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ORIGINAL ARTICLE

Measuring positive health: Concurrent and factorial validity based on a representative Dutch sample

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Abstract

The definition of health has been shifting from disease absence to physical, emotional and social well-being. To demedicalise societal problems, the term Positive Health (PH) was introduced—a concept focused on the ability to adapt and to self-manage, in the face of physical, emotional and social challenges. The concept of PH receives broad attention, among others because a PH dialogue tool is intensively being used as a communication instrument while reflecting on patients' health, but a PH measurement instrument is not yet fully established. Recently, however, a 17-item PH measurement model was proposed. In this paper, a factor analysis and regression analyses were performed to test the factorial validity and concurrent validity of this PH measurement model based on a representative sample of the Dutch population ($n = 1016$, 50.0% women; age: from 15 until 39 = 29.8%, from 40 until 65 = 43.0%, older than 65 = 27.2%; education levels: low = 28.7%, medium = 42.6%, high = 28.7%). These tests are crucial to understand how well the PH measurement model is suitable as a measurement instrument. The factor analysis provided support for the factorial validity of the proposed PH measurement model. When comparing the proposed PH measurement model with domains of other measurements of health (i.e. BRS, HR-SWB, ICECAP, and EQ5D), to test the concurrent validity, the model explained more than half of the variance in measurements of the domains *happiness* ($R^2 = 0.60$) and *overall self-rated health* ($R^2 = 0.57$), but explained less than a quarter of the variance in measurements of *autonomy* ($R^2 = 0.17$ / $R^2 = 0.13$), *personal growth* ($R^2 = 0.21$), *stability* ($R^2 = 0.20$), *self-care* ($R^2 = 0.15$), and *resilience* ($R^2 = 0.24$). Two of the six domains of the PH measurement model—mental functioning and daily functioning—were weakly related to the other measurements of health. The results of this study imply that the PH measurement model is suitable to measure multiple dimensions of health. They also suggest that the PH measurement model may not be an encompassing measure for the concepts measured through other health measurements and might explain variance in health beyond these other measurements.

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KEYWORDS
concurrent validity, factor analysis, factorial validity, positive health

1 | INTRODUCTION

As chronic disease has become more prevalent, scholars and healthcare providers have advocated for expanding the conventional definition of health beyond the focus on the absence of disease (Huber et al., 2011). Responding to this call, Huber and colleagues proposed the term Positive Health (PH), referring to a concept of health that addresses 'the ability to adapt and to self-manage, in the face of social, physical and emotional challenges' (Huber et al., 2016, p. 7). This concept of health has subsequently been developed into a PH framework based on qualitative and quantitative input from healthcare stakeholders—i.e., healthcare providers (physicians, nurses, physiotherapists), patients with a chronic condition, policymakers, insurers, public health professionals, citizens (as a representative sample of society), and researchers (Huber et al., 2016). During interviews and focus group sessions, the stakeholders were asked to indicate which aspects they considered to be related to the ability to adapt and to self-manage, in the face of social, physical and emotional challenges. Concepts such as salutogenesis, sense of coherence, and resilience were often mentioned by the stakeholders (Huber et al., 2016; Prinsen & Terwee, 2019; Van Vliet et al., 2021). Huber et al. (2016) categorised the broad range of indicators into a PH framework containing six dimensions, initially named: bodily functions, mental functions and perception, spiritual existential dimension, quality of life, social and societal participation and daily functioning. Introducing PH was thought to support shared decision-making in medical practice and demedicalise societal problems by bridging the gap between healthcare and the social domain (Huber et al., 2016, p. 1).

Since the introduction of PH, several steps have been taken to transform the concept of PH into a measurement suitable for practical application. A dialogue tool has been developed, that is a communication instrument that assists practitioners during conversations about PH (see Van Vliet et al., 2021), and items were generated and tested for both content validity (Prinsen & Terwee, 2019) and factorial validity (Van Vliet et al., 2021). Thus far, the dialogue tool has been widely used by practitioners in The Netherlands (Van Vliet et al., 2021), among others by the Dutch Ministry of Health, Welfare and Sport,[1] and is expanding internationally to Japan, Belgium, and Iceland.[2] However, a PH measurement instrument is still in development. The test of content validity, focused on a large set of items, revealed concerns with regard to relevance, comprehensiveness and comprehensibility of the items (Prinsen & Terwee, 2019). The test of factorial validity, based on a sample of highly educated, relatively old individuals, led to a selection of items that reliably measures six different factors (Van Vliet et al., 2021). To advance the transformation of the concept of PH into a measurement, further validation based on a more general population and comparisons with validated health measures is necessary (Van Vliet et al., 2021).

What is known about this topic?

- A Positive Health (PH) dialogue tool—i.e., a health communication instrument—has been widely used by practitioners, among others by the Dutch Ministry of Health, Welfare and Sport, but a PH measurement instrument is still in development.
- A recent previous study developed the Positive Health dialogue tool into a 17-item Positive Health measurement model based on a sample of highly educated, relatively old individuals.
- No studies have tested the concurrent validity of the previously proposed Positive Health measurement model.

What this paper adds?

- The current study provides empirical support for the *factorial validity* of the Positive Health measurement model based on a representative sample of the Dutch population.
- This paper tests the *concurrent validity* of the Positive Health measurement model by comparing the model with other measurements of health (i.e., Brief Resilience Scale, BRS; Health-Related Subjective Well-Being, HR-SWB; EuroQol 5-Dimensions, EQ-5D; EuroQol Visual Analog Scale, EQ-VAS; ICEpop CAPability measure for Adults, ICECAP-A).
- The Positive Health measurement model explained more than half of the variance in overall self-rated health and happiness, but less than a quarter of the variance in resilience, measured through the Brief Resilience Scale.

In this present paper, we aimed to test the factorial validity and concurrent validity of the 17-item PH measurement model proposed by Van Vliet et al. (2021). Using a representative sample of the Dutch population, a Confirmatory Factor Analysis (CFA) was conducted to test the factorial validity—that is, the extent to which a putative structure of a scale is recoverable in a set of test scores. The proposed PH measurement model was compared with validated health scales to examine the concurrent validity—that is, the extent to which a new test compares to a well-established test. Collectively, these tests of validity increase the understanding of how well the proposed PH measurement model is suited for measurement purposes. Such understanding is much needed given the large interest in PH. Our research questions were as follows:

1. To what extent does data from a representative sample of the Dutch population provide support for the factor structure of the 17-item PH measurement model proposed by Van Vliet et al. (2021)?
2. To what extent does the relationship between PH measurement scores and the scores on other measurements of health (i.e., Brief Resilience Scale, BRS; Health-Related Subjective Well-Being, HR-SWB; EuroQol 5-Dimensions, EQ-5D; EuroQol Visual Analog Scale, EQ-VAS; ICEpop CAPability measure for Adults, ICECAP-A) provide support for the measurement model proposed by Van Vliet and colleagues (2021)?

2 | METHODS

2.1 | Study population

Participants in this study were recruited through a Dutch internet panel in 2020, administered by research agency Flycatcher, a spin-off company of Maastricht University. The Flycatcher panel meets high quality requirements and is ISO-certified. The panel consists of 20,000 members from the Dutch general public. Individuals aged 18 and up are eligible to apply for the Flycatcher internet panel by registering on the Flycatcher website (www.flycatcher.eu). The participants of this study were contacted via email and invited to take part in the survey. We requested Flycatcher to recruit 1000 persons representative of the Dutch population. An invitation email for the survey, including a brief description of the study as well as an expiration date for completing the survey, was sent to 1540 panel members. In total, 1055 of these members started the study. Participants that completed the survey (n = 1016; 66% of invited panellists) were given points for completing the survey. These points were exchangeable for (charity) gift vouchers. In terms of demographic variables (gender, age, level of education, and region), the panellists participating in this study (50.0% women; age: from 15 until 39 = 29.8%, from 40 until 65 = 43.0%, older than 65 = 27.2%; education levels: low = 28.7%, medium = 42.6%, high = 28.7%) were representative of the general Dutch population (50.3% women; age: from 15 until 39 = 36.9%, from 40 until 65 = 39.8%, older than 65 = 23.3%; education levels: low = 28.3%, medium = 37.7%, high = 34.0%).

2.2 | Measurements

2.2.1 | My positive health

To measure PH, the 17-item measurement model proposed by Van Vliet and colleagues (2021) was used. The measurement model consists of six factors: bodily functioning, mental functioning, future perspective, contentment, social participation, and daily functioning. Except for mental functioning, each factor was composed of three items. Mental functioning was composed of two items. Example items were: 'I feel healthy' (bodily functioning), 'I can remember things well' (mental functioning), 'I look for ways to change difficult situations' (future perspective), 'I am happy' (contentment), 'I have good contact with other people' (social participation), and 'I know what I can and cannot do' (daily functioning). A full overview of item descriptions is reported in Table 1. In line with Van Vliet et al. (2021), responses were rated on an 11-point Likert scale ranging from *totally disagree* (=0) to *totally agree* (=11). PH scores for the six domains were computed as the mean response to the items.

2.2.2 | Validation scales

To test the concurrent validity of the PH measurement model, the relationship between the 17-item PH measurement model and other health-related scales was tested. Given that PH was thought to be a vital concept that can support shared decision-making in medical practice and demedicalise societal problems (Huber et al., 2016, p. 1), we argue it is important to test how well the proposed measurement of PH is an encompassing measurement for the concepts measured by commonly used and/or comprehensive health measurements. Four validation scales were used. The chosen validation scales are commonly used to assess health (e.g., Al-Janabi et al., 2012; Herdman et al., 2011) and/or comprehensive health outcome measures (de Vries et al., 2016). Moreover, the chosen validation scales are indicators of important aspects of PH: resilience, self-management, health, and well-being (Huber et al., 2016). The measurements described next are the validation scales.

2.2.3 | Resilience

To measure resilience, five items of the brief resilience scale (BRS) were used (Smith et al., 2008). The items used were: (1) 'I tend to bounce back quickly after hard times', (2) 'I have a hard time making it through stressful events', (3) 'It does not take me long to recover from a stressful event', (4) 'It is hard for me to snap back when something bad happens', and (5) 'I usually come through difficult times with little trouble'. Answers were given on a 5-point Likert scale ranging from *strongly disagree* (=1) to *strongly agree* (=5). After reverse cording the negatively worded items (2 and 4), the BRS scores were computed as the mean score on the items. The higher the mean score, the more resilient the respondent is.

2.2.4 | Health-related subjective well-being

Health-related subjective well-being (HR-SWB) was measured using the measurement proposed by De Vries and colleagues (2016). This measurement comprises five core dimensions: (1) bodily independence, (2) happiness, (3) loneliness, (4) autonomy, and (5) personal growth. Each domain was measured using one item, such as 'I feel lonely' (loneliness). Responses were rated on a 5-point Likert scale

ranging from *strongly disagree* (= 1) to *strongly agree* (= 5), and negatively worded items were reverse coded.

2.2.5 | EQ-5D

The EQ-5D-5L (EuroQol five-dimensions) questionnaire was used to measure different domains of health (Herdman et al., 2011): mobility, self-care, usual activities, pain/discomfort and anxiety/depression. To measure each domain, one question was asked. The answers to these questions were given on an ordinal scale with five levels: no problems (=5), some problems (=4), moderate problems (=3), severe problems (=2), and extreme problems/unable to (=1). A visual analog scale (VAS) was used to measure the self-rated health of the respondent that day. Responses were rated from *'The best health you can imagine'* (=100) to *'The worst health you can imagine'* (=0).

2.2.6 | ICECAP-A

The ICECAP-A (ICEpop CAPability measure for Adults) was used to measure well-being in terms of individuals' functionings (i.e. a state of being/doing) and capabilities (i.e. the freedom to carry out functionings) (Al-Janabi et al., 2012). The measurement comprises five domains: stability, attachment, autonomy, achievement, and enjoyment. Each of these domains was measured using one statement. Responses to these statements were rated on an ordinal scale with four levels ranging from *unable / cannot* (=1) to *completely / all / a lot* (=4).

2.3 | Analysis

To examine the factorial validity of the six-factor PH measurement model proposed by Van Vliet and colleagues (2021), we used CFA with robust Maximum Likelihood (MLR). Compared to Maximum Likelihood (ML) estimation, MLR is less dependent on the assumption of multivariate normal distribution (Li, 2016). While assessing the overall fit of the measurement model to the data, we focus on the chi-square statistic (χ^2), the Comparative Fit Index (CFI), the Tucker Lewis Index (TLI), the Root Mean Square Error of Approximation (RMSEA) and the Standardised Root Mean Square Residual (SRMR). Often used thresholds for these indices are: CFI and TLI values between 0.90 and 0.95 as indicator of moderate fit and CFI and TLI values greater than 0.95 as indicator of good model fit; RMSEA and SRMR values between 0.08 and 0.05 as indicators of moderate fit and RMSEA and SRMR values below 0.05 as an indicator of good model fit (Hu & Bentler, 1999; Marsh et al., 2004). Although traditional cutoff values 'amount to little more than rules of thumb based largely on intuition and have little theoretical justification' (Marsh et al., 2004, p. 321), they help quantify the fit of the measurement model. For examining the factorial validity, lavaan 0.6–7 (Rosseel, 2012) was used in R V4.0.5 (R Core Team, 2020).

In order to assess the concurrent validity of the PH measurement model suggested by Van Vliet and colleagues (2021), the relationship between PH measurement scores and the scores on other measurements of health (i.e. BRS, HR-SWB, ICECAP, and EQ5D) was examined. To examine this relationship, BRS and the underlying domains of HR-SWB, ICECAP, and EQ5D were regressed to the six factors of the PH measurement model through multiple multivariate regression analyses. No covariates were included in the regression models. The overall strength of the statistical relationships between PH and the other health domains (R^2) provided a quantification of how well the PH measurement model correlates with previously validated scales—which we denote as validation scales. We used R V4.0.5 (R Core Team, 2020) for fitting the regression models.

3 | RESULTS

The six-factor PH measurement model, as proposed by Van Vliet and colleagues (2021), showed a satisfactory fit to the data $\chi^2(104) = 465.51$, $p < .001$, CFI = 0.953, TLI = 0.939, RMSEA = 0.058 [90% CI: 0.054, 0.063], SRMR = 0.047. As reported in Table 1, the items showed positive factor loadings on the respective domains, with most standardised coefficients ranging from 0.70 to 0.95. The item *'Being able to handle changes'*, which in the PH dialogue tool does not belong to the same health domain as the other two items of *future perspective* (Van Vliet et al., 2021), had a somewhat lower standardised coefficient (0.56). In sum, answering Research Question 1, the data studied supports the factor structure proposed by Van Vliet and colleagues (2021).

As reported in Table 2, the correlations among the PH domains suggest acceptable discriminant validity among the variables. The correlation among the variables showed strong similarities with the correlations found by Van Vliet and colleagues (2021). Similar to the study of Van Vliet and colleagues (2021), we observed the strongest statistical association between *contentment* and *future perspective* ($r = 0.71$, $p < .001$) and the weakest statistical association between *social participation* and *bodily functioning* ($r = 0.39$, $p < .001$). The internal consistency (Cronbach's α) was sufficient for each factor: *bodily functioning* = 0.90; *mental functioning* = 0.89; *meaningfulness* = 0.77; *contentment* = 0.93; *social participation* = 0.89; and *daily functioning* 0.84. The BRS, used as a validation scale, had a sufficient internal consistency as well (Cronbach's α = 0.76).

The relationship between the six-factor PH measurement model and the validation scales showed a substantial amount of variance (see Table 3). Whereas the six factors were strongly related to validation scales such as *happiness* (HR-SWB, $R^2 = 0.60$) and *EQ-VAS* (EQ-5D, $R^2 = 0.57$), they were only moderately related to scales such as *autonomy* (HR-SWB, $R^2 = 0.13$; ICECAP-A, $R^2 = 0.17$), *self-care* (EQ-5D, $R^2 = 0.15$), *stability* (ICECAP-A, $R^2 = 0.20$), *personal growth* (HR-SWB, $R^2 = 0.21$), and *resilience* (BRS, $R^2 = 0.24$). As presented in Table 3, each of the six factors was important to explain variance across the

TABLE 1 Parameter estimates confirmatory factor analysis (CFA)

Latent factor	Item	Description	B	SE	Z	β	*p*
Social participation	29	Social contacts	1	0		0.83	
Social participation	32	Having the support of others	1.11	0.05	22.21	0.84	***
Social participation	33	Belonging	1.26	0.05	24.7	0.9	***
Daily functioning	37	Knowing your limitations	1	0		0.85	
Daily functioning	38	Knowledge of health	1.06	0.04	23.81	0.86	***
Daily functioning	39	Managing time	1.16	0.06	18.5	0.74	***
Bodily functioning	1	Feeling healthy	1	0		0.92	
Bodily functioning	2	Feeling fit	1.07	0.03	41.78	0.94	***
Bodily functioning	7	Exercise	1.11	0.04	27.11	0.78	***
Contentment	23	Being happy	1	0		0.88	
Contentment	24	Feeling good	1.17	0.04	31.73	0.93	***
Contentment	25	Feeling well-balanced	1.06	0.04	26.13	0.92	***
Future perspective	13	Being able to handle changes	1	0		0.56	
Future perspective	17	Wanting to achieve ideals	1.57	0.12	12.88	0.7	***
Future perspective	18	Feeling confident about own future	1.88	0.17	11.45	0.92	***
Mental functioning	8	Being able to remember things	1	0		0.85	
Mental functioning	9	Being able to concentrate	1.12	0.05	23.33	0.95	***

Note: Item numbering of Van Vliet et al. (2021, Table 2) is used.
***$p < .001$. B = unstandardised estimates, SE = standardised error.

validation scales. For example, *bodily functioning* was an important predictor of *mobility* (EQ-5D, $\beta = 0.74$, $p < .001$), *physical independence* (HR-SWB, $\beta = 0.68$, $p < .001$), *pain/discomfort* (EQ-5D, $\beta = 0.67$, $p < .001$), and *EQ-VAS* (EQ-5D, $\beta = 0.582$, $p < .001$); *mental functioning* was a predictor of *resilience* (BRS, $\beta = 0.12$, $p < .01$); *future perspective* a predictor of *personal growth* (HR-SWB, $\beta = 0.49$, $p < .001$) and *achievement* (ICECAP-A, $\beta = 0.28$, $p < .001$); *contentment* was a predictor of *happiness* (HR-SWB, $\beta = 0.70$, $p < .001$), *anxiety/depression* (EQ-5D, $\beta = -0.69$, $p < .001$), *enjoyment* (ICECAP-A, $\beta = 0.33$, $p < .001$), and *resilience* (BRS, $\beta = 0.33$, $p < .001$); *social participation* was a predictor of *attachment* (ICECAP-A, $\beta = 0.39$, $p < .001$), *enjoyment* (ICECAP-A, $\beta = 0.22$, $p < .001$), and *loneliness* (HR-SWB, $\beta = 0.22$, $p < .001$); and *daily functioning* was a predictor of *autonomy* (ICECAP-A, $\beta = 0.25$, $p < .001$; HR-SWB, $\beta = 0.22$, $p < .001$) and *self-care* (EQ-5D, $\beta = 0.19$, $p < .001$). The factors *mental functioning* (maximum absolute $\beta = 0.12$) and *daily functioning* (maximum absolute $\beta = 0.25$) showed the weakest association with the validation scales.

4 | DISCUSSION

The goal of this study was to assess the factorial validity (RQ1) and concurrent validity (RQ2) of the proposed six-factor PH measurement model proposed by Van Vliet et al. (2021). This 17-item measurement model was developed based on the PH dialogue tool (see Van Vliet et al., 2021). The PH dialogue tool has received broad interest from healthcare professionals (Prinsen & Terwee, 2019; Van Vliet et al., 2021). Although the dialogue tool comprises a set of questions, it was still largely unclear how well these questions are suited to measure the concept of PH (Prinsen & Terwee, 2019; Van Vliet et al., 2021). Tested on a representative sample of the Dutch population, and answering Research Question 1, the results of this study provide support for the six-factor PH measurement model proposed by Van Vliet et al. (2021). Answering Research Question 2, tests of concurrent validity, with BRS, HR-SWB, EQ-5D, and ICECAP-A as validation scales, showed mixed results. Whereas the PH model explained more than 50% of the variance in measurements of *overall self-rated health* and *happiness*, it explained less than 25% of the variance in measurements of *autonomy*, *personal growth*, *stability*, *self-care*, and *resilience*. Most PH factors showed theoretically sound statistical relationships with the validation scales. For example, *bodily functioning* loaded high on *mobility* (EQ-5D) and *physical independence* (HR-SWB), *future perspective* was a predictor of scores on *personal growth* (HR-SWB), and *contentment* was strongly related to *happiness* (HR-SWB) and *anxiety/depression* (EQ-5D). Collectively, this study provides some support for the factorial validity (RQ1) and concurrent validity (RQ2) of the six-factor PH measurement model (Van Vliet et al., 2021). These results imply two important points. First, they imply that the PH measurement model is suitable to measure multiple dimensions of health. Second, they imply that the PH measurement model may not be an encompassing measure for the concepts measured through the validation scales. However, the PH measurement model might explain variance in health beyond the validation scales.

This study warrants two important points for consideration. First, some validation scales were indeed only moderately related to the PH measurement model. Hence, the proposed PH measurement model may not be an encompassing measure for the concepts measured by

TABLE 2 Means (M), standard deviations (*SD*), Cronbach's alphas (in parentheses on the diagonal), and correlations

Variable	M	*SD*	1	2	3	4	5	6	7	8	9
1. Gender (1 = Female)	0.50	0.50	-								
2. Age (ordinal)	7.47	3.15	0.325	–							
3. Education level	2.00	0.76	0.018	−0.309***	–						
4. Bodily functioning	7.95	1.73	−0.088**	−0.146***	0.169***	(0.90)					
5. Mental functioning	8.46	1.51	−0.060	−0.021	0.117***	0.476***	(0.89)				
6. Future perspective	8.31	1.36	−0.055	−0.123**	0.142***	0.508***	0.509***	(0.77)			
7. Contentment	8.30	1.63	−0.107***	0.069*	0.013	0.601***	0.558***	0.705***	(0.93)		
8. Social participation	8.69	1.42	0.018	−0.006	0.068*	0.392***	0.426***	0.582***	0.660***	(0.89)	
9. Daily functioning	9.34	1.17	0.014	−0.018	0.078*	0.474***	0.546***	0.544***	0.582***	0.480***	(0.84)

Note: Glass' rank biserial correlation coefficients (*rg*) are reported for relationships between gender and variables 2 and 3. Point biserial correlation coefficients (*rpb*) are reported for relationship between gender and variables 4 to 9. Spearman's rank correlation coefficients (ρ) are reported for relationships between age, educational level, and variables 4 to 9. Pearson's correlation coefficients (*r*) are reported for relationships between variables 3 to 9. $N = 1016$; Age categories: 1 = 15 to 19 years, 2 = 20 to 24 years, 3 = 25 to 29 years, 4 = 30 to 34 years, 5 = 35 to 39 years, 6 = 40 to 44 years, 7 = 45 to 49 years, 8 = 50 to 54 years, 9 = 55 to 59 years, 10 = 60 to 64 years, 11 = 65 years and older. Education levels: 1 = Low, 2 = Medium, 3 = High.

$^*p < .05$; $^{**}p < .01$; $^{***}p < .001$.

the validation scales (RQ2). However, the moderate relationship between the PH measurement model and the validation scales is not surprising given that the concept of PH was intended to broaden the focus of health beyond the focus on existing health measures. If the relationship between the PH measurement model and the validation scales had been strong, it could have indicated that the PH measurement model adds little value over existing scales. Given that the concept of resilience served as the foundation for the concept of PH, the moderate relationship between the measurement of resilience and the PH measurement model is important to note (Huber et al., , 2016; Van Vliet et al., 2021). The relationship may be weaker than moderate because PH and the BRS may focus on different aspects of resilience. As Prinsen and Terwee pointed out 'the given patient-centred definition of what is called "resilience" does not correspond to what is known from the medical literature about resilience and related concepts; that "manageability" is not similar to "mastery" and that "perceived control" is a broader construct than "self-management"' (2019, p. 73). Another explanation for the moderate relationship may lie in the approach of the PH dialogue tool. Huber and colleagues (2016) suggested that PH help patients choose aspects of health they wish to cultivate. This process of active engagement is regarded as individual asset for building resilience (Fergus & Zimmerman, 2005; Zolkoski & Bullock, 2012). Rather than measuring resilience, the PH measurement tool might thus help to improve resilience.

Second, PH factors *mental functioning* and *daily functioning* were weakly related to the validation scales (RQ2). Hence, these factors added little value in explaining the health-related aspects measured through the validation scales, including overall health (EQ-VAS) and happiness (HR-SWB). This is an important finding given that patients and citizens in a previous large panel study rated mental functioning and daily functioning as about equally important aspects of health as the other dimensions (Huber et al., 2016). Possibly, *mental functioning* and *daily functioning* explain other aspects of health than measured through the validation scales. Note that *functioning*, focused on the ability to concentrate and remember things, was not well covered by the validation scales. The findings of this study point towards a small significant influence of *mental functioning* on *resilience* (BRS) and *usual activities* (EQ-5D), yet the content of these measurements—respectively the ability to bounce back and the ability to conduct usual activities (e.g. work, study, housework)—were different from the content of the measurement of mental functioning. *Mental functioning* might be stronger related to mental ability scales such as the Wechsler Memory Scale (Wechsler, 2009).

In light of the current findings, we recommend scholars to further develop the concept and measurement of PH. As Prinsen and Terwee argue (2019, p. 75): 'Validation is an iterative process in which validation results should be used to further develop the theory, which in turn provides a stronger basis for further validation of the measurement instrument'. In particular, we suggest scholars to reconsider the role of resilience within the PH framework. If the concept of resilience indeed is important within the framework of PH, scholars should consider advancing the measurement model by including a measurement of resilience. The importance of resilience

TABLE 3 Results of 17 multivariate regression analyses

Scale	Analysis	Domain	Standardised loadings (β) of Positive Health dimensions						
			Bodily functioning	Mental functioning	Future perspective	Contentment	Social participation	Daily functioning	R^2
BRS	1	Resilience	−0.036	0.121**	0.118**	0.332***	−0.031	0.053	0.242
HR-SWB	2	Physical independence	0.683***	−0.008	−0.054	−0.080	−0.021	0.098**	0.420
	3	Happiness	−0.063*	−0.047	0.066*	0.702***	0.115***	0.013	0.603
	4	Loneliness	−0.109**	−0.016	−0.003	0.465***	0.215***	0.045	0.342
	5	Autonomy	−0.072	−0.074	0.050	0.192***	0.071	0.215***	0.131
	6	Personal growth	−0.006	0.020	0.486***	−0.141**	0.091**	0.007	0.208
EQ-5D	7	Mobility	0.741***	−0.019	−0.029	−0.218***	−0.006	0.088**	0.420
	8	Self-care	0.334***	0.042	−0.086*	−0.142**	0.082*	0.188***	0.147
	9	Usual activities	0.503***	0.096**	−0.058	0.089	−0.033**	0.144	0.427
	10	Pain/Discomfort	0.665***	0.065*	−0.059	0.018	−0.075*	−0.091**	0.37
	11	Anxiety/Depression	0.113***	−0.088**	0.072	−0.689***	0.028	−0.015	0.382
	12	EQ-VAS	0.582***	−0.013	0.020	0.186***	−0.008	0.078**	0.568
ICECAP-A	13	Stability	0.038	0.074*	0.007	0.217***	0.178***	0.032	0.202
	14	Attachment	−0.079*	−0.072*	0.106**	0.206***	0.393***	0.015	0.315
	15	Autonomy	0.169***	−0.038	0.065	−0.014	0.068	0.250***	0.167
	16	Achievement	0.145***	0.052**	0.276***	0.110**	0.012	0.083*	0.305
	17	Enjoyment	−0.002	0.018	0.096**	0.328***	0.217***	0.069*	0.387

Note: $N = 1016$; Validation scales (see column domain) were regressed to Positive Health dimensions; R^2 denotes the amount of variance explained by the six domains of Positive Health

Abbreviations: BRS, brief resilience scale; EQ-5D, EuroQol 5-Dimensions; EQ-VAS, EuroQol Visual Analog Scale; ICECAP-A, ICEpop CAPability measure for Adults; HR-SWB, health-related subjective well-being.

*$p < .05$; **$p < .01$; ***$p < .001$.

could be tested among stakeholders, such as Huber et al. did (2016). The limited explanatory power of PH factors *daily functioning* and *mental functioning* also warrants reconsideration. The factors might explain variance in health beyond the aspects measured through the validation scales. A PH framework should inform researchers and practitioners about the nomological network of the PH factors—and thus about the theoretical relationship between daily functioning and mental functioning and other constructs. The theoretical relationship between PH factors and other constructs should subsequently be tested to further uncover the construct validity of PH.

This study has several strengths and limitations. A strength of this study was the representative sample of the Dutch population. PH receives broad interest within The Netherlands (Prinsen & Terwee, 2019; Van Vliet et al., 2021). A study based on a representative Dutch population helps to understand the validity of the six-factor PH measurement model within The Netherlands. Another strength of this paper is the chosen validation scales. The chosen validation scales are broadly used to assess health (e.g., Al-Janabi et al., 2012; Herdman et al., 2011) and/or comprehensive health outcome measures (de Vries et al., 2016). This study thus provides insight into the psychometric properties of the PH measurement model compared to readily available health measurements.

An important limitation of this study is its focus on two types of validity: factorial validity and concurrent validity. Prinsen and Terwee (2019) previously presented content validity issues; they pointed out major concerns with regard to relevance, comprehensiveness, and comprehensibility of the PH dialogue tool. The present study, nor the paper of Van Vliet et al. (2021) provide solutions for the content validity issues presented by Prinsen and Terwee (2019). As we suggested above, it is important that future research will reconsider the fit between the concept of PH and the measurement thereof. During the development of PH as a measurement tool, other measurement properties should be considered as well. If PH is to be considered a framework that 'bridges the gap between healthcare and the social domain' (Huber et al., 2016, p. 1), it is crucial that scholars assess PH in relation to healthcare and the social domain. For example, tests of the responsiveness of PH measurement model to the effects of interventions in healthcare and social settings would further uncover the added value of (the measurement of) PH.

5 | CONCLUSION

In this paper, we aimed to answer two research questions: (RQ1) 'To what extent does data from a representative sample of the Dutch population provide support for the factor structure of the 17-item PH measurement model proposed by Van Vliet and colleagues (2021)?' and (RQ2) 'To what extent does the relationship between PH measurement scores and the scores on other measurements of health (i.e., BRS; HR-SWB; EQ-5D; EQ-VAS; ICECAP-A) provide support for the measurement model proposed by Van Vliet and colleagues (2021)?' Based on a representative sample of the Dutch population, we found (RQ1) support for the factorial validity and (RQ2) identified important considerations with regards to the concurrent validity of the PH measurement model proposed by Van Vliet et al. (2021). The proposed PH measurement model explained more than half of the variance in *overall self-rated health* and *happiness*, but less than a quarter of the variance in *autonomy*, *personal growth*, *stability*, *self-care*, and *resilience*. Hence, the model does not seem to be an encompassing measurement of concepts such as resilience, at least as measured through the BRS. Two of the PH measurement model's six domains—mental functioning and daily functioning—were only weakly related to our validation scales. While studying health, the explanatory power of these domains may reach beyond that of our validation scales.

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CONFLICT OF INTEREST

None.

AUTHOR CONTRIBUTIONS

Brian Doornenbal: Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing; Rimke Vos: Writing–review & editing; Marja Van Vliet: Writing–review & editing, Funding acquisition, Project administration; Jessica Kiefte-De Jong: Writing–review & editing, Supervision; Elske van den Akker-van Marle: Conceptualization, Methodology, Validation, Writing–review & editing, Supervision.

ETHICS APPROVAL

The Medical Ethics Review Committee (MERC) of the Leiden University Medical Center approved this study (METC-LDD 19–035).

DATA AVAILABILITY STATEMENT

Data are available upon reasonable request.

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ENDNOTES

[1] https://www.loketgezondleven.nl/sites/default/files/2020-05/Landelijke-Nota-Gezondheidsbeleid-LNG-2020-2024.pdf

[2] https://eurohealthnet.eu/sites/eurohealthnet.eu/files/Event_Report_Promoting_positive_health_in_the_community_22_6.pdf

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