, C. L. (2014). Existential mattering: Bringing attention to a neglected but central aspect of meaning? In A. Batthyany & P. Russo-Netzer (Eds.), *Meaning in positive and existential psychology* (pp. 39–51). Springer.

George, L. S., & Park, C. L. (2016). Meaning in life as comprehension, Purpose, and Mattering: Toward integration and new research questions. *Review of General Psychology*, *20*(3), 205–220. https://doi.org/10.1037/gpr0000077

George, L. S., & Park, C. L. (2017). The multidimensional existential meaning scale: A tripartite approach to measuring meaning in life. *The Journal of Positive Psychology*, *12*(6), 613–627. https://doi.org/10.1080/17439760.2016.1209546

Goodman, F. R., Disabato, D. J., & Kashdan, T. B. (2021). Reflections on unspoken problems and potential solutions for the well-being juggernaut in positive psychology. *The Journal of Positive Psychology, Advance Online Publication* 16 , 831–837 6 https://doi.org/10.1080/17439760.2020.1818815 .

Heintzelman, S. J., & King, L. A. (2014). Life is pretty meaningful. *American Psychologist*, *69*(6), 561–574. https://doi.org/10.1037/a0035049

Hoge, R. (1972). A validated intrinsic religious motivation scale. *Journal for the Scientific Study of Religion*, *11*(4), 369–376. https://doi.org/10.2307/1384677

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Idler, E. L., Musick, M. A., Ellison, C. G., George, L. K., Krause, N., Ory, M. G., Pargament, K. I., Powell, L. H., Underwood, L. G., & Williams, D. R. (2003). Measuring multiple dimensions of religion and spirituality for health research: Conceptual background and findings from the 1998 general social survey. *Research on Aging*, *25*(4), 327–365. https://doi.org/10.1177/0164027503025004001

Ivanoff, A., Jang, S. J., Smyth, N. J., & Linehan, M. M. (1994). Fewer reasons for staying alive when you are thinking of killing yourself: The brief reasons for living inventory. *Journal of Psychopathology and Behavioral Assessment*, *16*(1), 1–13. https://doi.org/10.1007/BF02229062

King, L. A., Hicks, J. A., Krull, J. L., & Del Gaiso, A. K. (2006). Positive affect and the experience of meaning in life. *Journal of Personality and Social Psychology*, *90*(1), 179–196. https://doi.org/10.1037/0022-3514.90.1.179

Lambert, N. M., Stillman, T. F., Hicks, J. A., Kamble, S., Baumeister, R. F., & Fincham, F. D. (2013). To belong is to matter: sense of belonging enhances meaning in life. *Personality & Social Psychology Bulletin*, *39*(11), 1418–1427. https://doi.org/10.1177/0146167213499186

Leontiev, D. A. (2013). Personal meaning: A challenge for psychology. *The Journal of Positive Psychology*, *8*(6), 459–470. https://doi.org/10.1080/17439760.2013.830767

Leontiev, D. A. (2017). Converging paths toward meaning. *Journal of Constructivist Psychology*, *30*(1), 74–81. https://doi.org/10.1080/10720537.2015.1119089

Lovibond, P. F., & Lovibond, S. H. (1995). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the beck depression and anxiety inventories. *Behaviour Research and Therapy*, *33*(3), 335–343. https://doi.org/10.1016/0005-7967(94)00075-U

Maniaci, M. R., & Rogge, R. D. (2014). Caring about carelessness: Participant inattention and its effects on research. *Journal of Research in Personality*, *48*, 61–83. https://doi.org/10.1016/j.jrp.2013.09.008

Marsh, H. W., Hau, K.-T., & Wen, Z. (2004). In search of golden rules: Comment on hypothesis-testing approaches to setting cutoff values for fit indexes and dangers in overgeneralizing Hu and Bentler's (1999) findings. *Structural Equation Modeling*, *11*(3), 320–341. https://doi.org/10.1207/s15328007sem1103_2

Martela, F. (2020). *A wonderful Life: Insights on finding a meaningful existence* (New York: Harper Design).

Martela, F., & Riekki, T. J. J. (2018). Autonomy, Competence, Relatedness, and Beneficence: A Multicultural comparison of the four pathways to meaningful work. *Frontiers in Psychology*, *9*, 1–14. https://doi.org/10.3389/fpsyg.2018.01157

Martela, F., & Ryan, R. M. (2016). The benefits of benevolence: basic psychological needs, Beneficence, and the enhancement of well-being. *Journal of Personality*, *84*(6), 750–764. https://doi.org/10.1111/jopy.12215

Martela, F., Ryan, R. M., & Steger, M. F. (2018). Meaningfulness as satisfaction of autonomy, competence, relatedness, and beneficence: Comparing the four satisfactions and positive affect as predictors of meaning in life. *Journal of Happiness Studies*, *19*(5), 1261–1282. https://doi.org/10.1007/s10902-017-9869-7

Martela, F., & Steger, M. F. (2016). The meaning of meaning in life: Coherence, purpose and significance as the three facets of meaning. *Journal of Positive Psychology*, *11*(5), 531–545. https://doi.org/10.1080/17439760.2015.1137623

Mason, W., & Suri, S. (2012). Conducting behavioral research on Amazon's mechanical turk. *Behavior Research Methods*, *44*(1), 1–23. https://doi.org/10.3758/s13428-011-0124-6

Monteiro, R. P., Coelho, G. L. D. H., Hanel, P. H. P., de Medeiros, E. D., & da Silva, P. D. G. (2022). The efficient assessment of self-esteem: Proposing the brief rosenberg self-esteem scale. *Applied Research in Quality of Life* 17 931–947 . https://doi.org/10.1007/s11482-021-09936-4

Morgan, J., & Farsides, T. (2009). Measuring meaning in life. *Journal of Happiness Studies*, *10*(2), 197–214. https://doi.org/10.1007/s10902-007-9075-0

Mõttus, R., Kandler, C., Bleidorn, W., Riemann, R., & McCrae, R. R. (2017). Personality traits below facets: The consensual validity, longitudinal stability, heritability, and utility of personality nuances. *Journal of Personality and Social Psychology*, *112*(3), 474–490 https://doi.org/10.1037/pspp0000100.

Paolacci, G., & Chandler, J. (2014). Inside the turk: Understanding mechanical turk as a participant pool. *Current Directions in Psychological Science*, *23*(3), 184–188. https://doi.org/10.1177/0963721414531598

Reker, G. T., & Wong, P. T. P. (1988). Aging as an individual process: Toward a theory of personal meaning. In J. E. Birren & V. L. Bengtson (Eds.), *Emergent theories of aging* (pp. 214–246). Springer Publishing Co.

Roepke, A. M., Jayawickreme, E., & Riffle, O. M. (2014). Meaning and health: A systematic review. *Applied Research in Quality of Life*, *9*(4), 1055–1079. https://doi.org/10.1007/s11482-013-9288-9

Rosenberg, M. (1965). *Society and the adolescent self-image*. Princeton University Press.

Routledge, C., & Arndt, J. (2008). Self-sacrifice as self-defence: Mortality salience increases efforts to affirm a symbolic immortal self at the expense of the physical self. *European Journal of Social Psychology*, *38*(3), 531–541. https://doi.org/10.1002/ejsp.442

Ryan, R. M., & Frederick, C. (1997). On energy, personality, and health: Subjective vitality as a dynamic reflection of well-being. *Journal of Personality*, *65*(3), 529–565. https://doi.org/10.1111/j.1467-6494.1997.tb00326.x

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology*, *57*(6), 1069–1081. https://doi.org/10.1037/0022-3514.57.6.1069

Scott, A., Schimel, J., & Sharp, M. (2021). Long live A (me) Rica! An examination of the interplay between nationalistic–symbolic immortality striving and belief in life after death. *Journal of Personality and Social Psychology*, *120*(4), 861–881. https://doi.org/10.1037/pspa0000262

Seligman, M. E. P. (2011). *Flourish: A visionary new understanding of happiness and well-being*. Free Press.

Soto, C. J., & John, O. P. (2017). The next big five inventory (BFI-2): Developing and assessing a hierarchical model with 15 facets to enhance bandwidth, fidelity, and predictive power. *Journal of Personality and Social Psychology*, *113*(1), 117–143. https://doi.org/10.1037/pspp0000096

Steger, M. F. (2012). Experiencing meaning in life—Optimal functioning at the nexus of well-being, psychopathology, and spirituality. In P. T. P. Wong (Ed.), *The human quest for meaning: Theories, research, and applications. 2nd edition* (pp. 165–184). Routledge.

Steger, M. F., Dik, B. J., & Duffy, R. D. (2012). Measuring meaningful work the Work and Meaning Inventory (WAMI). *Journal of Career Assessment*, *20*(3), 322–337. https://doi.org/10.1177/1069072711436160

Steger, M. F., Frazier, P., Oishi, S., & Kaler, M. (2006). The meaning in life questionnaire: Assessing the presence of and search for meaning in life. *Journal of Counseling Psychology*, *53*(1), 80–93. https://doi.org/10.1037/0022-0167.53.1.80

Steger, M. F., Shin, J. Y., Shim, Y., & Fitch-Martin, A. (2013). Is meaning in life a flagship indicator of well-being? In A. S. Waterman (Ed.), *The best within us: Positive psychology perspectives on eudaimonia* (pp. 159–182). APA Press.

Van Tongeren, D. R., DeWall, C. N., Green, J. D., Cairo, A. H., Davis, D. E., & Hook, J. N. (2018). Self-regulation facilitates meaning in life. *Review of General Psychology*, *22*(1), 95–106. https://doi.org/10.1037/gpr0000121

Womick, J., Ward, S. J., Heintzelman, S. J., Woody, B., & King, L. A. (2019). The existential function of right-wing authoritarianism. *Journal of Personality*, *87*(5), 1056–1073. https://doi.org/10.1111/jopy.12457

Wong, P. T. P. (2010). Meaning therapy: An integrative and positive existential psychotherapy. *Journal of Contemporary Psychotherapy*, *40*(2), 85–93. https://doi.org/10.1007/s10879-009-9132-6

Wong, P. T. P. (2012). Toward a dual-systems model of what makes life worth living. In P. T. P. Wong (Ed.), *The human quest for meaning: Theories, research, and applications. 2nd edition* (pp. 3–22). Routledge.

Wood, A. M., Linley, P. A., Maltby, J., Baliousis, M., & Joseph, S. (2008). The authentic personality: A theoretical and empirical conceptualization and the development of the authenticity scale. *Journal of Counseling Psychology*, *55*(3), 385–399. https://doi.org/10.1037/0022-0167.55.3.385

Appendix 1: Three Dimensional Meaning in Life Scale (3DM)

Please read each of the following items carefully, thinking about how it relates to your life, and then indicate how true it is for you. Use the following scale to respond:

1 2 3 4 5 6 7
not at all true somewhat true very true

Coherence
Most things happening in my life do make sense.
By and large, I am able to understand the world around me.
I can comprehend what my life is all about.
I can easily make sense of my life.
Purpose
I pursue one or more big purposes in my life.
I am highly committed to certain core goals in my life.
I have a set of core goals that give my life a sense of direction.
My daily activities are consistent with a broader life purpose.
Significance
My life is full of value.
My personal existence is significant.
Every day I experience the sense that life is worth living.

Appendix 2: The vignettes used in Study 4

General story about John Smith read in all three conditions

John Smith is 45-year-old accountant living in Minneapolis. Originally from a small town in Iowa, after high school he went to study in the Carlson School of Management at University of Minnesota. There, during his sophomore year, he met his future wife, Cynthia, who was a freshman pharmacy student at the same university. After they graduated, both got jobs within Minneapolis and they decided to stay in the city. Now they have been together for more than 20 years and have two teenagers, 16-year-old son and 14-year-old daughter, living in a nice neighborhood at the outskirts of the city.

Low coherence scenario

However, lately he has had a hard time grasping what is happening around him. In the company, new managers have made many changes and also in his personal life several surprises has made his life much less predictable and graspable than what it used to be. John feels a bit lost in the current situation, not really knowing what's going to happen next in his life or why certain things are happening in his marriage and in his work.

Low purpose scenario

However, John has increasingly grown disillusioned with his work. He is good at what he is doing and earns a good salary, but the work no longer motivates him. He has a hard time to find any targets to strive for in his work. Instead he feels like he goes through the same motions every day, without any clear sense of progress or achievement. Somehow he feels that there is nothing grander that his daily activities are contributing to.

Low significance scenario

However, recently John has had a harder time to understand what value his life ultimately has, if any. Despite everything seemingly going well, there is a kind of emptiness and a sense of void that he has been struggling more and more with. Does his existence matter, does it make any difference? The more John thinks about these questions, the emptier his life feels.

High purpose scenario

John is highly driven by his work. The company he works for is producing new type of prostheses that are significantly cheaper than the traditional ones and thus provide more affordable and accessible care for people. John feels that he has an important role to play in this rapidly growing company, keeping the finances right. He thus feels that work provides him with valuable and clear targets to pursue in life.

High significance scenario

John is also very happy about his marriage with Cynthia. Even after all these years, he feels excited to come home after work to find his beloved wife with whom he can share everything and his kids, with whom he tries to spend as much time together as possible. He feels that the mere opportunity to be with his loved one's is a big part of what makes his life good.

High coherence scenario

John feels that currently everything is under control in his life. He knows what to expect from work and the world around himself, and various parts of his life seem to be in their proper place. After some more turbulent years, nowadays he has a firm grasp of his life. He seems to be in a situation where things happening are mostly expected and he has a reliable mental map of his life.