The Structure of State Hope: Testing Alternative Models Based on the Polish Version of the State Hope Scale

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ABSTRACT

Hope, defined as a cognitive set of beliefs concerning goal-related activities and comprising agency thinking and pathways thinking, is considered both as a relatively stable disposition and as a momentary state. To expand knowledge on state hope, we validated its measure by testing alternative factorial models. With two cross-sectional studies, we aimed to validate the factorial structure of the Polish version of the State Hope Scale (SHS-PL). Study 1 involved 242 Polish employees (158 women) aged 18–64 years, and Study 2 involved 953 Polish adults (704 women) aged 18 to 75 years. The results demonstrated that the bifactor model was the best representation of the structure of state hope. It simultaneously captures the global aspect of state hope and its two specific dimensions: agency and pathways. The results also revealed that the SHS-PL scores showed full scalar invariance across genders and across two age groups. Finally, the total score as well as the agency and pathways scales achieved acceptable levels of reliability (in both studies, the Cronbach's α coefficient was greater than .85 for all scales) and validity: Correlations of the SHS-PL scores with dispositional hope and with positive and negative affect conformed to the theoretically expected pattern of results. The results provide evidence supporting the postulated structure of state hope and validate the new Polish-language version of its measure.

KEYWORDS

hope

psychometric properties

factorial structure

INTRODUCTION

According to Snyder (2002), hope is understood as a cognitive appraisal referring to goal-related activities. Research demonstrates that it is important for successful psychological adaptation (e.g., Hirsch & Sirois, 2016; Ong et al., 2006; Wu, 2011). As proposed by Snyder (2002), two aspects of hope can be distinguished: a relatively stable disposition and a situationally changeable state. Both are of interest to researchers (e.g., Davidson et al., 2012; Martin-Krumm et al., 2015; Mascaro & Rosen, 2005).

Although the dimensionality of dispositional hope has been extensively tested (e.g., Babyak et al., 1993; Brouwer et al., 2008; DiGasbarro et al., 2020), the structure of the construct of state hope requires further research to resolve the debate on its dimensionality (Martin-Krumm et al., 2015; Snyder, 2002). Moreover, for scholars to conduct new studies on its role in different contexts and cultures, new language versions of a state hope measure are needed.

To fill these gaps, we have developed the Polish version of the State Hope Scale (SHS), the SHS-PL, because no Polish-language versions of a measure capturing hope as a state were available. Next, we used the SHS-PL to test new models of the structure of state hope, providing a new solution to the inconsistencies found in the literature. Therefore, this article brings twofold input: providing a new language version of a state hope measure and testing new models of its structure.

Dispositional and State Hope Measures

There is a growing tendency among researchers to suggest that various personal characteristics can be viewed in two ways: as stable dispositions and as changeable states that vary in response to the situations encountered (Horstmann & Ziegler, 2020). One of these characteristics is hope, which can be analyzed both as a relatively stable disposition or as a state (Davidson et al., 2012; Hirsch & Sirois, 2016; Martin-Krumm et al., 2015). The growing interest in the fluctuating aspect of a variable generates the need for validated tools to capture it (Mielniczuk, 2023). Several scales have been developed to assess hope: the Adult Dispositional Hope Scale (ADHS; Snyder et al., 1991) and the

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Children's Hope Scale (CHS; Snyder et al., 1997), both of which measure hope as a disposition, and the State Hope Scale (SHS; Snyder et al., 1996), which captures the fluctuating aspects of hope. These measures, based on the Snyder's model, are now the dominant methods of evaluating hope (Gallagher et al., 2019) though alternative factor models have been tested for most hope measures (Rose, 2022).

The factor structure and basic psychometric properties of the ADHS, measuring hope as a stable disposition, have been tested in many studies which have confirmed its reliability and validity (e.g., Babyak et al., 1993; Brouwer et al., 2008; DiGasbarro et al., 2020). Moreover, several language versions of the ADHS are also available (e.g., Galiana et al., 2015; Gana et al., 2013; Łaguna et al., 2005; Moreira et al., 2018; Sun et al., 2012). However, in the case of the SHS, which measures hope as a state, we found only two publications that have examined its factorial structure (Martin-Krumm et al., 2015; Snyder et al., 1996). Moreover, only two alternative models were tested and compared in these studies. Snyder et al. (1996) tested a single-factor model and a two-factor model, and Martin-Krumm et al. (2015) compared a single-factor model with a hierarchical model, namely, a model with two first-order factors and one second-order factor.

Developments in psychometrics make it possible to offer new factorial solutions for the structure of state hope. A bifactor model has been advocated as a recommended alternative method for studying multifactor constructs. Research has shown that bifactor models, which identify a single general factor and multiple unique factors, allow for a better representation of various personality constructs (Alessandri et al., 2015; Laguna et al., 2019). Such a model simultaneously captures the global aspect of a construct and the specificity of its dimensions. Despite its advantages, the validity of a potential bifactor structure of the SHS has not yet been examined.

Therefore, the aim of our research was twofold: (a) to determine whether a bifactor model represents state hope, as measured by the SHS, accurately and better than alternative models, and (b) to establish initial psychometric properties of the Polish version of this scale.

State Hope

According to Snyder's (2002) theory, hope is a cognitive appraisal that a person makes regarding goal-related activities. This theory differs substantially from other perspectives on hope, which focus on affect (Bruininks & Malle, 2005; Farran et al., 1995). More specifically, hope is conceptualized as "a positive motivational state that is based on an interactively derived sense of successful (a) agency (goal-directed energy), and (b) pathways (planning to meet goals)" (Snyder et al., 1991, p. 287). Agency thinking is the motivational component of hope, reflecting the determination and energy to achieve goals, whereas pathways thinking refers to the individual's perceived ability to use one of the multiple pathways to achieve their goals. Understood this way, hope is important for successful psychological adaptation. In the face of goal failure, hope facilitates the creation of alternative paths to goal attainment (pathways thinking) and helps individuals direct their motivation to the alternative path (agency thinking, Snyder, 2002; Snyder et al., 2005). What must be noted is that state hope encompasses agency, and pathways thinking understood as involving temporary states related to specific situations in people's lives (Snyder et al., 1996).

The results of numerous studies indicate that state hope is meaningfully associated with variables responsible for psychological adaptation. On the one hand, state hope was found to be positively associated with mental health (Martin-Krumm et al., 2015), self-efficacy (Davidson et al., 2012), and existential meaning (Mascaro & Rosen, 2005). Daily state hope was associated with positive adaptation to stress (Ong et al., 2006) and subjective quality of life (Wu, 2011). In individuals with chronic illness, state hope was related to less pain, lower perceived stress, and lower fatigue (Hirsch & Sirois, 2016). On the other hand, state hope was negatively associated with anxiety, post-traumatic stress disorder symptom severity (Larson et al., 2007), and burnout (Gustafsson et al., 2010). All these findings demonstrate that state hope is important for people's well-being and successful functioning. As such, it becomes important in many research projects, making vital the issues of the structure and measurement of this variable.

Factorial Structure of Hope

Regardless of whether hope is understood as a state or as a trait, studies thus far have failed to provide a clear answer on whether it is a one-dimensional global construct or whether two separate dimensions (pathways and agency) should be distinguished, as Snyder (2002) proposed. In past research, this issue has mainly been tested in relation to dispositional hope and very rarely to state hope. Thus, we refer first to research concerning the dimensionality of the ADHS, and then to the few studies concerning the SHS.

Analyzing the structure of dispositional hope, Brouwer et al. (2008) challenged the distinctness of the two dimensions captured by the ADHS. After comparing a single-factor model with multidimensional models for the ADHS, they found a very high correlation between the two subscales ($r = .91$). They concluded that this may indicate that dispositional hope should be considered as a unidimensional construct. However, a confirmatory factor analysis (CFA) performed to examine the factorial structure of the construct (e.g., Roesch & Vaughn, 2006; Sun et al., 2012) showed that the two-factor model fits the data better than the single-factor model.

Because of these ambiguities, some authors chose to calculate a single global hope score by averaging all ADHS items (e.g., Brouwer et al., 2008; Lopez & Calderon, 2011), whereas others examined the two dimensions of dispositional hope separately (Arnau et al., 2007; Bailey et al., 2007). Some results revealed that only one dimension of hope was significantly related to other variables. For example, Tong et al. (2010) found that a respondent's level of agency thinking could differ from their level of pathways thinking. Such a result suggests that agency and pathways are separate components of hope. Alternative factorial solutions were proposed to address these inconsistencies. A hierarchical model, a model with one second-order factor representing general hope and two first-order factors representing agency and pathways thinking, was proposed. Such a model was supported in studies of dispositional hope using the ADHS which proved to fit the data better than the single-factor model (Babyak et al., 1993). However, further studies indicated that the

bifactor model is the best representation of the structure of dispositional hope (Brouwer et al., 2008; Gomez et al., 2015; Li et al., 2018).

The bifactor model includes, simultaneously, a single general factor and multiple unique factors. It differs substantially from a hierarchical model. In a bifactor model, the general factor explains the covariance of items whereas in a hierarchical model, a second-order factor provides an explanation for the covariance of the underlying first-order factors (Markon, 2019). Thus, in the hierarchical model, the target latent variable (hope) is what the subscales (agency thinking and pathways thinking) have in common, not what the items have in common. The situation is somewhat different in the bifactor model, where there is a general variable (hope) that explains some portion of the common variance for all items and where there are also subcomponents (agency thinking and pathways thinking) that explain additional common variance for subsets of items (Reise et al., 2010).

In the case of state hope, which was of main interest in our research, only two studies have examined the factorial structure of the SHS. In the first one, Snyder et al. (1996) compared the single-factor model with the two-factor model and found that the latter better fit the data. In the second one, Martin-Krumm et al. (2015) compared the hierarchical model with the single-factor model and found the superiority of the hierarchical solution. Thus, the two-factor model and hierarchical model of SHS were supported by previous findings. We are not aware of any study that have tested other factorial solutions for the SHS. Therefore, it is worth exploring the bifactor model, which found support in the case of dispositional hope (Brouwer et al., 2008; Gomez et al., 2015; Li et al., 2018). As Snyder (2002) postulated, the structure of state hope may be similar to that of trait hope.

The Current Study

We conducted two cross-sectional studies. In Study 1, we compared several factorial models of the structure of state hope based on the Polish version of the SHS that was developed for the purpose of this study (SHS-PL). In Study 2, we tested the factor structure of the SHS-PL again, on a larger sample, and investigated the measurement invariance of the superior factorial structure.

Moreover, in Study 2 we also tested the criterion validity of the SHS-PL by investigating its associations with dispositional hope, positive affect, and negative affect. These variables were chosen as criterion validity indicators on the basis of past research that had revealed their correlations with state hope. Similar findings obtained using the SHS-PL would confirm criterion validity of the measure. First, according to Snyder et al. (1996), "theoretically, dispositional hope should relate to the intensity of state hope by setting a band or range within which state hope varies" (p. 321). In other words, the authors have assumed that individuals with higher dispositional hope should also exhibit higher state hope compared with people with low dispositional hope. Their research positively verified this assumption, showing that participants with high dispositional hope reported greater daily hope as well. Second, state hope was found to be positively related to current positive affect and negatively related to current negative affect (e.g., Ouweneel et al., 2012; Steffen & Smith, 2013; Snyder et al., 1996). State hope is also accompanied by fewer symptoms of depression, is a positive predictor of positive affect, and a negative predictor of negative affect over and above personality, bipolar optimism, and spirituality (Ciarrocchi & Deneke, 2006). Similar associations were expected in our study to confirm the criterion validity of the SHS-PL.

STUDY 1

To test the factorial structure of state hope, we compared five alternative models. Model 1 assumed that all items loaded on a single common factor. Model 2 assumed two uncorrelated factors: agency and pathways, each comprising three observed variables (items). Model 3 allowed the two factors extracted in the previous model to be correlated. Model 4 was a hierarchical model that postulated that there was one second-order factor (hope) consisting of two first-order factors (agency and pathways). Model 5 was a bifactor model that assumed the existence of three factors: a general state hope factor, formed by all items, and two correlated factors, agency and pathways, each encompassing three observed variables (see Figure 1).

Method

PROCEDURE

To determine sample size, we applied a general rule of thumb. We chose the CFA as main analytical strategy, and according to a common rule of thumb a sample size of more than 200 offers adequate statistical power (Kline, 2016). Taking into account a low number of indicators per factor (three items per each SHS factor), a larger sample is recommended. Therefore, we decided to obtain data from at least 250 participants.

We invited companies to take part in a larger research project of which this study was a part. In every company, we asked employees to participate after we had obtained consent from the managers. The criteria for the selection of employees were: being an adult (≥ 18 years old) and having a work agreement with the company taking part in the study.

The data were gathered during direct interactions with participants at their companies, using paper-and-pencil questionnaires. Filled questionnaires were given back in sealed envelopes to ensure confidentiality and anonymity of data. Participation in the study was voluntary, and the participants did not receive any reward.

PARTICIPANTS

The study involved 257 Polish employees. Women accounted for 61.2% of the sample (N = 158; six participants did not report their gender). Participants were 18–64 years old (M = 33.05, SD = 9.66). The sample consisted of people with higher (78, 2%) or secondary education (21, 8%). The employees worked in different sectors: in the service industry (91.3%), construction (5.4%), or the industrial sector (3.9%). They had a full-time work contract (52.1%), a part-time work contract (25.3%) or another type of job agreement (21,8 %).

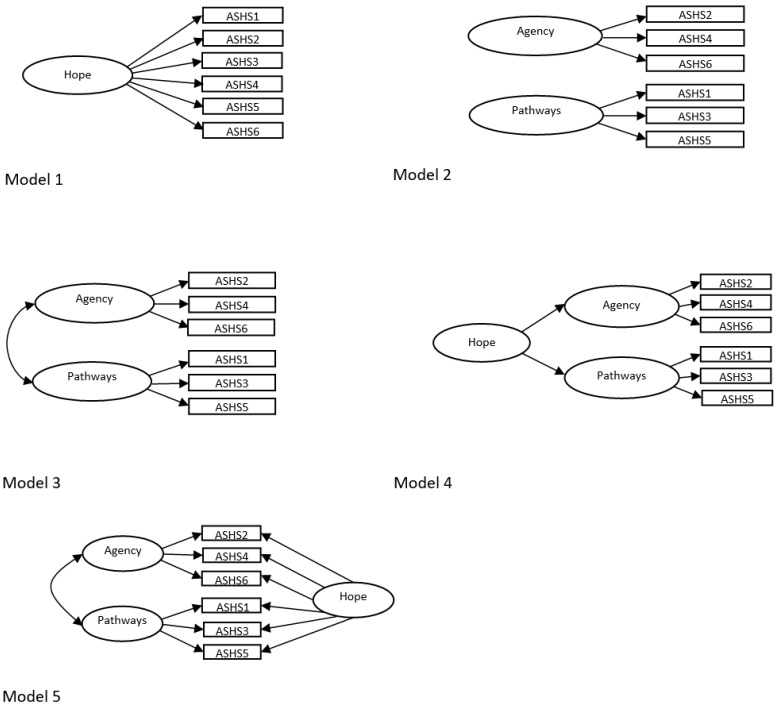

FIGURE 1.

The alternative measurement models for the State Hope Scale.

PARTICIPANTS

State Hope. We used the State Hope Scale developed by Snyder et al. (1996), which measures state hope in adults. This self-report questionnaire consists of six items (e.g., "I can see many ways to deal with whatever problem I am facing now"). Participants respond to each item using an eight-point scale (1 = *definitely false* to 8 = *definitely true*). To develop the SHS-PL, we applied a recommended multistep procedure that ensured quality and equivalence of the translated content (Acquadro et al., 2008). First, the items were forward translated into Polish by five independent translators. Next, the synthesis of these translations was agreed on by the research team fluent in English and Polish. It was then back translated into English by a translator totally blind to the original version. After comparing the original and the back-translated versions, the research team made improvements in item wording to ensure language equivalence. Developed this way, the SHS-PL was completed and evaluated (in the form of thinking aloud) by four adults with relatively low education (secondary or lower), which was meant to test items' comprehensibility. Again, the research team reviewed the Polish version and made improvements in item wording to ensure their clarity to respondents. In this way, we obtained the final version of the SHS-PL (see Appendix).

DATA ANALYSES

We used the CFA (Brown, 2006) as a main analytical approach to compare the different factorial structure models of the SHS-PL. The analysis was performed using Amos 28 (Arbuckle, 2021). We applied the maximum likelihood estimation method. The χ^2 test, comparative fit index (CFI), root-mean-square error of approximation (RMSEA), standardized root mean square residual (SRMR), and the Akaike information criterion (AIC) were used as measures of model fit. The lower the value of AIC, the better the model fits the data; <.08 for RMSEA and SRMR, , and >.90for CFI indicate good model fit (Brown, 2006). When comparing the models (non-nested), we used the ΔCFI index, for which values lower than .01 indicate no statistically significant difference in model fit (Cheung & Rensvold, 2002).

Results

PRELIMINARY ANALYSES

To conduct a preliminary exploration of the structure of the data, we carried out an exploratory factor analysis (EFA). The results showed sampling adequacy (Kaiser–Meyer–Olkin test = .88; Bartlett's test of sphericity χ^2 = 1,205.61, df = 15, p < .001) and a lack of multicollinearity (the determinant = .008). A single-factor solution emerged with eigenvalues >1, which accounted for 73.27% of the variance. This initial analysis did not allow us to compare alternative models. However, it demonstrated that the item pool was suitable for further analyses. Moreover, for all SHS-PL items, their skewnesses and kurtoses ranged from −1.0 to + 1.0, demonstrating no great distortion of the normal distribution (Gao et al., 2008). Any outliers were excluded from the analyses. To deal with missing data, the few missing observations (six to nine observations per item) were filled using regression data imputation available in Amos.

COMPARISON OF ALTERNATIVE MODELS: CONFIRMATORY FACTOR ANALYSIS

We analyzed the fit indices of the five alternative models (see Table 1). The bifactor model (Model 5) fit the data best. All indicators of model fit accepted this model as reflecting the factor structure of state hope as measured by the SHS-PL. Moreover, it fit the data significantly better than any of the alternative models (including the single-factor model from the EFA), as indicated by ΔCFI values exceeding .01 for all comparisons and by the lowest AIC values (see Table 1).

Descriptive statistics and factor loadings for the best-fitting bifactor model are presented in Table 2. The factor loadings ranged from .21 to .78 for general state hope, from .41 to .77 for pathways, and from .62 to .92 for agency. The two latent factors, pathways and agency, were significantly and highly correlated with each other at r = .94.

RELIABILITY

The internal consistency of the SHS-PL scales was estimated using Cronbach's α. The results revealed adequate reliability indices for the pathways (α = .89) and agency (α = .88) factors and for the general state hope factor (α = .92).

STUDY 2

In Study 2, we further tested the factorial structure of the SHS-PL and examined the measurement invariance of the best fitting model across gender and age groups. We also tested the criterion validity of the measure.

Method

PROCEDURE

Because we carried out a CFA and analyzed measurement invariance across different gender and age groups, we used two criteria to determine sample size. First, as a rule of thumb, sample sizes of 200+ offer adequate statistical power for a single-group CFA. Second, for a multigroup CFA, a general rule of thumb is 100 participants in each group, and because CFA is a large-sample technique, the bigger the sample, the better (Kline, 2016). Therefore, we aimed to obtain as large (and diverse in age) a sample as possible to be able randomly select large-enough groups differing in gender, and especially differing in age, distinguishing groups of young adults (≤ 20 years) and middle-aged adults (≥ 40 years).

University students of different departments from two universities were invited after their courses to take part in this survey, as were employees of several businesses and local government administration offices. The data were gathered during direct interactions with respondents using paper-and-pencil questionnaires. Filled questionnaires were returned in sealed envelopes to ensure the confidentiality and anonymity of data. Participation in the study was voluntary, and the participants did not receive any remuneration.

PARTICIPANTS

The study involved 953 Polish adults (704 women) aged 18 to 75 years (M = 28.49, SD = 10.58). The majority of respondents (69.05% of the sample) had completed a high school education; those with higher education accounted for 30.22% of the sample, and those with primary

TABLE 1.
Study 1: Comparison of Fit Indices Across Alternative Factor Models of State Hope

Model	χ^2	df	p	RMSEA	SRMR	CFI	AIC	Model comparison	ΔCFI
M1 Single factor	118.936	9	.001	.218	.054	.906	142.936	M1 vs M5	.093
M2 Two uncorrelated factors	305.530	9	.001	.359	.419	.746	329.530	M2 vs M5	.253
M3 Two correlated factors	78.090	8	.001	.185	.045	.940	104.090	M3 vs M5	.059
M4 Hierarchical	78.090	8	.001	.185	.045	.940	104.090	M4 vs M5	.059
M5 Bifactor	4.704	4	.319	.026	.016	.999	38.704	-	-

Note. RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; CFI = comparative fit index; AIC = Akaike information criterion.

TABLE 2.
Study 1: Descriptive Statistics and Factor Loadings for the Polish Version of the State Hope Scale

Item	M	SD	Factor loading		
			Hope	Pathways	Agency
Item 1	6.27	1.22	.78	.41	
Item 3	5.97	1.36	.73	.55	
Item 5	5.80	1.31	.47	.77	
Item 6	5.54	1.57	.21		.62
Item 4	5.68	1.46	.35		.76
Item 2	5.81	1.51	.49		.92

education accounted for only 0.21% (five participants did not provide information on their education level).

MEASURES

State Hope. To capture state hope, we used the SHS-PL developed in Study 1.

Dispositional Hope. To measure dispositional hope, we administered the ADHS (Snyder et al., 1991), as adapted into Polish (Łaguna et al., 2005). Out of its 12 items, eight items yield a total score (e.g., "There are lots of ways around any problem") Responses are given on an eight-point scale (1 = *definitely false* to 8 = *definitely true*). The Polish version of the ADHS demonstrated good reliability—Cronbach's αs ranged from .76 to .86 in different samples—and high content validity, criterion validity, and known-groups validity in previous studies (Łaguna et al., 2005). Cronbach's α in this study was .88.

Positive and negative state affect. To measure positive and negative state affect, we applied the Positive and Negative Affect Schedule—Expanded version (PANAS-X; Watson et al., 1988), as adapted into Polish (Fajkowska & Marszał-Wiśniewska, 2009). Respondents estimated the current intensity of their feelings and emotions on a five-point scale (1 = *very slightly or not at all* to 5 = *extremely*). Ten items measure positive affect (e.g., "enthusiastic"), and 10 others measure negative affect (e.g., "afraid"). The Polish version of both PANAS-X scales demonstrated reliability—Cronbach's αs ranged from .85 to .90 in different samples—and high content and criterion validity in previous studies (Fajkowska & Marszał-Wiśniewska, 2009). Cronbach's α in this study was .85 for positive affect and .87 for negative affect.

DATA ANALYSIS

As in Study 1, we conducted a CFA that compared five alternative models and applied the same model fit criteria. Next, we examined the measurement invariance of the SHS-PL across gender and age groups using multigroup confirmatory factor analysis (Meredith, 1993; Steenkamp & Baumgartner, 1998). A series of increasingly constrained models were tested. We started with testing configural invariance by estimating the same model in all groups without cross-group constraints. In the second step, we proceeded to test more stringent conditions, requiring equivalent factor loadings across groups (metric invariance, also called weak invariance; Meredith, 1993). In the third step, we constrained equivalent intercepts across groups (scalar invariance, also called strong invariance; Meredith, 1993). To test the differences between increasingly restricted nested models, we used ΔCFI. An absolute difference in CFI l < .01 is regarded as indicating measurement invariance (Cheung & Rensvold, 2002).

We also tested basic descriptive statistics, reliability, and criterion validity (Pearson's *r* correlations between SHS-PL and criterion variables).

Results

FACTORIAL STRUCTURE OF STATE HOPE

Before conducting the factor analysis, we filled out the missing data (five to nine observations per item) using regression data imputation, and we checked the normality of the distribution for each variable, analyzing the kurtosis and skewness values. For all items, skewnesses and kurtoses ranged from –1.0 to + 1.0. Any outliers were excluded from the analysis.

We compared five alternative CFA models of the SHS-PL, the same as in Study 1. The bifactor model (Model 5, see Figure 1) obtained good fit indices and fit the data better than alternative models (see Table 3).

The factor loadings in the bifactor model ranged from .35 to .78 for the general state hope factor, from .34 to .69 for pathways, and from .55 to .84 for agency. The two latent factors—pathways and agency—significantly correlated with each other (*r* = .90).

RELIABILITY

The internal consistency of the SHS-PL scales evaluated using Cronbach's α was acceptable: α = .86 for the pathways scale, α = .85 for the agency scale, and α = .90 for general state hope.

MEASUREMENT INVARIANCE

We tested the measurement invariance of the SHS-PL across gender and age groups. Because there were 245 men in the sample, we randomly selected 245 women in order to have an equal number of participants in both groups. The configural unrestricted model showed a good fit to the data (see Table 4). Next, we imposed equality constraints on all factor loadings across men and women. The constrained model did not differ significantly from the configural model, indicating metric invariance. Therefore, in the next step we imposed equality constraints on all item intercepts, to test scalar invariance. Again, all indicators of model fit supported full scalar invariance of the measure across men and women.

TABLE 3.
Study 2: Comparison of Fit Indices Across Alternative Factor Models of State Hope

Model	χ^2	*df*	*p*	RMSEA	SRMR	CFI	AIC	Model comparison	ΔCFI
M1 Single factor	317.930	9	.001	.190	.054	.911	341.930	M1 vs M5	.082
M2 Two uncorrelated factors	858.986	9	.001	.315	.377	.756	882.986	M2 vs M5	.237
M3 Two correlated factors	174.083	8	.001	.148	.043	.952	200.083	M3 vs M5	.041
M4 Hierarchical	174.083	8	.001	.148	.043	.952	200.083	M4 vs M5	.041
M5 Bifactor	26.761	4	.001	.077	.040	.993	60.761	-	-

Note. RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; CFI = comparative fit index; AIC = Akaike information criterion.

TABLE 4.
Study 2: Measurement Invariance of the Polish Version of the State Hope Scale Across Gender and Age Groups

Model	χ^2	*df*	*p*	RMSEA	SRMR	CFI	AIC	Model comparison	ΔRMSEA	ΔSRMR	ΔCFI
Gender invariance (N = 245 men, N = 245 women)											
M1. Configural invariance	12.296	8	.138	.033	.016	.997	80.30	-	-	-	-
M2. Metric invariance	37.653	17	.003	.050	.036	.988	87.65	M2 vs M1	.017	.020	.009
M3. Scalar invariance	52,845	19	.001	.060	.044	.980	98.85	M3 vs M1	.010	.008	.008
Age invariance (N = 149 young adults, N = 134 middle-aged adults)											
M1. Configural invariance	13.74	8	.089	.050	.038	.995	85.31	-	-	-	-
M2. Metric invariance	32.882	17	.012	.058	.037	.985	82.88	M2 vs M1	.008	.001	.010
M3. Scalar invariance	34.916	19	.014	.055	.036	.985	80.92	M3 vs M2	.003	.001	.000

Note. RMSEA = root mean square error of approximation; SRMR = standardized root mean square residual; CFI = comparative fit index; AIC = Akaike information criterion.

To assess the measurement invariance of the SHS-PL across age, we selected two diverse age groups distinguished in life span developmental psychology (Lachman, 2004): (a) young adults (aged 18–20 years; n = 149) and (b) middle-aged adults (aged over 40 years; n = 134). We applied the same procedure of measurement invariance analysis as in the case of gender groups. The results supported not only configural but also metric and full scalar invariance of the SHS-PL across these age groups (see Table 4). These results ensure that meaningful intergroup comparisons are possible for both regression slopes and mean SHS-PL scores between men and women and across the two age groups (Chen, 2007).

Such comparisons of mean scores revealed statistically significant differences between men and women in general state hope (M_{Men} = 5.81, SD_{Men} = 1.15; M_{Women} = 5.38, SD_{Women} = 1.36; $F(1, 488)$ = 13.95, p = .001, η^2 = .28), in pathways thinking (M_{Men} = 6.05, SD_{Men} = 1.22; M_{Women} = 5.51, SD_{Women} = 1.44; $F(1, 488)$ = 20.12, p = .001, η^2 = .40), and in agency scales (M_{Men} = 5.57, SD_{Men} = 1.34; M_{Women} = 5.26, SD_{Women} = 1.44; $F(1, 488)$ = 6.13, p = .014, η^2 = .12). Compared with women, men demonstrated higher levels of general state hope and its components.

Univariate analyses for the two age groups also revealed statistically significant differences in general state hope ($M_{Young\ adults}$ = 5.40, SDYoung adults = 1.31; $M_{Middle\text{-}aged\ adults}$ = 5.79, $SD_{Middle\text{-}aged\ adults}$ = 1.35; F(1, 282) = 6.13, p = .014, η^2 = .21), in pathways thinking ($M_{young\ adults}$ = 5.54, $SD_{Young\ adults}$ = 1.39; $M_{Middle\text{-}aged\ adults}$ = 5.97, $SD_{Middle\text{-}aged\ adults}$ = 1.43; $F(1, 282)$ = 6.59, p = .011, η^2 = .23), and in agency thinking ($M_{Young\ adults}$ = 5.26, $SD_{Young\ adults}$ = 1.43; $M_{Middle\text{-}aged}$ = 5.61, $SD_{Middle\text{-}aged}$ = 1.46; $F(1, 282)$ = 4.21, p = .041, η^2 = .15). Middle-aged adults demonstrated higher levels of all state hope dimensions compared with young adults. The results indicated that the level of state hope and its components may depend on respondents' gender and age.

DESCRIPTIVE STATISTICS AND CRITERION VALIDITY

Correlations between state hope and all criterion variables were statistically significant, and each of them were in the expected direction (see Table 5). General state hope as well as the agency and pathways components were strongly and positively related to dispositional hope. Moreover, they correlated positively with positive affect and negatively with negative affect. These results are consistent with the results of previous studies (e.g., Ouweneel et al., 2012; Steffen & Smith, 2013; Snyder et al., 1996) and confirm the criterion validity of the SHS-PL.

DISCUSSION

The aim of our study was to test the factorial structure of state hope as measured by the Polish adaptation of the SHS (Snyder et al., 1996). First, we developed the Polish version of the measure (SHS-PL). Next, we compared the fit of five alternative factorial models and chose the best-fitting one for further analyses of the measure's reliability and validity. The comparison of alternative models demonstrated that the bifactor model fit the data best. This confirmed that the SHS-PL captures two dimensions—agency and pathways thinking—and one general state hope factor, confirming Snyder's (2002) theory with

TABLE 5.
Study 2: Descriptive Statistics and Correlations of SHS-PL Scores with Dispositional Hope, Negative Affect, and Positive Affect

		M	*SD*	1	2	3	4	5
1	SHS-PL General Score	47.50	8.85					
2	SHS-PL Agency	22.54	4.98	.92***				
3	SHS-PL Pathways	24.94	4.69	.91***	.67***			
4	Dispositional hope	33.57	7.96	.79***	.77***	.67***		
5	Negative affect	17.30	6.74	−.26***	−.24***	−24***	−.37***	
6	Positive affect	28.03	7.05	.52***	.51***	.45***	.56***	−.20***

Note. *** p < .001 (two-tailed). N = 953.

regard to state hope. Our results are consistent with those of studies testing the structure of dispositional hope, which also supported the bifactor model (Brouwer et al., 2008; Gomez et al., 2015; Li et al., 2018). We have also extended previous research on state hope that tested the two-factor model and hierarchical models of the SHS (Martin-Krumm et al., 2015; Snyder et al., 1996), providing new solution. Altogether, the findings demonstrate that both dispositional hope and state hope may be considered as bifactor constructs, which allows one to analyze not only two specific dimensions of hope but also the general hope scores. This may be important for future studies and for practical applications of the SHS, which is one of the dominant methods of assessing hope (Gallagher et al., 2019). Moreover, we add to the current debate of alternative factor models for hope measures (Rose, 2022) demonstrating usefulness of a bifactor solution for studying multifactor constructs (Alessandri et al., 2015; Laguna et al., 2019).

We also proved that SHS-PL scores demonstrated full scalar invariance across gender and across two age groups, which allows for meaningful comparisons of mean scores (Little, 1997; Meredith, 1993). Therefore, it can be reasonably assumed that differences in SHS-PL scores between groups can be interpreted as reflecting real differences in state hope rather than differences resulting from measurement error. Scalar invariance can also be interpreted as additional support for the bifactor model's robustness (Gomez et al., 2015; Sun et al., 2012). Interestingly, we observed differences in state hope level across gender and age. Compared to women, men reported significantly higher levels of general state hope as well as for the agency and pathways components. These findings are consistent with those of Chang (2003), who found similar differences between women and men in a middle-aged population. In addition, in our study, middle-aged adults showed a higher level of overall state hope and its components than young adults. This may suggest that state hope increases with age, but more research with longitudinal designs is needed to verify this hypothesis. In case of dispositional hope, results of a longitudinal study showed that it increases with age, peaking between the ages of 30-45 and 46-64, and then declines sharply after the age of 65 (Marques et al., 2017). The question of the malleability of state hope deserves further analysis. Moreover our results revealed that the SHS-PL and its two scales achieved acceptable reliability and validity. The values of Cronbach's α were similar to those obtained in other studies (Martin-Krumm et al., 2015; Snyder et al., 1996) and indicated good to excellent reliability of the scales. Correlations between SHS-PL scales and dispositional hope as well as positive and negative affect showed a pattern of results in line with theoretical expectations (Snyder et al., 1996) and previous studies (Ouweneel et al., 2012; Steffen & Smith, 2013). Higher levels of general state hope and its two scales are accompanied by higher levels of dispositional hope and positive affect, and by a lower level of negative affect. These findings confirm the criterion validity of the SHS-PL, demonstrating its logical and theoretically expected links with other constructs.

Strengths, Limitations, and Avenues for Future Studies

The current study has some limitations. We investigated the relationship of state hope with three criterion variables. To further test the validity of the scale, it would be advisable to examine the relationship of state hope to other variables with which it should logically correlate (e.g., self-esteem, self-efficacy). We found that all state hope factors (general state hope, agency thinking, and pathways thinking) were similarly related to dispositional hope and two types of state affect. One could argue that some other outcomes can be predicted by only one subdimension of hope. For example, in the case of dispositional hope, agency thinking—but not pathways thinking—has been shown to predict job burnout (Sun et al., 2012). Such results could further support the validity of treating the two dimensions as separate and distinct components of state hope.

Because the SHS-PL is a short measure, it can be used repeatedly, which makes it useful in intensive longitudinal studies that have become popular recently (Mielniczuk, 2023). Therefore, additional research using repeated SHS-PL measurements is needed. This would allow for a multilevel factor analysis to reexamine the structure of the tool. Moreover, subsequent studies should test whether the factor structure of the SHS-PL remains unchanged in other specific groups (e.g., clinical samples or unemployed people). If the bifactor model turns out to best fit the data from other samples, this can be taken as additional confirmation of the factorial structure of the SHS-PL.

Recommendations for Practice

The results of our studies demonstrated that separate scores for two distinct but highly correlated dimensions—namely, agency (Items 2, 4, and 6) and pathways thinking (Items 1, 3 and 5)—can be calculated on the basis of the SHS-PL items. Because a bifactor solution occurred in the best-fitting model, it is also possible to calculate the global score of state hope (an average of all six items). These three scores can be useful in scientific research and in applied settings. However, in future studies, they should not be included simultaneously as independent variables into a multiple regression model because of high correlations between two state hope dimensions. A strong correspondence among them would lead to multicollinearity, which could result in misleading interpretations of the results (Vatcheva et al., 2016). The solution may be to include the global score or only one of the two dimensions in the equation, depending on the study aims. However, all three scales can be used in counseling and other applied contexts because all scales obtained high reliability: Cronbach's α exceeded .80 for both dimensions and even .90 for the global score. Therefore, the measure can be used in individual diagnosis, allowing one to track current hope levels. The measure may be valuable, for example, in therapeutic sessions with depressed patients (Mascaro & Rosen, 2005) or chronically ill patients (Hirsch & Sirois, 2016), during a coaching process when working on goal realization, or during psychological interventions (Davidson et al., 2012). Therefore, the SHS-PL may be fruitful both for future research and for psychological practice.

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DATA AVAILABILITY

Data are available from the corresponding author.

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APPENDIX

Polish version of the State Hope Scale

Przeczytaj uważnie każde z poniższych twierdzeń. Korzystając z poniższej skali, wybierz cyfrę, która najlepiej opisuje to, jak o sobie myślisz w tej chwili. Skup się przez chwilę na sobie oraz na tym, co się dzieje aktualnie w Twoim życiu. Kiedy osiągniesz już stan koncentracji na „tu i teraz", przejdź do udzielania odpowiedzi i wypełnij kwestionariusz posługując się poniższą skalą:

1 = *Zdecydowanie nieprawdziwe*, 2 = *W większości przypadków nieprawdziwe*, 3 = *Raczej nieprawdziwe,* 4 = *Trochę nieprawdziwe*, 5 = *Trochę prawdziwe*, 6 = *Raczej prawdziwe*, 7 = *W większości przypadków prawdziwe*, 8 = *Zdecydowanie prawdziwe.*

1.	Jeśli znalazł(a)bym się teraz w trudnej sytuacji, potrafił(a)bym wymyślić wiele sposobów, aby znaleźć z niej wyjście.	1	2	3	4	5	6	7	8
2.	Z zapałem realizuję moje aktualne zamierzenia.	1	2	3	4	5	6	7	8
3.	Widzę wiele sposobów poradzenia sobie z każdym problemem, z którym się teraz zmagam.	1	2	3	4	5	6	7	8
4.	W tym momencie uważam siebie za osobę odnoszącą sukcesy.	1	2	3	4	5	6	7	8
5.	Przychodzi mi do głowy wiele sposobów na osiągnięcie moich aktualnych celów.	1	2	3	4	5	6	7	8
6.	Obecnie osiągam cele, które sobie wyznaczyłem(am).	1	2	3	4	5	6	7	8