Psychological Medicine, 2001, **31**, 367–372. Printed in the United Kingdom
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BRIEF COMMUNICATION

Does Beck's Hopelessness Scale really measure several components?

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ABSTRACT

Background. Much of the interest in hopelessness stems from the key role it plays in the prediction of suicidal behaviour. To measure hopelessness, Beck *et al.* (1974) developed a 20-item scale (BHS), applied exploratory factor analysis and argued that the scale measures three specific components (affective, motivational and cognitive). Subsequent exploratory factor analyses identified two, three or more factors underlying the scale.

Methods. Several confirmatory factor analyses (LISREL) were run on data on 324 suicide attempters in Sweden in order to test the hypothesized factorial structures and to investigate the psychometric properties of the individual items.

Results. Neither three- nor two-factor models fitted the data. A simpler structure was sufficient to account for the observed correlations between most of the items. This led to the development of several variants of a one-factor model, each a combination of affective, motivational and cognitive items. The number of items varied between four and 15.

Conclusions. Our findings suggest that most of the items (15) of Beck's Hopelessness Scale measure one factor. They further suggest that the number of items could considerably be reduced. A four-item scale produced an excellent fit. It includes positive and negative items describing the perception of the future in terms of success, darkness, lack of opportunity and faith. It might even be possible to replace the total scale with one item only, 'my future seems dark to me'.

INTRODUCTION

Within the context of his research on depression and suicidal behaviour, Beck (Beck, 1963, 1967, 1974, 1976; Beck *et al.* 1979) observed that depressed individuals share common cognitive features, i.e. a negative view of the self, of the self in relation to the world and of the self in relation to the future. He introduced the concept of hopelessness to refer specifically to one of these cognitive features, i.e. a negative view of the self in relation to the future. According to Beck and his colleagues, hopelessness is a useful psychological construct and has substantial clinical utility for suicide risk assessment and prediction. They produced empirical evidence for the association between hopelessness and suicide intent and argued that seriousness of suicidal intent is more closely related to hopelessness than to depression (Minkoff *et al.* 1973; Beck *et al.* 1975, 1985).

In order to facilitate the study of hopelessness, Beck *et al.* (1974) designed the hopelessness scale (Table 1). To determine the dimensionality of the scale, the authors carried out an exploratory factor analysis on data on suicide attempters ($N = 294$) and derived a three-factor solution. According to Beck and his colleagues, the three factors extracted (an affective, a motivational and a cognitive component) made sense clinically. The dimensionality of Beck's Hopelessness Scale has been subsequently analysed in other studies and for different populations (Hill *et al.* 1988; Bouvard *et al.* 1992; Steer *et al.* 1993; Dyce, 1996; Tanaka *et al.*

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https://doi.org/10.1017/S0033291701003300 Published online by Cambridge University Press

Table 1. *List of items included in Beck's Hopelessness Scale*

1	
2	
3	
4	
5	
6	In the future I expect to succeed in what concerns me most (SUCCEED)*
7	My future seems dark to me (DARK FUTURE)*
8	
9	I just don't get the breaks and there is no reason to believe I will in the future (BREAKS)*
10	
11	
12	
13	
14	
15	I have great faith in the future (FAITH)*
16	
17	
18	
19	
20	

The response categories are coded 0 for positive expectations and 1 for negative expectations.
* Items referring explicitly to the future.

1998). Exploratory factor analyses identified either two factors (Tanaka *et al*. 1998), three factors (Hill *et al*. 1988; Steer *et al*. 1993; Dyce, 1996), four factors or more (Bouvard *et al*. 1992). In most cases, the factors were labelled differently and were not measured with exactly the same items as in Beck *et al*.'s study.

One of the objectives of the current study was to test, with confirmatory factor analysis, the hypotheses about the dimensionality of the hopelessness concept derived from the previous studies. The dimensionality of the hopelessness scale is of considerable interest. Do the 20 items in Beck's scale measure multiple and specific subcomponents (multi-factorial structure)? Or do they form a single dimension of hopelessness (uni-factorial structure)? If hopelessness is, for example, directly related to suicidal behaviour and if it contains several subcomponents, it is important to identify them because they might well be differentially predictive of suicidal behaviour. For instance, Hill *et al*. (1988) found that only one component, giving up (the motivational component), was significantly related to suicidal intent. In that case, combining components into a composite variable might weaken the predictive value of the total score if it contains nonpredictive subscores. A second objective was to investigate the psychometric properties of the individual indicators with the intention to select the most valid and reliable items. The final objective was to develop a scale with a reduced number of items, a more time-effective instrument that could be used both in clinical settings and in research.

METHOD

Data

The data analysed in this study come from the administration of Beck's Hopelessness Scale to 324 suicide attempters admitted to health care facilities in Sweden in 1990. This data was collected as part of the repetition–prediction project of the WHO/EURO multicentre study on parasuicide (Kerkhof *et al*. 1994). In this project, hospital-admitted parasuicide patients in different countries were interviewed within a week of admission, using the European Parasuicide Study Interview Schedule (EPSIS1). The Schedule is a structured questionnaire that covers sociodemographic background variables as well as psychological, psychosocial and psychometric variables.

Method of analysis

Confirmatory factor analysis (CFA) with LISREL 8.20 was used to cross-validate factor structures derived from previous empirical studies and to test new measurement hypotheses. CFA is a specific application of structural equation modelling (Bollen, 1989; Bollen & Scott Long, 1993; Jöreskog & Sörbom, 1993; Maruyama, 1998) when testing measurement

https://doi.org/10.1017/S0033291701003300 Published online by Cambridge University Press

Table 2. *Fit of the tested factor models derived from previous research and of the uni-factor models developed by Aish and Wasserman*

Authors	Description of model	χ^2	df	*P* value	RMSEA
Beck *et al.* (1974)	Three factor model (affective; motivational; cognitive)	Non-admissible solution			
Hill *et al.* (1988)	Three factor model (hopeless about future; expectations about giving up; future anticipations)	Non-admissible solution			
Steer *et al.* (1993)	Three factor model (rejection of possibility of a hopeful future; resignation to the futility of changing the future; acceptance of the inevitability of a hopeless future)	Non-admissible solution			
Dyce (1996)	Three factor model (expectations of success; expectations of failure; future uncertainty)	Non-admissible solution			
Bouvard *et al.* (1992)	Two factor model (negative feeling towards the future; capacity to imagine the future; desires with respect to the future)	24·72	13	0·025	0·068
Tanaka *et al.* (1998)	Two factor model: (doubt about a hopeful future; belief about a hopeless future)	Non-admissible solution			
Aish/Wasserman (2000)	One factor models (hopelessness)				
	Model 1 (items: 2, 9, 11, 12, 13, 14, 15, 17, 18, 20)	42·48	35	0·18	
	Model 2 (items: 2, 6, 8, 9, 10, 11, 13, 14, 15, 19, 20)	46·22	38	0·38	
	Model 3 (items: 2, 6, 8, 9, 10, 11, 13, 14, 15, 16, 19, 20)	53·58	54	0·49	
	Model 4 (items: 2, 6, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 20)	68·70	65	0·35	
	Model 5 (items: 2, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 17, 18, 20)	76·68	77	0·49	
	Model 6 (items: 2, 5, 6, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20)	96·00	90	0·31	
	Model 7 (items-future only: 1, 6, 7, 9, 10, 13, 15, 17, 18)	34·47	27	0·27	
	Model 8 (items: 6, 7, 9, 15)	1·02	2	0·60	

The numbers in parentheses correspond to the numbers of the items in the list in Table 1.

Chi-square values which are small relative to the degrees of freedom are non-significant, i.e. indicate that the model fits the data. The *P* values should be as high as possible.

The RMSEA values, measures of approximate fit, should be as small as possible and smaller than or equal to 0·05. Since the Aish–Wasserman models fit the data, the RMSEA is not given.

instruments. CFA has several advantages over exploratory factor analysis (EFA). EFA seeks to identify the number of common factors underlying a large number of items and interprets them on the basis of the semantic content of the items loading on them. This *post-hoc* interpretation is subjective and often differs from researcher to researcher. Unlike EFA, CFA starts with a concept, specifies its dimensionality, and proposes indicators to measure the concept or its dimensions. In other words, it forces the researcher to be explicit about measurement hypotheses to be tested. For example, the measurement hypothesis derived from the empirical results of Beck and his associates (1974), which we tested, corresponds to a conceptual specification of the hopelessness concept in terms of three components or three dimensions (affective, motivational and cognitive), and each component is assumed to be measured with specific items (see Table 1: to measure the affective component, items 1, 5, 6, 13, 15, 19; to measure the motivational component, items 2, 3, 9, 11, 12, 16, 17, 20; and to measure the cognitive component, items 4, 7, 8, 10, 14, 18).

A confirmatory factor analysis implies essentially four steps: (1) the formal specification of the measurement instrument in terms of a factor model; (2) the statistical fitting of the factor model to observed data (variances and covariances or correlations); (3) the assessment of overall fit and local fit according to some criteria; (4) the substantive interpretation of the results if the model is consistent with the data.

If the model is not consistent with the data, it may be modified, refitted, and re-evaluated.

Fitting consists in estimating the free parameters in the factor model (i.e. the loadings, the correlations between the factors, the error variances) with one of the several estimation methods that LISREL provides (maximum likelihood, unweighted least squares, weighted least squares, etc.; see Bollen, 1989, for more details). The estimation must be such that the difference between the observed variance–covariance matrix and the expected variance–covariance

https://doi.org/10.1017/S0033291701003300 Published online by Cambridge University Press

matrix (model derived) is as small as possible. To evaluate the overall fit of the model, there are several measures, formal and descriptive (e.g. χ^2, goodness-of-fit indices, information measures of fit, incremental fit indices, RMSEA; see Bollen & Scott Long, 1993, for more details). Essentially, they all assess the overall congruence between a specific model and observed data. The assessment of local fit, which concerns the individual parameters, is done with the *t* values (estimate/standard error) associated with each of the estimated (free) parameters, and the modification indices for each of the originally fixed parameters.

Given the nature of the variables (dichotomous) and the characteristics of the data (skewed distributions), the confirmatory factor analyses were done on the tetrachoric correlations between the observed variables (computed with PRELIS 2.20) and the weighted least squares estimation method (WLS) was used to estimate the free parameters of the models (Aish & Jöreskog, 1990; Jöreskog, 1990). The free parameters were the loadings of the observed variables on the latent variables that they were supposed to measure (if an observed variable was not assumed to measure a latent variable, the corresponding loading was fixed to zero), the correlations between the latent variables, the error variances. We examined all the fit indices to assess the model-data consistency (Gerbing & Anderson, 1993; Tanaka, 1993; Marsh *et al.* (1996), but Table 2 in this paper only reports on the chi-square, a test of exact fit (Browne & Cudeck, 1993) and the RMSEA, a test of close or approximate fit (Steiger, 1990). A good fitting model has a χ^2 value which is small relative to the degrees of freedom. For a model to be approximately fitting, the value of the RMSEA should not be $> 0{\cdot}05$ (Jöreskog, 1993). We investigated the modification indices to see to what extent we could improve the model. A modification index indicates a decrease in the value of the chi-square if a fixed parameter is set free to be estimated. Detailed information on the analyses can be found in Aish & Wasserman (2000).

RESULTS

Several factorial structures were tested: the three factorial structures identified by Beck *et al.* (1974), Hill *et al.* (1988), Steer *et al.* (1993) and Dyce (1996); the two factorial structures identified by Bouvard *et al.* (1992) and by Tanaka *et al.* (1998).

Table 2 summarizes the main messages resulting from the analysis: none of the hypothesized three-factor structures fitted the data and neither did the two-factor structures. The initial solutions did not converge. The two-factor structure identified by Bouvard *et al.* (1992) has an approximate fit but several items were left out. Respecification of the models did not produce satisfactory results or led to modification indices for cross-loadings of the items on two and three factors simultaneously. Most of the items appeared to be a measure of each component (loading on each factor) and therefore did not discriminate properly between the components. It was clear from an examination of the correlations between the factors (latent variables), none of these being significantly different from 1, that a much simpler structure was sufficient to account for the correlations between the observed variables.

As a consequence, we developed and tested several one-factor models. Each model had a slightly different combination of what were called affective, motivational and cognitive items. The number of items ranged from 4 to 15. The correlations between the five left out variables could not be accounted for by another factor. All the models fitted the data well as can be read from Table 2. One of the models (model 7) only had items that refer explicitly to the 'future'. The fit of the model with four items: I expect to succeed in the future (affective and positive), the future seems dark to me (cognitive and negative), I will not get the breaks/opportunity in the future (motivational and negative), I have great faith in the future (affective and positive), was excellent (model 8).

A confirmatory factor analysis with LISREL tests the hypothesized dimensionality of measurement instruments. In addition, it gives information on the psychometric properties (validity and reliability) of each of the measures (unlike Cronbach's alpha which is an estimate of the reliability of a scale). For all the uni-factor models developed by Aish & Wasserman, the individual items measured the concept they were supposed to measure (validity) and they meas-

https://doi.org/10.1017/S0033291701003300 Published online by Cambridge University Press

ured the concept well (reliability). The validities (loadings) of the 15 items in model 6 were: 0·97, 0·77, 0·95, 0·75, 0·95, 0·83, 0·95, 0·91, 0·81, 0·83, 0·91, 0·91, 0·99, 0·92, 0·97 and their reliabilities (total variance minus error variance) were: 0·93, 0·59, 0·90, 0·56, 0·90, 0·70, 0·91, 0·84, 0·66, 0·68, 0·82, 0·83, 0·98, 0·85, 0·94). The results were very similar for the other models. Overall, the motivational items (in Beck's terms), had the highest validity and reliability. On the contrary, most of the cognitive items had the lowest validity and reliability with the exception of item 7 (the future looks dark to me). This item measures hopelessness almost perfectly. It seems to sum up all the essential aspects of hopelessness: no light at the end of the tunnel, the perception of a threatening uncertain future.

DISCUSSION

A first objective of this study was to test several hypotheses on the dimensionality of Beck's Hopelessness Scale. It was argued that identifying subcomponents, if there are any, is important because they may well have a differential effect on outcomes variables. Previous exploratory factor analyses of Beck's Hopelessness Scale suggested that the scale did contain several dimensions but our confirmatory analyses with LISREL (the first CFA on the hopelessness scale) did not provide sufficient evidence for its multi-factorial structure. On the contrary, our findings indicated that most of the items (15) tap a single dimension of hopelessness. Statistically speaking, we do not need a two- and certainly not a three-factor model to account for the correlations between the observed variables. A second objective was to study the psychometric properties of the individual items, i.e. whether the items are valid and reliable indicators of the theoretical concept hopelessness. If concepts are badly measured, i.e. if the relationship between concepts and indicators is weak or faulty, analysis of the indicators can lead to misleading conclusions concerning the latent concept. Almost all the items in Aish & Wasserman's well-fitting models were highly valid and reliable measures of hopelessness. A third and major objective was to develop a more time-efficient scale that would be of great practical value in clinical settings. Uni-factor models with less items fitted the data well and a model with four items produced a perfect fit. These could be built into an index. One may question whether a smaller number of items would reduce the value of Cronbach's alpha (internal consistency reliability of a scale) since this value increases with an increase in the number of items (as long as adding items does not reduce the average interitem correlation). Without going to much in detail (see Aish *et al*. 2000, for more detailed information), it is important to point out that a correct interpretation of alpha is based on the assumptions (to be tested) that a scale is unidimensional, i.e. factorially homogeneous, and that the measures are 'tau-equivalent'. As the number of items increases, these assumptions are less tenable. In the particular case of Beck's Hopelessness Scale, we would argue that a small number of items would be acceptable because most of them seem to be valid and reliable interchangeable measures. We would even argue that one single item, 'the future looks dark to me', would be sufficient because it measures hopelessness almost perfectly (loading = 98).

The advantages of confirmatory factor analysis seem clear. It enables researchers to test *a priori* formulated measurement hypotheses and thus to develop more satisfactory measurement instruments.

The research was supported by the Swedish Medical Research Council and by a visiting research professorship grant from the Karolinska Institute.

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