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Development and validation of an integrative scale to assess hope

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Abstract

Background Hope includes the dimensions of time, goals, control, relations and personal characteristics. Existing tools that measure it vary in length and psychometric properties and cover different parts of its overall concept.

Objectives This study aimed to develop an instrument that integrates all relevant aspects of hope is concise, easy to use and shows good psychometric properties.

Design Three pre-existing instruments (Miller Hope Scale, Herth Hope Index, Snyder Hope Scale) covering complementary and overlapping aspects of hope were administered cross-sectionally to a general population sample ($n = 489$). Factor analysis was used for item reduction. Reliability and validity were tested using factor analysis and item correlations between the new scale and quality of life and depression scales.

Setting and participants The study was set in Austria. Participants were sampled from the general population using a quota sampling strategy.

Results The initial 60 items were reduced to a 23-item scale with four dimensions: 'trust and confidence', 'positive future orientation', 'social relations and personal value' and 'lack of perspective'. The new scale's factor structure was highly stable and its internal consistency high (alpha = 0.92 for the overall scale, 0.80–0.85 for its subscales). Hope scores were negatively correlated with depression ($r = -0.68$) and positively with quality of life ($r = 0.57$), with the factor analysis and item discriminant validity supporting the new scale's construct validity.

Conclusions The new scale comprehensively covers the concept of hope is significantly shorter than previous scales and shows satisfactory reliability and validity.

Introduction

Hope has been of interest across centuries and diverse cultures gaining particular relevance in times of crisis and desired change. It may be seen as a common sense notion that is part of everyone's understanding or as a philosophical topic. In the last decades, hope has also been the subject of medical and psychological research across a range of health conditions, e.g. Refs 1–6. In healthy people and in those with severe physical illness, hope is, for example, related to better psychosocial functioning,[1,2] diminished stress reactivity and more effective coping,[3] global life satisfaction, well-being and better quality of life.[1,2] In people with mental illness, hope contributes to therapeutic effectiveness while loss of hope can predict suicide.[4,5] It is negatively correlated with depression, anxiety and distress and positively correlated with personal resilience, self-efficacy and subjective health.[5] Moreover, both patients and therapists consistently identify hope as a key factor in psychotherapy.[6]

Hope has been conceptualized in numerous ways and against various theoretical backgrounds. To just provide a brief overview of the vast literature, hitherto proposed hope theories and their corresponding scales fall into four broad and widely overlapping categories: (i) mainly emotion-based concepts, e.g. Ref. 7; (ii) mainly cognition-based concepts, e.g. Ref. 8; (iii) concepts combining emotion and cognition, e.g. Ref. 9 and (iv) multidimensional concepts, e.g. Refs 10,11. Emotion-based concepts have been criticized as being unclear and difficult to measure,[12] while cognition-based concepts tend to frame hope in a narrow or one-sided fashion.[12] The most prominent example of a concept combining cognitive and emotional aspects is that by Snyder *et al.*[9] whose scale was criticized not to reflect all the complexities of its theoretical underpinnings.[13] Finally, multidimensional hope concepts were developed with different populations and hence also emphasize differing and often limited aspects of the overall concept.[5]

A comprehensive literature review incorporating all hitherto published definitions of hope identified a number of key dimensions integral to the overall concept.[5] These include time, covering past experience and the important future reference of hope; broad or specific goals; control, which may be internal (personal activity) and/or external (environmental and contextual factors); relations, including partnerships, the relational aspect of medical care or treatment, trust, spirituality or a sense of meaning and purpose in life; and personal characteristics such as inner strength, motivation and energy to pursue one's goals. The concept includes a reality reference, in that the desired outcomes or goals are subjectively perceived as being possible, and it allows for hope to arise both from a negative as well as a positive starting point, i.e. as a desire for the improvement of an undesirable or an already satisfactory situation.[5]

Given its central role in psychiatry and psychotherapy, the adequate measurement of hope should be carefully considered. Existing hope scales, however, cover differing and often limited aspects of the complex concept and show varying length and psychometric properties.[5] To assess hope adequately and comparably in different populations, a measure of hope would be expected to be (i) based on the most comprehensive definition of the concept available; (ii) feasible in terms of length, complexity and mode of application; and (iii) psychometrically robust. None of the existing measurement tools meets all these criteria.

Hence, the aim of the present study was (i) to develop a new, easy to use and widely applicable scale that covers all relevant components of hope and (ii) to investigate, on a preliminary basis, its psychometric properties in a representative sample of the Austrian general population.

Methods

Scales

To meet the above demands, we based the new scale on a combination of three pre-existing scales that together cover all established

dimensions of hope and reflect its different theoretical underpinnings: the Miller Hope Scale (MHS),[11] the Herth Hope Index (HHI)[10] and the Snyder Hope Scale (SHS).[9] The MHS largely covers the dimensions of hope but does not explicitly refer to spirituality and is a lengthy tool with an unstable factor structure. The HHI and the SHS reflect different and complementary components of the construct.[5] The HHI prominently comprises aspects of spirituality, trust, meaning and purpose in life, individual characteristics and the dimension of time, while the SHS reflects goal setting and pursuit.

The SHS is an eight-item scale using a four-point continuum (1, definitely false, to 4, definitely true). Cronbach's alpha for the scale ranges between 0.74 and 0.84, the test–retest reliability between 0.73 and 0.85. The SHS does not provide one overall but two subscores called 'agency' and 'pathways'.[9] The HHI consists of 12 items in a four-point Likert format (1, strongly disagree, to 4, strongly agree). Its internal consistency lies between 0.75 and 0.94 and its test-retest reliability between 0.89 and 0.91. The scale provides one overall score with three suggested dimensions: (i) 'temporality and future'; (ii) 'positive readiness and expectancy'; and (iii) 'interconnectedness'.[10] The MHS is a 40-item scale using a six-point Likert format (1, strongly disagree, to 6, strongly agree), with good construct and divergent validity, high internal consistency ($\alpha = 0.93$) and an overall test–retest reliability of 0.82.[11] A three factor solution was suggested for the scale: (i) 'satisfaction with self, others and life'; (ii) 'avoidance of hope threats'; and (iii) 'anticipation of a future', which, however, is not strongly supported empirically.[11] On all scales, higher scores indicate higher hopefulness.

Previous research found hope to be negatively correlated with depression[14] and positively correlated with the quality of life.[1] Hence, to establish concurrent and construct validity, depression and quality of life were assessed using the 'Allgemeine Depressionsskala' (ADS)[15] and the WHOQOL-BREF.[16] The ADS is a screening instrument for depression containing 20 items rated on a four-point scale with higher scores indicating higher depressive symptoms. The WHOQOL-BREF is a 26-item scale employing a five-point format to assess subjective quality of life, spanning the domains of physical health, psychological health, social relationships, environment and global quality of life. Higher scores indicate higher subjective quality of life. Scales were administered in the order given here.

Translation and content validation

The MHS, HHI and SHS were translated from English into German according to the World Health Organisation's recommendations.[17] This involved the professional translation of the original scales into German followed by the examination of the translation by a group of three bilingual German and English speaking psychiatrists and a unilingual German speaking group of 30 people from different sociodemographic backgrounds. The translation was amended according to their comments and back-translated to English by a different professional translator. The back-translation was sent to the authors of the original scales for comments. These were positive throughout, and no further adaptation was deemed necessary.

Sample and data collection

The study was conducted using a cross-sectional design. The target sample characteristics were derived from the latest Population Census in Austria[18] and involved people ($\geq$ 16 years) residing in urban ($>$ 100 000 inhabitants) and rural ($<$ 100 000 inhabitants) areas in each of the nine geographic and administrative regions. A quota sampling strategy was employed with participants grouped, proportionally to the Austrian population, by sociodemographic characteristics (i.e. age, education, gender and community size). In view of the scheduled statistical method (factor analysis), we aimed at 500 participants. According to common practice, the suggested number of participants per variable is between 3 and 15, but a total sample size of 300 cases is regarded a good basis for factor analysis regardless of the amount of variables.[19] Thus, a sample of 500 was expected to produce a highly

reliable result in the main factor analysis, while also allowing for the comparison of two subgroups with reasonably high reliability.

Recruitment was carried out in three waves by a total of nine trained and supervised collaborators, one in each of the nine Austrian regions between September and December 2008. Collaborators were provided with a table of the target sample to be approached for each wave and recruited potential participants as a convenience sample. As approved by the responsible ethics committee, written informed consent was obtained and the questionnaires were filled out by the participants without assistance.To achieve a sample that approximates the characteristics of the Austrian general population, the sociodemographic characteristics of the participants were analysed after each wave to adapt the target sample for the following wave of recruitment. Recruitment was stopped after a sample size of 500 had been achieved.

Scale development

The reduction of the 60 candidate items from the three original hope scales involved a series of steps: (i) exploratory factor analysis was used to assess the structure of the evolving new scale. (ii) the resulting factor solutions proposed by the different analytical procedures were discussed among the researchers and item reduction was based on both statistical and theoretical considerations by consensus. We excluded items with redundant content, factor loadings lower than 0.40 on the suggested underlying latent structure and with cross-loadings onto another sub-dimension of hope[20] while all components of hope proposed by the underlying literature review[5] were preserved in the questionnaire. This process was repeated three times until no further reduction in questions was deemed appropriate in order not to lose any relevant information.

Statistical analysis

Data were analysed using SPSS version 15.0 (SPSS Inc., Chicago, IL, USA). To assess the underlying factors of hope, a principal axis factoring method (PAF) was used in the reduction process as well as for evaluating the resulting new hope scale.[21] Given the hypothesis that the sub-dimensions of hope are correlated to each other, oblique rotation (direct oblimin) was used to achieve the best solution for the factor loadings and the underlying structure[20]. To evaluate the stability of the factor solution, the Kaiser–Meyer–Olkin (KMO) coefficient was calculated. In the resulting scale, PAF was additionally applied to a random half of the sample and the subgroups of women/men and rural/urban inhabitants, respectively.

Because one crucial task of the factor analysis was to determine how many factors and items to retain, four different decision rules came into operation:[20] (i) Kaiser's criterion, with factors with an eigenvalue greater than one being retained,[20,22] and (ii) scree plot, which plots a graph of each eigenvalue against the factor with which it is associated. However, the eigenvalues-greater-than-one rule typically overestimates the number of components and the scree plot involves visual judgements of plots for sharp demarcations between the eigenvalues for major and trivial factors, usually resulting in a low reliability of its interpretation.[23] Hence, additionally applied decision rules were (iii) the parallel analysis and (iv) the Velicer's MAP test. Both were calculated with the syntax of O'Connor.[23]

The new scale's internal consistency was estimated using Cronbach's alpha coefficient for both the entire scale and its individual factors. The new hope scale was correlated with the quality of life and depression to test its concurrent validity. Construct validity was examined in two ways: (i) discriminant validity was assessed by calculating each item's correlation with its scale and the competing scales[24] and (ii) convergent validity was tested by calculating item correlations within the subscales of hope using PAF.[25] To estimate concept coverage, the Integrative Hope Scale (IHS) and its sub-dimensions were correlated with the three pre-existing scales excluding those items that were similarly contained in both dimensions, respectively. Normal distribution for each utilised item was explored

by examining the histograms and Q-Q-plots. Pearson and Spearman's rho correlation coefficient were used as appropriate.

Results

Sample

After the exclusion of seven questionnaires owing to at least six missing items and four owing to the respondents' age being below 16 years, the sample consisted of 489 participants. Distributions of sociodemographic variables, depression and quality of life are displayed in Table 1 together with normative scores in the general population.

Compared with the Austrian general population, the study sample includes more working-age participants with middle and higher education while retired people and those with low education are underrepresented. In comparison with normative data from Germany,[15,16] participants in our sample were overall younger than the reference population and tended to have more depressive symptoms but higher than expected quality of life scores. Apart from these differences, scores roughly reflect the expected distribution with depressive symptoms being more likely at an older age and in less educated people and quality of life scores behaving inversely.

Description of the new IHS

The initial 60 questions on hope were reduced to a concise 23-items scale. The completion rate (i.e. the rate of participants without missing responses in any of the 23 items) was highly

Table 1 Characteristics of study participants in comparison with the latest census data in Austria, depression scores (ADS) and quality of life scores (WHOQOL-BREF) overall and by education in the sample population (n = 489) and normative scores of the respective scales where available

	Sample	General population	Depression mean (SD)	General population	Quality of life mean (SD)	General population
Sample size	n = 489	n = 6 679 444	n = 489	n = 2005	n = 489	n = 2055
Men: number (%)	212 (43.35)	(48.42)				
Age: mean (SD) years	41.55 (15.10)	46.70				
	16–89	≥ 15	12.58 (9.56)	11.69 (9.03)	73.23 (19.86)	67.59 (17.93)
Highest education: number (%)						
No formal education	76 (15.64)	(35.66)	17.57 (10.61)	12.02 (9.17)	67.17 (19.79)	n/a
Primary education	215 (44.24)	(45.46)	13.53 (9.63)		71.12 (20.89)	n/a
Secondary education	152 (31.28)	(11.43)	9.92 (8.18)		77.71 (16.96)	n/a
University, or similar	43 (8.85)	(7.45)	9.06 (7.48)	9.84 (7.94)	79.72 (19.99)	n/a
Employment						
Working (> 15 h per week)			330 (68.46)			(55.82)
Retired			66 (13.69)			(26.15)
Housekeeping			19 (3.94)			(8.24)
Student			30 (6.22)			(5.99)
Unemployed			16 (3.32)			(3.82)
Other			21 (4.36)			(1.82)
City size: number (%)						
< 1000			68 (14.02)			(4.67)
1000–10 000			215 (44.33)			(51.02)
10 000–100 000			91 (18.76)			(15.81)
100 000–500 000			49 (10.10)			(8.44)
> 500 000			62 (12.78)			(20.06)

ADS, 'Allgemeine Depressionsskala'.

satisfactory with 7.9% of the sample leaving one question unanswered and only 4.3% leaving two or more questions unanswered.

The new tool is a self-rating instrument with items being rated on a six-point Likert scale from 1, strongly disagree, to 6, strongly agree. It provides an overall score and four dimension scores, obtained by summing up the individual item scores, with negative items being rated inversely. This produces possible overall hope scores ranging from 23 to 138 with higher scores representing higher hopefulness. The scores for the sub-dimensions vary according to the number of items.

The four dimensions contain questions from all three original scales. Questions from the SHS and the HHI congregate in the first factor, while the other three factors are comprised of reassembled questions of the MHS (Table 2). The factor 'trust and confidence' reflects a reference to past experience, individual characteristics, spirituality and trust, as well as to motivational aspects of goal striving. The factor 'lack of perspective' reflects the absence of hope and its

Table 2 Factor structure of the new Integrative Hope Scale, indicating the pre-existing scales items were derived from (n = 484–489)

	Four-factor solution				One-factor
	1	2	3	4	1
Trust and confidence					
I have deep inner strength.[HHI]	0.70	−0.00	0.08	0.04	0.61
I believe that each day has potential.[HHI]	0.65	−0.09	0.10	0.05	0.65
I have a sense of direction.[HHI]	0.64	−0.03	0.05	−0.04	0.63
Even when others get discouraged, I know I can find a way to solve the problem.[SHS]	0.62	−0.10	−0.02	0.07	0.54
I feel my life has value and worth.[HHI]	0.54	−0.08	0.12	−0.19	0.76
I can see possibilities in the midst of difficulties.[HHI]	0.52	−0.10	0.06	0.01	0.56
My past experiences have prepared me well for my future.[SHS]	0.52	0.06	0.14	−0.01	0.49
I've been pretty successful in life.[SHS]	0.45	−0.09	0.02	−0.11	0.56
I have a faith that gives me comfort.[HHI]	0.45	0.04	−0.17	−0.16	0.36
Lack of perspective					
It is hard for me to keep up my interest in activities I used to enjoy.[MHS]	−0.02	0.70	−0.01	−0.12	−0.47
It seems as though all my support has been withdrawn.[MHS]	0.13	0.70	−0.15	0.14	−0.63
I am bothered by troubles that prevent my planning for the future.[MHS]	−0.03	0.68	0.08	0.04	−0.54
I am hopeless about some parts of my life.[MHS]	−0.16	0.67	0.12	0.07	−0.63
I feel trapped, pinned down.[MHS]	−0.03	0.65	−0.12	0.12	−0.69
I find myself becoming uninvolved with most things in life.[MHS]	−0.08	0.47	−0.13	0.05	−0.56
Positive future orientation					
There are things I want to do in life.[MHS]	0.04	−0.00	0.71	0.03	0.46
I look forward to doing things I enjoy.[MHS]	−0.00	−0.09	0.56	−0.25	0.62
I make plans for my own future.[MHS]	0.18	−0.12	0.55	−0.02	0.61
I intend to make the most of life.[MHS]	0.20	−0.01	0.53	−0.19	0.67
Social relations and personal value					
I feel loved.[MHS]	−0.06	−0.17	0.10	−0.78	0.73
I have someone who shares my concerns.[MHS]	−0.02	−0.08	0.05	−0.70	0.60
I am needed by others.[MHS]	0.18	−0.00	0.03	−0.58	0.61
I am valued for what I am.[MHS]	0.34	0.02	0.07	−0.50	0.70
Explained variances (unrotated solution)	36.7%	5.59%	3.91%	3.59%	36.15%
Sum				49.84%	36.15%

Extraction method: principal axis factoring; oblique (direct oblimin) rotation.
Pairwise data exclusion.
HHI, items stemming from Herth Hope Index; MHS, items stemming from Miller Hope Scale; SHS, items stemming from Snyder Hope Scale.

constituent aspects, i.e. not dealing with situations, as well as lack of inner strength, future orientation and support. 'Positive future orientation' and 'social relations and personal value' are dimensions represented in the two remaining factors.

True values for the new scale and its subscales achieved in our sample (mean, SD and 95% CI) were IHS overall M = 93.78; SD = 12.83; 95% CI [92.61–94.96] (50% of participants scored between 84 and 104, 25% scored below and above this range, respectively), 'trust and confidence' M = 27.81; SD = 4.03; 95% CI [27.44–28.18] (50% = 26–31), 'lack of perspective' M = 15.10; SD = 5.39; 95% CI [14.60–15.59] (50% = 11–19), 'positive future orientation' M = 20.01; SD = 2.90; 95% CI [19.75–20.28] (50% = 18–22), 'social relations and personal value' M = 19.06; SD = 3.33; 95% CI [18.75–19.36] (50% = 16–22).

Factor structure

As a result of the theoretical and statistical considerations described earlier, a four-factor solution was chosen (Table 2). All statistical procedures proposed an extraction with four factors, except for the scree plot, which offered both a one- and a four-factor solution. All items show adequate loadings onto their respective factor, and no cross-loading above 0.30 occurs, except for the item 'I am valued for what I am'. The item 'I have a faith that gives me comfort' only shows a loading of 0.36 onto the overall scale. However, being the only available item directly referring to the dimension of spirituality, it was retained in the questionnaire. Within the sub-dimensions, factor loadings are high throughout with values above 0.40. This indicates at least 16% shared variance between the variable and the factor. Hence, all variables can be used for interpretation purposes.[26]

The KMO coefficient for the scale was 0.94. The KMO statistic varies between 0 and 1, with values higher than 0.5 being considered acceptable and those above 0.9 superb.[26] PAF was repeated for men and women and for urban and rural inhabitants separately as well as for 50% randomly chosen participants to avoid systematic effects. In all cases, results confirmed the variables' fit into the expected sub-dimensions with only slight differences in factor loadings.*

Reliability indices

Cronbach's alpha was established for the overall scale and for each of its subscales, supporting their high internal consistency: IHS (overall) 0.92; trust and confidence 0.85; lack of perspective 0.85; positive future orientation 0.80; social relations and personal value 0.85. Corrected total-items correlations for the individual subscales were all above 0.3, suggesting that all items contribute adequately to their respective subscales without being redundant.

Validity

To test concurrent validity, the new hope scale was correlated with quality of life and depression. Hope and depression were highly negatively correlated ($r = -0.677$; $P < 0.001$), while hope and quality of life showed a highly positive correlation ($r = 0.565$; $P < 0.001$).

As shown in Table 2, all items of each subscale are highly correlated to each other and to their underlying constructs, loading onto the expected factors, i.e. supporting the assumption of convergent validity for the new scale. Item discriminant validity showed that all items of the IHS correlated higher with their own scale than with the competing scales (ADS and WHO-QOL-BREF) (Table 3).

Comparison with pre-existing scales

The overall IHS and its sub-dimensions are highly correlated with the MHS ($r = 0.92$–0.73) and the HHI ($r = 0.81$–0.64), while the respective correlations are lower ($r = 0.62$–0.39) with the two scores of the SHS. The individual dimensions of the IHS show intercorrelations between $r = 0.63$ and $r = 0.52$ (Table 4).

*Data not shown, but on request from the first author.

Table 3 Item correlations between the new hope scale (IHS), the depression scale ADS and the quality of life scale WHOQUOL-BREF (n = 483–489)

	IHS	ADS	WHOQOL-BREF
I have deep inner strength.	0.57	−0.35	0.30
I believe that each day has potential.	0.64	−0.38	0.36
I have a sense of direction.	0.59	−0.34	0.31
Even when others get discouraged, I know I can find a way to solve the problem.	0.51	−0.28	0.30
I feel my life has value and worth.	0.71	−0.45	0.38
I can see possibilities in the midst of difficulties.	0.52	−0.33	0.26
My past experiences have prepared me well for my future.	0.47	−0.22	0.22
I've been pretty successful in life.	0.53	−0.39	0.37
I have a faith that gives me comfort.	0.40	−0.20	0.26
It is hard for me to keep up my interest in activities I used to enjoy.	0.57	−0.47	0.36
It seems as though all my support has been withdrawn.	0.72	−0.53	0.46
I am bothered by troubles that prevent my planning for the future.	0.61	−0.51	0.45
I am hopeless about some parts of my life.	0.69	−0.53	0.44
I feel trapped, pinned down.	0.77	−0.56	0.48
I find myself becoming uninvolved with most things in life.	0.67	−0.47	0.38
There are things I want to do in life.	0.50	−0.22	0.22
I look forward to doing things I enjoy.	0.63	−0.35	0.33
I make plans for my own future.	0.65	−0.43	0.34
I intend to make the most of life	0.69	−0.37	0.35
I feel loved.	0.73	−0.45	0.42
I have someone who shares my concerns.	0.62	−0.38	0.31
I am needed by others.	0.62	−0.31	0.32
I am valued for what I am.	0.70	−0.42	0.37

IHS, Integrative Hope Scale; ADS, 'Allgemeine Depressionsskala'.
Spearman's rho (for all correlations to enhance comparability).
All correlations significant ($P < 0.001$; two-tailed).

Table 4 Correlation between the new Integrative Hope Scale (IHS) and its sub-dimensions with the three pre-existing scales (double items excluded) (n = 438–486)

	IHS				
Correlations	Overall	Trust and confidence	Lack of perspective	Positive future orientation	Relations and personal value
IHS					
Lack of perspective	–	−0.52[1]	1		
Positive future orientation	–	0.56[1]	−0.59[1]	1	
Relations & personal value	–	0.63[2]	−0.56[1]	0.62[1]	1
HHI overall	0.81[2]	0.66[2]	−0.64[1]	0.70[1]	0.64[2]
SHS					
Agency	0.56[2]	0.62[2]	−0.39[1]	0.44[1]	0.45[2]
Pathways	0.60[2]	0.57[2]	−0.47[1]	0.43[1]	0.45[2]
MHS overall	0.92[2]	0.74[2]	−0.75[1]	0.80[1]	0.73[2]

All correlations are significant at the 0.01 level (two-tailed).
HHI, Herth Hope Index; SHS, Snyder Hope Scale; MHS, Miller Hope Scale.
[1]Spearman's rho correlation.
[2]Pearson correlation.

Discussion

Hope is a variable positively affecting various health outcomes and an important factor in psychiatry and psychotherapy.[29] However, existing measurement tools have a number of limitations including their feasibility, psychometric properties and coverage of the overall concept of hope.[5] This study reports the development and preliminary validation of an IHS which spans all established dimensions of hope while at the same time providing advantages in terms of applicability and factor stability.

The new scale was developed on the basis of three pre-existing measures covering complementary and overlapping components of the concept using an item reduction procedure based on statistical and theoretical considerations. The factor analysis of the 23 retained items identified a unique overall factor for the new scale, with items dimensionally grouped into four subscales. Although the respective items are grouped differently when compared to the qualitatively gained results of the underlying literature review, the subscales of the IHS reflect all relevant dimensions of hope.[8]

Given that the first factor accounts for 36% of the variation while the other three factors add further 13%, it could also be interpreted that the three frail factors are owing to factor fracturing and that the solution includes one dominant factor and three minor factors, which are correlated with the main factor. This would indicate the applicability of Speilberger's classic Trait-State model and theory of this class of variables which is most strongly supported by our finding of a clearly oblique factor structure with intercorrelations of the IHS sub-dimensions between $r = 0.52$ and $r = 0.63$. The question of whether hope should be interpreted as a trait or state or both has been prominently discussed in the literature, e.g. Ref. 27. Our results clearly argue for an interpretation of hope as state-trait variable.

One noteworthy result of the factor analysis was that the dimension of spirituality, explicitly referred to in the item 'I have a faith that gives me comfort', did not highly load onto the overall scale. Its representation within the dimension 'trust and confidence' appears plausible. However, it may be assumed that spirituality or religious faith constitutes a separate set of characteristics with only partial overlap with the concept of hope. In line with this assumption, religiosity or spirituality has been defined as a multidimensional construct involving feelings, thoughts, experiences and behaviours that arise from a search for the 'sacred' and that may exert a protective effect differentially depending on the population studied.[28] Hence, it can be concluded that spirituality and hope may be interrelated, but differing complex concepts that need to be investigated both in their own right but also in their combined influence on processes and outcomes.[29]

Psychometric properties of the new scale

Analyses of the new hope scale's psychometric properties provide satisfactory evidence for its reliability and validity. The highly satisfactory completion rate also indirectly supports the acceptability of the content and the feasibility of the questionnaire.

Cronbach's alpha coefficients were satisfactory for the overall scale and for each of its subscales, as were the corrected total-items correlations. As Cronbach's alpha depends on the number of variables per latent construct,[21] a high number of variables generally lead to a high alpha. Hence, the findings for the presented subscales with 4–8 items per construct can be regarded as excellent.

The concurrent validity showed correlations in the expected directions,[1,14] with hope and depression being highly negatively correlated while hope and quality of life had a strong positive correlation. Interitem correlations between all items of the IHS and the competing scales (i.e. ADS and WHOQOL-BREF) resulted in higher correlation of all IHS items with their own scale in comparison with the competing scales, supporting the assumption of different constructs and hence the new hope scale's discriminant validity.

The factor structure of the IHS was remarkably stable. For different subgroups (a random halve, men/women, rural/urban inhabitants),

the same variables loaded onto the same factors with a similar magnitude. Thus, it can be concluded that the new hope scale and its subdimensions capture a stable construct equally reliably across these groups.

The SHS is only moderately correlated with the IHS, which may be explained by its narrow focus on goal setting and pursuit. The high correlation of the IHS with the MHS and the HHI confirms that the new scale comprehensively covers the concept of hope. Especially, the fact that the new scale achieves a particularly high correlation with the lengthy MHS while only containing about half the number of items constitutes a major advantage in terms of feasibility and applicability at preserved conceptual validity.

All three pre-existing scales have been used in research in a variety of fields and among healthy as well as diseased populations, e.g. Refs 1–6. Hence, the new scale, being based on these instruments, can be assumed to be equally applicable in healthy as well as ill people while at the same time having the advantage of most comprehensively covering the concept of hope, being concise, and psychometrically robust according to our preliminary validation.

Scoring and interpretation

In our general population sample, the mean value for hope achieved was 93.78 (SD 12.83), with 50% of the sample scoring between 84 and 104 which we preliminarily recommend to use as normative scores for healthy people. The upper and especially the lower quartile, i.e. above 104 and below 84, may be regarded as outliers in the general population indicating a psychopathological or social problem in diseased samples.

Given the content of the new scale, low values in the individual factors may reflect the need for specific interventions to support patient well-being, e.g. a lack in the factor 'Social relations and personal value' may warrant relationship oriented work to foster hope, as has been suggested elsewhere,[29–31] while scores in the factor 'Positive future orientation' may be specifically related to goal setting and individual agency, also potentially amendable by specific interventions.[29–31] Hence, both a person's social context and individual traits may affect hope scores and interventions targeted at such variables may impact profoundly on patient experience and well-being. In practice, terms such as hopes, goals and expectations – which are clearly different but interrelated constructs – are often used ambiguously.[29] Establishing goals and future expectations can be difficult for people with somatic as well as psychiatric conditions, which influences treatment outcomes and patient satisfaction[33–34] and may be reflected in their hope scores. Hence, given the importance of adequate communication for sharing power and decision making when it comes to implementing patient-centred care in clinical practice,[32] it is relevant for clinicians to be aware of both the differential conceptualizations of these terms as well as of their interrelation and external influences. Quantitative data involving these concepts will have to be created to underpin conceptual background work provided by this and other studies.[29]

Limitations of this study

One limitation of this study is its non-random sampling. However, we did not intend to assess the epidemiological distribution of hope in the Austrian general population, but to construct a stable and reliable instrument that can be applied across different sociodemographic backgrounds. The applied sampling method produced a sample roughly approximating the sociodemographic characteristics of the Austrian general population, and a distortion of the sample owing to non-random sampling is compensated by the high number of participants. Differences in depressive symptoms and quality of life scores compared to the normative data may partly be explained by the study population being younger than the overall general population. Moreover, a comparison with normative data from a neighbouring country has to be interpreted with caution as the subjective experience of depressive symptoms and quality of life is heavily influenced by the cultural background and socioeconomic conditions.[35]

Because of the cross-sectional design of the present study, we were not able to evaluate psychometric properties such as test–retest reliability or sensitivity to change, which should be investigated in further studies.

Strength

Given the complexity of the concept of hope, the diversity of definitions proposed in the literature and the inherent limitations of any measurement tool, the potential constraints of imposing a measurement framework on an intricate notion such as hope need to be acknowledged. Attempts to capture hope in a simple questionnaire have resulted in a number of published measurement tools which very often cover only limited parts of the complex concept.[8] In this respect, a prominent strength of our study is its comprehensive coverage of the concept based on broad conceptual background knowledge on hope in healthy people as well as those with various physical and mental health conditions.

Apart from covering all relevant dimensions of hope found in the literature, this new scale is more concise when compared with pre-existing assessment instruments. It is easy to use and shows excellent psychometric properties, all of which contributes to the advantages of this new tool. We therefore consider it a generic tool that may be applicable to healthy as well as diseased samples after adequate validation in the respective populations.

Hence, we introduce a measurement tool that encompasses three main advantages in comparison with pre-existing tools: it contains all established conceptual dimensions of hope, is significantly shorter and more concise than pre-existing tools and shows convincing psychometric properties.

In view of the international development towards patient-centred healthcare, hope is an important health outcome in its own right. At the same time, it is a potent predictor of quality of life and other positive outcome domains in a wide range of health conditions. Thus, the new hope scale may serve as a valuable primary outcome measure or as a mediator in trials investigating complex interventions as well as in epidemiological research.

Conflict of interest

None.

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