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Development and cross-validation of a short questionnaire to evaluate self-reported Positive Health; A cross sectional panel study of structural validity among a general Dutch population

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DEVELOPMENT AND CROSS-VALIDATION OF A SHORT QUESTIONNAIRE TO EVALUATE SELF-REPORTED POSITIVE HEALTH; A CROSS SECTIONAL PANEL STUDY OF STRUCTURAL VALIDITY AMONG A GENERAL DUTCH POPULATION

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DECLARATIONS

Ethical approval and consent to participate: The study was conducted in accordance with current public regulations, laws, and the principles of the Declaration of Helsinki. Informed consent was given by each participant to be included as a LISS-panel member. For more information see: https://www.lisspanel.nl/ethics. The Medical Ethics Committee of Brabant (Tilburg, the Netherlands) reviewed this study and declared that the Medical Research Involving Human Subjects Act (WMO) did not apply to this study (study number NW2024-15). Consent for publication: Not applicable

Availability of data and materials: The original dataset(s) supporting the conclusions of this article is(are) available from https://www.lissdata.nl/access-data upon request for researchers and policymakers.

Competing interests: MvV co-developed the MPH dialogue tool and works at the Institute for Positive Health.

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Author contributions: LNvV wrote the protocol and manuscript, and conducted the statistical analyses. VvD contributed to the first part of the statistical analysis. BvdZ supervised the research, statistical analyses and the writing process. LNvV, BvdZ, MM and MvV participated at the research meetings concerning the item reduction process; content discussion and interpretation of the statistical output. MM and MvV contributed equally. All author's reviewed and approved the final manuscript.

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1 ABSTRACT

> Objectives: In this study it was aimed to further develop and cross-validate a short questionnaire to measure self-reported Positive Health in general (Dutch) populations for evaluative purposes, stemming from the original 42 items of the My Positive Health dialogue tool (MPH). Positive Health refers to 'health from the perspective of patients and citizens' following the concept of Huber et. al. Design and setting: A cross sectional study was performed among a panel representative for the general adult Dutch population living at home. Participants: Response rate was 76%, 1327 of a total of 2457 respondents were female, and mean age (year) was 53.3 ± 17.8. Methods: First, item reduction was carried out through content discussions following statistical output retrieved from factor structures and loadings, inter-item correlations (IIC) and internal consistency (Cronbach's alphas). Next, among the other half of the study population, measurement properties for the developed short questionnaire were calculated using goodness of fit indices from confirmatory factor analyses (CFA). Results: The item reduction process (n=1199) resulted in a questionnaire of 22 items (PH22) with a four-factor structure and explained variance of 62.4%. Cronbach's alphas were 0.84, 0.92, 0.81, and 0.78 for the renamed factors 'Physical fitness' (5 items), 'Contentment with life' (9 items), 'Daily life management' (5 items) and 'Future perspective' (3 items), respectively. Cross validation (n=1258) showed adequate goodness of fit indices of the PH22, based on both first- and second-order CFA. The scores of the PH22 were normally distributed. No floor or ceiling effects were present. Conclusions: A short 22 item questionnaire to measure self-reported Positive Health in a general (Dutch) population for evaluative purposes such as scientific or policy research at Positive Health or patient-centered interventions was developed and cross-validated, named PH22. This study supports its structural validity. To use this questionnaire in practice its test-retest reliability and responsiveness should be known also. Future research has to reveal this.

- 23 Strengths and limitations of this study
- The main strength of this study was that the choice to keep or remove an item during the
 development of the short Positive Health questionnaire was not only based on statistical output such
 as factor loadings, but combined with thorough content discussion by the expert team and judgement
 of inter-item correlations and internal consistency.
 This study is robust in terms of its large sample size, the high response rate and the representativeness
 - 29 of the general Dutch population.

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3 4	30	• Development of the short Positive Health questionnaire was based on the items of the My Positive
5 6	31	Health dialogue tool, which is widely used in the Netherlands.
7 8	32	• It can be argued that content discussion is less objective or transparent to follow than statistical
9 10	33	output. To overcome this, the results from the content discussion were thematized and each step of
11 12	34	the item reduction process thoroughly reported.
13 14	35	• Choices made by the expert team, might have been more support-based if more representatives were
15 16	36	included in the content discussion, i.e., if focus groups were organized. Nevertheless, the members of
17 18	37	the research team represent different backgrounds and relevant expertise. Moreover, it should be
19 20	38	realized that the basic set of items of the My Positive Health dialogue tool was based on health
21 22	39	indicators retrieved from a large study among various stakeholders and judged relevant.
23 24	40	
25 26	41	Key words
27 28	42	Positive Health; patient reported outcome measures; general population; structural validity; cross-validation;
29 30	43	measurement properties; internal consistency; factor loadings; goodness of fit indices
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44 INTRODUCTION

Since the concept of Positive Health was introduced in the Netherlands, a mind shift unrolled among
healthcare workers and beyond. The approach of health as a state of complete physical, mental and social wellbeing as formulated in the constitution of the World Health Organization(1) changed to a more dynamic
approach of health focusing on self-management and the ability to adapt to physical, mental and social
challenges during life(2). This new vision on health is being integrated among all kinds of domains and political
agendas within the Netherlands and abroad(3).

To support the applicability of this vision on health in daily healthcare practice, the dialogue tool My Positive Health (MPH)(4) was developed. The content of this dialogue tool was derived from a large mixed methods study with interviews into the perceptions about health among different stakeholder groups such as patients, citizens, and healthcare professionals(5). This inductive, bottom- up approach enabled the researchers to gain a thorough insight into the perceptions about health. From these perceptions 32 aspects emerged, representing indicators for (positive) health(5). Accordingly, these aspects were thematized among six dimensions named: bodily functions, mental functions and perception, spiritual existential dimension, quality of life, social and societal participation and daily functioning. This operationalization of health was called Positive Health, and from here the 42-item MPH dialogue tool was developed. This MPH tool aims to support the conversation about Positive Health between patient and care worker and stimulate self-

61 reflection(4).

At an individual, organizational, community, regional and national level, the concept (broad and dynamic vision on health) and method (MPH tool and dialogue) are increasingly integrated. The Dutch government considers Positive Health a promising approach to promoting well-being and handle the increasing burden of disease(6). To assess the effectiveness of working with this Positive Health approach, the need for an instrument to measure self-reported Positive Health has been arising(7,8). Although the MPH is a relevant dialogue tool for the conversation about health(3), it should be emphasized that the MPH is not obviously useful for measuring purposes; the item grouping among the six dimensions of the MPH tool was not the result of a study aiming to assess structural validity in order to develop an outcome measure instrument. To our knowledge, two instruments were developed for this measuring purpose; the Positive Health

70 measurement scale with 17 items (PH17)(9,10) and the Positive Health measurement tool using all 42 dialogue
 72 items (PH42)(11). These two instruments face some limitations. Although measurement properties for the

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2 3 4	73	PH17 seemed adequate(10).the initial item selection of the PH17 took place among citizens in just one part of
4 5 6	74	the Netherlands and response rate was low (25%)(9), questioning the generalizability of their results. Even
7 8	75	more important, the methodological approach for item reduction included judgement of factor loadings, but
9 10	76	without, simultaneously, content discussion and judgement of inter-item correlations and maintaining
11 12	77	acceptable internal consistencies as recommended by others(12). Without these steps relevant items might be
13 14	78	deleted, and shortchange its content and discriminant validity. The other instrument, the PH42, was developed
15 16	79	among a representative general population(11), but consists of 42 items which might not be preferable for all
17 18	80	practices. From practical and methodological perspectives, it is preferable to use a shorter questionnaire,
19 20	81	which requires less effort and results in higher response rates, especially important during repeated
21 22	82	measurements needed to evaluate (positive) health or patient-centred interventions.
23 24	83	The aim of this study was to develop and cross-validate a short questionnaire to measure self-reported
25 26	84	Positive Health for evaluation purposes in scientific or policy research at Positive Health promoting, or patient-
27 28	85	centered interventions in general populations. Its structural validity was assessed and the more extensive
29 30	86	method for item reduction was applied among a representative study population. The conditions set were that
31 32	87	the questionnaire had to contain the original items of the MPH dialogue tool to retain its recognizability with
33 34	88	daily practice and with Positive Health as operationalised by Huber et. al.(5), referring to 'health from the
35 36	89	perspective of patients and citizens'.
37 38	90	
39 40	91	METHODS
41 42	92	Study design and participants
43 44	93	In this paper, we make use of data from the LISS panel (Longitudinal Internet studies for the Social Sciences)
45 46	94	managed by the non-profit research institute Centerdata (Tilburg University, the Netherlands). The LISS panel
47 48	95	consists of a representative sample of approximately 7,000 individuals from 5,000 households from the general
49 50	96	Dutch population. The panel is based on a true probability sample of households drawn from the population
51 52	97	register by Statistics Netherlands(13). LISS panel members complete monthly online questionnaires and are
53 54	98	paid for each completed questionnaire. To become a LISS panel member, at least one person in the household
55 56	99	has to be proficient in the Dutch language. To minimize selection bias, households were provided with a
57 58	100	computer and internet connection if they could otherwise not participate. Response rates for this panel are
59 60	101	high (>80%). More information about the LISS panel can be found at: <u>www.lissdata.nl</u> .

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3	102	
4 5 6	103	To answer our research question a cross sectional study was performed among a random selection of members
7 8	104	from the LISS panel. From this panel, 2,500 adults (≥18 years), one per household, were randomly selected to
9 10	105	participate. The process of item reduction and cross-validation were carried out in two randomly split samples
11 12	106	of this study population. Ethical review was conducted by the METC Brabant (Tilburg, the Netherlands, study
13 14	107	number NW2024-15).
15 16	108	
17 18	109	This study was reported according to the COSMIN Reporting Guideline(14) recommended for studies that
19 20	110	evaluate the measurement properties of patient-reported outcome measures (PROMs). The terms dimension
21 22	111	and factor are used interchangeably.
23 24	112	
25 26	113	Data collection and administration
27 28	114	During November 2020 the selected study population was asked to complete the original 42 items of the My
29 30	115	Positive Health questionnaire (MPH) (see Additional file A) receiving one reminder after 2 weeks. The same as
31 32	116	the original MPH dialogue tool the items were introduced per dimension using the original introduction,
33 34 35	117	answer options and icons of the dialogue tool(4). In contrast to the original tool the respondents did not see
36 37	118	their results among a spiderweb. Respondents completed the electronic questionnaire at home using the
38 39	119	regular internet platform of LISS receiving a private link. Characteristics of the study population such as gender,
40 41	120	age, level of education and health care use were available from the regular LISS panel HEALTH survey
42 43	121	(https://www.lissdata.nl/research/liss-core-study).
44 45	122	
46 47	123	My Positive Health (MPH) dialogue tool
48 49	124	The MPH consists of 42 statements about Positive Health, representing the 32 indicators for (positive) health
50 51	125	as assessed by Huber et al.(5). For practical use, they were formulated to a simple language level (B1). The
52 53	126	statements are scored on an 11-point Likert scale ranging from 0 'completely disagree' to 10 'completely
54 55	127	agree'. Higher scores indicate better health. Also, the six dimensions (bodily functions, mental functions and
56 57	128	perception, spiritual existential dimension, quality of life, social and societal participation and daily functioning)
58 59	129	are visualised in a spider web with six axes, representing the dimensions and ranging from value 0 (in the
60	130	centre for poor) to 10 (on the periphery, for excellent). The self-reported MPH questionnaire takes 10-20

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3 4	131	minutes to complete. Over the last years it was shown by various users (citizens, patients and professionals)
5 6	132	that the MPH was a relevant dialogue tool including comprehensiveness and comprehensibility of the items,
7 8	133	response options, and instructions(3).
9 10	134	
10 11 12	135	Preconditions for the short Positive Health questionnaire to be developed
13 14	136	Preconditions formulated by the research team for an useful self-reported questionnaire to measure Positive
15 16	137	Health were; 1) a multidimensional structure was held to ensure a broad representation of health conform
17 18	138	literature(5,15), 2) items were not reformulated to keep recognizability with the specific Positive Health
19 20	139	dialogue approach according to MPH(4), 3) to hold model stability each dimension contained at least three
21 22	140	items (12), and 4) the short questionnaire contained a maximum of about 20 items to be user-friendly.
23 24	141	
25 26	142	Statistical analyses
27 28	143	Development: Process of item reduction
29 30	144	Prior to this study, Van Druten et al. developed the measurement tool PH42 (11). They assessed the factor
31 32	145	structure of the 42 original items of the dialogue tool MPH. This resulted in a model with a six-factor structure
33 34	146	including all 42 items with an explained variance of 68%, no inter-items correlations > 0.9, factor loadings
35 36	147	ranging from 0.36 to 0.94, Cronbach's alpha's ranging from 0.74 up to 0.97, and acceptable fit indices . This
37 38	148	study of Van Druten et al. was based on the same dataset as our study. Their results (see Additional file B-C)
39 40	149	were the starting point for the item reduction process of our study. We used the same settings to assess
41 42	150	dimensionality during the process of item reduction: extraction method; Principal Component Analysis
43 44	151	(PCA)(16–18), rotation method; Oblimin with Kaiser Normalisation, and eigen value >1.0 using SPSS V27.0.
45 46	152	Analyses were performed on similar randomly split half of the study population (n=1199).
47 48	153	The following steps of the item reduction process were taken conform the methodology published by
49 50	154	De Vet and Terwee ^{12,15} . Content discussions initiated through statistical output were performed in different
51 52	155	rounds with experts taking part in the research team. First, the items of the PH42 were assessed per factor on
53 54	156	low (<0.2; i.e. possibly unrelated to the construct) and high (>0.7; i.e. possibly overlapping and thus redundant
55 56 57	157	in the construct) inter-item correlations(12). Based on content discussion low or highly correlated items were
58 59	158	held or removed. Then, PCA was performed. Items that hardly loaded at all on any of the factors were
60	159	considered for deletion. A minimum factor loading of 0.5 was taken as threshold(12). Also, items loading

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>0.32(12,19) on more than one factor were discussed. Based on content discussion, items were held or
removed. Content was leading, meaning that for some items, high correlations or low factor loadings might be
accepted. Items were deleted one by one repeating PCA every step, because deletion of one item might change
structures or loadings of other items(12). Final decisions to delete an item were combined with judgement of
consequences for internal consistencies (Cronbach's alpha) aimed between 0.7-0.9 (12).

166 <u>Cross validation</u>

To assess goodness of fit of the developed short Positive Health questionnaire, confirmatory factor analyses (CFA) was performed in the second half of the study population (n=1258) CFA for normal continuous data with maximum likelihood (ML) as estimation method was used (R Lavaan 0.6.14)(20). Goodness of fit indices included; chi-square (X^2) (a non-significant X^2 is desirable, however in a large sample, the X^2 is usually significant), comparative fit index (CFI), root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR). Indicators of model fit were(12,21); CFI values between 0.90 and 0.95 with >0.95 indicating superior model fit, RMSEA values <0.05 represent good fit, 0.05-0.08 acceptable fit, >0.08 medium fit and >0.1 poor fit, and SRMR value of <0.08 representing good fit. To assess if the item scores of the questionnaire fit the factor sum scores first-order CFA was executed. To investigate if the factor sum scores fit the total sum score of the questionnaire as well, second-order CFA was executed(12,20).

8 177

178 Scores of the developed questionnaire

179 Last, the distribution of the total and factor sum scores of the developed questionnaire were described; mean,

180 median, standard deviation, minimum, maximum, skewness and kurtosis (< -1 and > 1), and floor and ceiling

6 181 effects (\geq 15% of the respondents scores lowest or highest possible scores, respectively(22)).

48 182

50 183 Sample size calculation

¹² 184 Size of both randomly split subgroups (n=1199, n=1259)(11) was adequate to apply PCA and CFA; rule of

thumb is that four to ten respondents per item of the questionnaire are included, with a minimum of 100 (23).

58 187 Patient and public involvement

1 2		
2 3 4	188	Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our
5 6	189	research.
7 8	190	
9 10	191	RESULTS
11 12	192	Participants
13 14	193	The response rate was 76% with 777 respondents not responding. Twelve respondents not completing the
15 16	194	questionnaire completely were excluded, leaving 2457 respondents for the analyses; 54% female, mean age
17 18	195	(years) 53.3 \pm 17.8, 39.9% high level of education, and 39.8% visited a medical specialist at the hospital,
19 20	196	psychiatrist, psychologist or psychotherapist last 12 months. Next, the study population was randomly split:
21 22	197	n=1199 and n=1258, in which the process of item reduction and cross-validation was carried out, respectively.
23 24	198	
25 26	199	Development: Process of item reduction
27 28	200	LNvV, BvdZ, MM and MvV participated at six research meetings of an hour between May and August 2023
29 30	201	concerning the item reduction process; content discussion and interpretation of the statistical output. During
31 32	202	round 1 interitem correlations were explored for the six-factor structure of the PH42 (see Additional file C ; .
33 34	203	From all factors four contained half or more items that were too highly (>0.7) correlated to another item:
35 36	204	Factor 1 (11 out of 13), factor 2 (4/8), factor 3 (2/7), factor 4 (5/8), factor 5 (0/3) and factor 6 (2/3),
37 38	205	respectively. Two of all items correlated low (<0.2) with each other but adequately with the other items; factor
39 40	206	2 (2/8). First, the items with interitem correlations >0.8 were discussed on their content, next those items with
41 42	207	correlations >0.7. Initiated by these high correlations content discussion led to choices for deletion of an item
43 44	208	for various reasons such as inadequate formulation of the statement, not being inclusive or (not) being specific.
45 46	209	In Table 1 detailed information about the choices made per item are shown.
47 48 49	210	
50	211	
51 52	212	
53 54 55	213	
55 56 57	214	
58 59	215	
59 60	216	

217 218 Table 1. Process of item reduction with the PH42 questionnaire as starting point

1 2 3

		Ro	ound	1	Round 2			Round 3		Rοι	und	5	
		IC	 Item deleted 	Content ^{1,2}	L.	 Item deleted 	Content ^{1,2}	FL • Item deleted	Content ^{1,2}	IIC, CA	 Item deleted 	Content ^{1,2}	Final Hama 0023 (-A
	Acceptance, meaningfulness				th life								
IPH25	Feeling well-balanced	>0.8	•	A,D	Loods doublo	_							
IPH24 IPH23	Feeling good	>0.8 >0.8	•	F	Loads double	•	C,D						
IPH25	Being happy Enjoyment	>0.8	•	A,D A,D									-
IPH16	Being high-spirited	0.7-0.8	•	F									
IPH11	Being cheerful	0.7-0.8	•	A,D									
IPH19	Accepting life	0.7-0.8	•	F						0.7-0.8	٠	F	
IPH20	IPH20 Being grateful	0.7-0.8	•	F						0.7-0.8	٠	A,C	
IPH15	Having a meaningful life	0.7-0.8	•	A,D									
IPH12	Accepting yourself						_						
IPH18 IPH14	Feeling confident about own future	0.7-0.8 0.7-0.8	•	F	Loads double	•	В					_	_
IPH14	Having control Feeling safe	0.7-0.8		F									
111120	Physical health and												_
	functioning												
IPH7	Exercise	0.7-0.8		с									
IPH7 IPH6	Physical condition	0.7-0.8	•	F	6					0.7-0.8	•	F	-
IPH2	Feeling fit	>0.8	•	F							•	F	
IPH1	Feeling healthy	>0.8	•	A,D						0.7 0.0	-		
IPH41	Being able to work			,	FL<0.5, Loads double	•	А						
IPH3	Having physical complaints or pain				FL<0.5	•	F						
IPH4	Sleeping pattern				Loads double	•	F	Loads double •	F				
IPH5	Eating pattern												
	Self-management												
IPH40	Managing money												
IPH37	Knowing your limitations	0.7-0.8	•	F									
IPH38 IPH39	Knowledge of health Managing time	0.7-0.8	•	E								_	_
IPH36	Looking after yourself												
IPH28	Having enough money				Loads double	• /	А, В						
IPH42	Asking for help							FL<0.5	F				
	Social network and societal roles												
IPH32	Having the support of others	>0.8	٠	F									
IPH31	Doing fun things together	>0.8	•	А									
IPH33	Belonging	0.7-0.8	•	A									
IPH30	Being taken seriously	0.7-0.8	•	F						0.7-0.8	•	A,D	-
IPH29 IPH27	Social contacts Living conditions	0.7-0.8	•	F						0.7-0.8	•	F	
IPH27 IPH35	Being interested in society				FL<0.5	•	D						
IPH34	Doing meaningful things				. = .0.0	-	-						
	Personal development												
IPH21	Continue learning												
IPH17	Wanting to achieve ideals												
IPH13	Being able to handle changes				FL<0.5	٠	F						
	Cognition												
IPH8	Being able to remember things	0.7-0.8	•	А									
IPH9	Being able to concentrate	0.7-0.8	•	F	FL<0.5	•	В						
IPH10	Being able to communicate		•	E									

ts content discussion expressed as A-F² to delete or hold an item supported by the measurement properties: ICC; interitem ⁺Kes 60

221 correlations, FL; factor loadings, CA; Cronbach's alphas extracted during exploratory factor analyses.

²A to F; A Content is sufficiently reflected in other questions, B Content does not sufficiently match the factor, C Question/Wording not inclusive, D Wording not specific enough, too broad, E Unclear wording, may not be properly understood, F Retained for specific content. For the factor 'Cognition' the content discussion resulted in that only one item was retained. It was accepted by the research team that this factor would not continue to exist as dimension of Positive Health. In total, in round 1 12 out of 42 items, originating from each of the six factors, were deleted. For the remaining items (n=30) PCA was applied.

At round 2 PCA with 30 items resulted in a four-factor structure with explained variance of 60.7% (see Additional file D for factor loadings). Kaiser-Meyer-Olkin (KMO) and Bartlett's test was statistically significant (0.96; p ≤.001). Factor loadings ranged from 0.369 to 0.780. A new factor with 15 items arose from the former factor 'Acceptance, meaningfulness and satisfaction with life' and the factor 'Social network and societal roles' of the PH42. Based on the content of these items this new combined factor was renamed by the research team and further called 'Contentment with life' (15 items). The other factors were comparable to round 1 (i.e., to the PH42 model), except that the factor Cognition was no longer part of the model. Also, one item; IPH41 about 'being able to work', loaded highest, but low (0.495), on the factor 'Self-management' instead of the factor 'Physical health and functioning'. The item about concentration (IPH9), kept from the former factor Cognition, loaded highest, but low (0.369), on the new factor 'Contentment with life'. Five items had a factor loading (FL) <0.5, and five items loaded also high on another factor (FL>0.32). Of these items, three items were retained based on the content discussion (See Table 1). For example; the items about sleeping pattern (IPH4) and having no pain or complaints (IPH3), both part of the factor 'Physical health and functioning', were judged to be specific content that should be held for the measurement tool. For similar reasons item IPH13 (being able to handle changes) was kept. In total, in round 2 6 out of 30 items were deleted. In addition, the items selected to delete during round 2 were ranked by the expert team to process the order of item reduction in subsequent PCA. First those items with low factor loadings <0.5 were deleted from the model (in following order; IPH9, IPH35, IPH41). Next those items with also a high factor loading (> 0.32) on another factor were deleted (IPH18, IPH28, IPH24). PCA was executed and checked per deleted item. No changing structures were seen. In round 3, PCA with 24 items resulted in a similar four-factor structure as round 2 with explained variance of 62.4% (see Additional file E for factor loadings). KMO and Bartlett's test was statistically significant $(0.96; p \le .001)$. Factor loadings ranged from 0.474 to 0.855. Overall, there was 1 item with a low factor loading

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> pattern (IPH4), similar to the results of round 2, and the item about asking for help from official institutes (IPH42). Both items were retained because of its specific and relevant content. In this round no items were deleted.

At round 4 interitem correlations and Cronbach's alpha (CA) were judged for this four-factor structure with 24 items. For the factor 'Contentment with life' 4/11 items were highly correlated (>0.7 but <0.8) and CA was high (0.94). Two additional items were deleted from this factor. There was some doubt about the content of item IPH26 (feeling safe) and its fit among the factor Contentment with life. It was decided to retain this item because it was the only item about this specific subject and considered to be an important aspect of Positive Health. For the factor 'Physical health and functioning' two items were highly correlated, but both were kept because of its specific content and good CA of the factor (n=5, CA=0.78). No high interitem correlations nor CA were present among the other factors Self-management (n=5, CA =0.81) and Personal development (n=3, CA=0.74). In total, in round 4, 2 out of 24 items were deleted. For the remaining items (n=22) PCA was applied again.

At round 5, PCA with 22 items showed similar four-factor structure with explained variance of 62.4% (see Table 2 for factor loadings and Table 3A-D for Interitem correlations). KMO and Bartlett's test was statistically significant (0.95; $p \le .001$). The factor Self-management contained the only item with low FL (0.476). Based on the statistical output and its content no further items were deleted.

|--|

	Factor ¹			
	Contentment	Physical	Daily life	Future
	with life	fitness	management	perspective
IPH32 Having the support of others	0.800	-0.139	0.042	0.057
IPH27 Living conditions	0.785	-0.049	0.098	-0.124
IPH29 Social contacts	0.753	-0.047	0.032	0.096
IPH26 Feeling safe	0.669	0.088	0.083	0.063
IPH16 Being high-spirited	0.648	0.236	-0.028	0.181
IPH19 Accepting life	0.630	0.114	0.037	0.162
IPH14 Having control	0.566	0.124	0.134	0.216
IPH12 Accepting yourself	0.566	0.209	0.113	0.076
IPH34 Doing meaningful things	0.538	0.106	0.074	0.237
IPH2 Feeling fit	0.079	0.689	0.134	0.153
IPH6 Physical condition	0.019	0.686	0.132	0.191
IPH4 Sleeping pattern	0.385	0.667	-0.101	-0.193
IPH3 Having physical complaints or pair	า -0.145	0.560	0.052	0.153
IPH5 Eating pattern	0.295	0.545	0.240	-0.184
IPH37 Knowing your limitations	0.033	0.026	0.855	-0.062
IPH36 Looking after yourself	-0.087	0.123	0.793	0.021

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IPH40 Managing money		_	.101			0.03		_	0.78		-0.081	
IPH39 Managing time).018		C	.067	7		0.76	8	0.054	
IPH42 Asking for help			.190		-().198	8		0.47		0.169	
IPH21 Continue learning			.060		C	.040)		0.05	3	0.760	
IPH17 Wanting to achieve ideals			.153		C	.147	7		-0.06	1	0.705	
IPH13 Being able to handle change xtraction Method: Principal Component Ana			.171			0.018			0.09		0.610	
During the process of item reduction the nar nanagement and Personal development. Afte tness, Daily life management, and Future pe	erwards t rspective	hese were	e rena	amed b	by the rese	earch	team	into Cor	ntentm	ent with lif	e, Physical	
able 3A. Interitem correlation matr										1	1	
	IPH12	IPH14		IPH1			IPH2		H27	IPH29	IPH32	IP
IPH12 Accepting yourself	1.000	0.670		0.63			0.57		479	0.517	0.485	0.
IPH14 Having control	0.670	1.000		0.66			0.63		545	0.591	0.516	0.
IPH16 Being high-spirited	0.635	0.669		1.00			0.59		558	0.590	0.548	0.
IPH19 Accepting life	0.667	0.664		0.67			0.59		492	0.512	0.506	0.
IPH26 Feeling safe	0.574	0.639		0.59			1.00		605	0.523	0.552	0.
IPH27 Living conditions	0.479	0.545		0.55			0.60		000	0.509	0.582	0.
IPH29 Social contacts	0.517	0.591	L	0.59	0 0.5	12	0.52	23 0.	509	1.000	0.695	0
												-
IPH32 Having support of others	0.485	0.516	5	0.54	8 0.5	06	0.55	52 0.	582	0.695	1.000	0
IPH32 Having support of othersIPH34 Doing meaningful things		0.516	5		8 0.5	06	0.55 0.52	52 0.			1.000 0.557	0
IPH34 Doing meaningful things	0.485 0.527	0.583	5 3	0.54 0.62	8 0.50 8 0.52	06 24	0.52	52 0. 21 0.	582 485	0.695 0.607	0.557	0.
	0.485 0.527	0.583	5 3	0.54 0.62 <i>fitne</i>	8 0.50 8 0.52	06 24	0.52 2 iten	52 0. 21 0.	582 485	0.695 0.607	0.557	0.
IPH34 Doing meaningful things	0.485 0.527	0.583	5 3 sical	0.54 0.62 <i>fitne</i> 13	8 0.50 8 0.52 ess ¹ of th	06 24 ne 22	0.52 2 iten 15	52 0. 21 0. n PH m	582 485	0.695 0.607	0.557	0.
IPH34 Doing meaningful things able 3B. Interitem correlation matr	0.485 0.527 ix of fac	0.583 ctor <i>Phys</i> IPH2	5 3 sical IPH	0.54 0.62 <i>fitne</i> 13 861	8 0.50 8 0.52 ess ¹ of th IPH4	06 24 ne 22 IPH	0.52 2 iten 15 16	52 0. 21 0. n PH m IPH6	582 485	0.695 0.607	0.557	0
IPH34 Doing meaningful things able 3B. Interitem correlation matr IPH2 Feeling fit	0.485 0.527 ix of fac	0.583 ctor <i>Phys</i> IPH2 1.000	5 3 sical IPH 0.3	0.54 0.62 <i>fitne</i> 13 361 000	8 0.50 8 0.52 ess ¹ of th 1PH4 0.488	06 24 ne 22 IPH 0.5	0.52 2 iten 15 16 56	52 0. 21 0. n PH m IPH6 0.735	582 485	0.695 0.607	0.557	0.
IPH34 Doing meaningful things able 3B. Interitem correlation matr IPH2 Feeling fit IPH3 Having physical complaints o	0.485 0.527 ix of fac	0.583 ctor Phys IPH2 1.000 0.361	5 3 sical IPH 0.3 1.0	0.54 0.62 <i>fitne</i> 13 361 000 262	8 0.50 8 0.52 ess ¹ of th IPH4 0.488 0.262	06 24 1PH 0.5 0.2	0.52 2 iten 15 16 56 29	52 0. 21 0. n PH m IPH6 0.735 0.313	582 485	0.695 0.607	0.557	0
IPH34 Doing meaningful things able 3B. Interitem correlation matr IPH2 Feeling fit IPH3 Having physical complaints of IPH4 Sleeping pattern	0.485 0.527 ix of fac	0.583 tor Phys IPH2 1.000 0.361 0.488	5 3 sical IPH 0.3 1.0 0.2	0.54 0.62 <i>fitne</i> 13 61 000 262 256	8 0.50 8 0.52 ess ¹ of th 1PH4 0.488 0.262 1.000	06 24 1PH 0.5 0.2 0.5	0.52 2 iten 15 16 56 29 00	52 0. 21 0. n PH m IPH6 0.735 0.313 0.462	582 485	0.695 0.607	0.557	0.
IPH34 Doing meaningful things able 3B. Interitem correlation matr IPH2 Feeling fit IPH3 Having physical complaints of IPH4 Sleeping pattern IPH5 Eating pattern IPH6 Physical condition able 3C. Interitem correlation matr	0.485 0.527 ix of fac	0.583 IPH2 1.000 0.361 0.488 0.516 0.735	sical IPH 0.3 1.0 0.2 0.2 0.3 y life	0.54 0.62 1 <i>fitne</i> 13 661 000 262 256 313	8 0.50 8 0.50 ess ¹ of th 1PH4 0.488 0.262 1.000 0.529 0.462	06 24 1PH 0.5 0.2 0.5 1.0 0.5	0.52 2 iten 15 16 56 29 00 37 of the	52 0. 21 0. n PH m IPH6 0.735 0.313 0.462 0.537 1.000 I	582 485 nodel	0.695 0.607 (n=1199	0.557	0.
IPH34 Doing meaningful things able 3B. Interitem correlation matr IPH2 Feeling fit IPH3 Having physical complaints of IPH4 Sleeping pattern IPH5 Eating pattern IPH6 Physical condition able 3C. Interitem correlation matr	0.485 0.527 ix of fac r pain ix of fac IPH36	0.583 IPH2 1.000 0.361 0.488 0.516 0.735 ctor Dail/ IPH37	5 5 5 5 5 5 5 5 5 6 7 10 0.2 0.2 0.2 0.3 0.2 0.3 7 10 0.2 0.3 1.0 0.2 0.3 1.0 0.2 0.3 1.0 0.3 1.0 0.2 0.3 1.0 0.3 1.0 0.2 0.3 1.0 0.3 1.0 0.2 0.3 1.0 0.2 0.3 1.0 0.3 1.0 0.2 0.3 1.0 0.2 0.3 1.0 0.2 0.3 0.3 0.2 0.3 0.3 0.3 0.2 0.3 0.2 0.3 0.3 0.2 0.3 0.3 0.3 0.3 0.3 0.3 0.3 0.3	0.54 0.62 1 <i>fitne</i> 13 661 000 262 256 313 256 313 29 813	8 0.50 8 0.51 ess ¹ of th IPH4 0.488 0.262 1.000 0.529 0.462 inagemention	D6 D6 24 IPH 0.5 0.2 0.5 1.0 0.5 IF	0.52 2 iten 15 16 56 29 00 37 37 00 37	52 0. 21 0. n PH m IPH6 0.735 0.313 0.462 0.537 1.000 I	582 485 nodel	0.695 0.607 (n=1199	0.557	0.
IPH34 Doing meaningful things able 3B. Interitem correlation matr IPH2 Feeling fit IPH3 Having physical complaints of IPH4 Sleeping pattern IPH5 Eating pattern IPH6 Physical condition able 3C. Interitem correlation matr IPH36 Looking after yourself	0.485 0.527 ix of fac r pain ix of fac IPH36 1.000	0.583 IPH2 1.000 0.361 0.488 0.516 0.735 Ctor Dail, IPH37 0.656	5 sical IPH 0.3 1.0 0.2 0.3 y life IPH 0.2	0.54 0.62 1 <i>fitne</i> 13 661 000 262 256 313 256 313 243 256 313	8 0.50 8 0.51 rss ¹ of th IPH4 0.488 0.262 1.000 0.529 0.462 IPH40 0.503	D6 D6 24 IPH 0.5 0.2 0.5 1.0 0.5 IPH 0.5 1.0 0.5 IPH	0.52 2 iten 15 16 56 29 00 37 00 37 00 37 00 37 .305	52 0. 21 0. n PH m IPH6 0.735 0.313 0.462 0.537 1.000 I	582 485 nodel	0.695 0.607 (n=1199	0.557	0.
IPH34 Doing meaningful things able 3B . Interitem correlation matr IPH2 Feeling fit IPH3 Having physical complaints of IPH4 Sleeping pattern IPH5 Eating pattern IPH6 Physical condition able 3C . Interitem correlation matr IPH36 Looking after yourself IPH37 Knowing your limitations	0.485 0.527 ix of fac r pain ix of fac IPH36 1.000 0.656	0.583 IPH2 1.000 0.361 0.488 0.516 0.735 Ctor Dail IPH37 0.656 1.000	5 3 IPH 0.3 1.0 0.2 0.3 0.2 0.3 1.0 0.2 0.3 0.4 0.5 0.6	0.54 0.62 1 <i>fitne</i> 13 61 000 262 256 313 256 313 256 313 255 13 2501 628	8 0.50 8 0.50 ess ¹ of th IPH4 0.488 0.262 1.000 0.529 0.462 Dagement IPH40 0.503 0.569	D6 D6 24 IPH 0.5 0.2 0.5 1.0 0.5 IPH 0.5 0.5 1.0 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	0.52 2 item 15 16 56 29 00 37 00 37 00 37 00 40 29 00 37 .37 .305 .393	52 0. 21 0. n PH m IPH6 0.735 0.313 0.462 0.537 1.000 I	582 485 nodel	0.695 0.607 (n=1199	0.557	0.
IPH34 Doing meaningful things able 3B. Interitem correlation matr IPH2 Feeling fit IPH3 Having physical complaints of IPH4 Sleeping pattern IPH5 Eating pattern IPH6 Physical condition able 3C. Interitem correlation matr IPH36 Looking after yourself IPH37 Knowing your limitations IPH39 Managing time	0.485 0.527 ix of fac r pain ix of fac IPH36 1.000 0.656 0.501	0.583 IPH2 1.000 0.361 0.488 0.516 0.735 ctor Dail IPH37 0.656 1.000 0.628	5 sical IPH 0.3 1.00 0.2 0.3 y life IP 0.2 0.3 1.00 0.2 0.3 1.00 0.2 0.3 1.00 0.2 0.3 1.00 0.1	0.54 0.62 1 1 13 661 262 256 313 256 313 256 313 256 313 256 313 256 313 256 313 256 313 256 313 256 313 256 313 256 313 256 256 313 256 256 256 256 256 256 256 256 256 256	8 0.50 8 0.50 ess ¹ of th IPH4 0.488 0.262 1.000 0.529 0.462 0.462 1.0462 0.462 0.503 0.569 0.554	D6 D6 24 IPH 0.5 0.2 0.5 1.0 0.5 0.5 1.0 0.5 0.10 0.5 0.5 0.5 0.0 0.5	0.52 2 item 15 16 56 29 00 37 00 37 00 37 00 37 00 412 .305 .393 .417	52 0. 21 0. n PH m IPH6 0.735 0.313 0.462 0.537 1.000 I	582 485 nodel	0.695 0.607 (n=1199	0.557	0.
IPH34 Doing meaningful things able 3B. Interitem correlation matr IPH2 Feeling fit IPH3 Having physical complaints of IPH4 Sleeping pattern IPH5 Eating pattern IPH6 Physical condition able 3C. Interitem correlation matr IPH36 Looking after yourself IPH37 Knowing your limitations IPH39 Managing time IPH40 Managing money	0.485 0.527 ix of fac r pain ix of fac IPH36 1.000 0.656 0.501 0.503	0.583 IPH2 1.000 0.361 0.488 0.516 0.735 Ctor Dail IPH37 0.656 1.000 0.628 0.569	5 sical IPH 0.3 1.0 0.2 0.3 IPH 0.2 0.3 IPH 0.1 1.0 0.2 0.3 IPH 0.4 0.5 0.6 0.7 0	0.54 0.62 0.62 0.62 000 2.62 2.56 3.13 2.56 3.13 2.56 3.13 0.00 5.54	8 0.50 8 0.50 ess ¹ of th IPH4 0.488 0.262 1.000 0.529 0.462 IPH40 0.503 0.569 0.554 1.000	D6 24 IPH 0.5 0.2 0.5 1.0 0.5 1.0 0.5 0.0 0.5 0.0 0.5	0.52 2 item 15 16 56 29 00 37 00 00 37 00 37 00 37 00 37 00 37 00 37 00 37 00 37 00 00 00 37 00 00 00 00 00 00 00 00 00 00 00 00 00	52 0. 21 0. n PH m IPH6 0.735 0.313 0.462 0.537 1.000 I	582 485 nodel	0.695 0.607 (n=1199	0.557	0.
IPH34 Doing meaningful things able 3B. Interitem correlation matr IPH2 Feeling fit IPH3 Having physical complaints of IPH4 Sleeping pattern IPH5 Eating pattern IPH6 Physical condition able 3C. Interitem correlation matr IPH36 Looking after yourself IPH37 Knowing your limitations IPH39 Managing time IPH40 Managing money	0.485 0.527 ix of fac r pain ix of fac IPH36 1.000 0.656 0.501	0.583 IPH2 1.000 0.361 0.488 0.516 0.735 ctor Dail IPH37 0.656 1.000 0.628	5 sical IPH 0.3 1.0 0.2 0.3 IPH 0.2 0.3 IPH 0.1 1.0 0.2 0.3 IPH 0.4 0.5 0.6 0.7 0	0.54 0.62 1 1 13 661 262 256 313 256 313 256 313 256 313 256 313 256 313 256 313 256 313 256 313 256 313 256 313 256 313 256 256 313 256 256 256 256 256 256 256 256 256 256	8 0.50 8 0.50 ess ¹ of th IPH4 0.488 0.262 1.000 0.529 0.462 0.462 1.0462 0.462 0.503 0.569 0.554	D6 24 IPH 0.5 0.2 0.5 1.0 0.5 1.0 0.5 0.0 0.5 0.0 0.5	0.52 2 item 15 16 56 29 00 37 00 37 00 37 00 37 00 412 .305 .393 .417	52 0. 21 0. n PH m IPH6 0.735 0.313 0.462 0.537 1.000 I	582 485 nodel	0.695 0.607 (n=1199	0.557	0.
IPH34 Doing meaningful things able 3B. Interitem correlation matr IPH2 Feeling fit IPH3 Having physical complaints of IPH4 Sleeping pattern IPH5 Eating pattern IPH6 Physical condition able 3C. Interitem correlation matr IPH36 Looking after yourself IPH37 Knowing your limitations IPH39 Managing time IPH40 Managing money	0.485 0.527 ix of fac r pain ix of fac IPH36 1.000 0.656 0.501 0.503 0.305	0.583 IPH2 1.000 0.361 0.488 0.516 0.735 Ctor Dail IPH37 0.656 1.000 0.628 0.569 0.393 Ctor Futu	5 3 IPH 0.3 1.0 0.2 0.3 0.2 0.3 y life IP 0.2 0.3 0.10 0.2 0.3 y life IP 0. 0.1 0.2 0.3 y life IP 0.1 0.2 0.3 0.4 0.5 0.5 0.6 0.7 <td< td=""><td>0.54 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.628 0.00 0.554 417</td><td>8 0.50 8 0.51 ess¹ of th IPH4 0.488 0.262 1.000 0.529 0.462 0.462 IPH40 0.503 0.569 0.554 1.000 0.443</td><td>D6 224 IPH 0.5 0.2 0.5 1.0 0.5 1.0 0.5 0.5 1.0 0.5 0.5 1.0 0.5 0.5 0.5 1.0 0.5 <</td><td>0.52 2 iten 15 16 56 29 00 37 00 37 00 37 00 37 00 0 5 142 .305 .393 .417 .443 .000</td><td>52 0. 21 0. n PH m 0. IPH6 0.735 0.313 0.462 0.537 1.000 22 ite 0.</td><td>582 485 nodel</td><td>0.695 0.607 (n=1199) model (1</td><td>0.557) n=1199)</td><td>0.</td></td<>	0.54 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.62 0.628 0.00 0.554 417	8 0.50 8 0.51 ess ¹ of th IPH4 0.488 0.262 1.000 0.529 0.462 0.462 IPH40 0.503 0.569 0.554 1.000 0.443	D6 224 IPH 0.5 0.2 0.5 1.0 0.5 1.0 0.5 0.5 1.0 0.5 0.5 1.0 0.5 0.5 0.5 1.0 0.5 <	0.52 2 iten 15 16 56 29 00 37 00 37 00 37 00 37 00 0 5 142 .305 .393 .417 .443 .000	52 0. 21 0. n PH m 0. IPH6 0.735 0.313 0.462 0.537 1.000 22 ite 0.	582 485 nodel	0.695 0.607 (n=1199) model (1	0.557) n=1199)	0.
IPH34 Doing meaningful things able 3B. Interitem correlation matr IPH2 Feeling fit IPH3 Having physical complaints of IPH4 Sleeping pattern IPH5 Eating pattern IPH6 Physical condition able 3C. Interitem correlation matr IPH36 Looking after yourself IPH39 Managing time IPH40 Managing money IPH42 Asking for help able 3D. Interitem correlation matr	0.485 0.527 ix of fac r pain ix of fac IPH36 1.000 0.656 0.501 0.503 0.305 ix of fac IPH36 1.000 0.656 0.501 0.503 0.305	0.583 IPH2 1.000 0.361 0.488 0.516 0.735 Ctor Dail/ IPH37 0.656 1.000 0.628 0.569 0.393 Ctor Futu 13 IPH	5 3 IPH 0.3 1.00 0.2 0.3 0.2 0.3 y life IP 0.2 0.3 0.2 0.3 y life IP 0.1 0.2 0.3 y life IP 0.1 0.2 0.3 0.1 0.2 0.3 0.4 0.5 0.5 0.6 0.7 0.7 0.8 0.9 0.1 0.1 0.2 0.3 0.4 0.5 0.7 0.8 0.9 0.1 0.2 0.3 0.4 0.5 0.7 0.8 0.9 <t< td=""><td>0.54 0.62 <i>fitne</i> 13 61 000 262 256 313 628 000 554 417 perspe</td><td>8 0.50 8 0.51 ess¹ of th IPH4 0.488 0.262 1.000 0.529 0.462 0.462 0.462 0.569 0.554 1.000 0.554 1.000 0.554 1.000 0.443 ective¹ c 21</td><td>D6 224 IPH 0.5 0.2 0.5 1.0 0.5 1.0 0.5 0.5 1.0 0.5 0.5 1.0 0.5 0.5 0.5 1.0 0.5 <</td><td>0.52 2 iten 15 16 56 29 00 37 00 37 00 37 00 37 00 0 5 142 .305 .393 .417 .443 .000</td><td>52 0. 21 0. n PH m 0. IPH6 0.735 0.313 0.462 0.537 1.000 22 ite 0.</td><td>582 485 nodel</td><td>0.695 0.607 (n=1199) model (1</td><td>0.557) n=1199)</td><td>0.</td></t<>	0.54 0.62 <i>fitne</i> 13 61 000 262 256 313 628 000 554 417 perspe	8 0.50 8 0.51 ess ¹ of th IPH4 0.488 0.262 1.000 0.529 0.462 0.462 0.462 0.569 0.554 1.000 0.554 1.000 0.554 1.000 0.443 ective ¹ c 21	D6 224 IPH 0.5 0.2 0.5 1.0 0.5 1.0 0.5 0.5 1.0 0.5 0.5 1.0 0.5 0.5 0.5 1.0 0.5 <	0.52 2 iten 15 16 56 29 00 37 00 37 00 37 00 37 00 0 5 142 .305 .393 .417 .443 .000	52 0. 21 0. n PH m 0. IPH6 0.735 0.313 0.462 0.537 1.000 22 ite 0.	582 485 nodel	0.695 0.607 (n=1199) model (1	0.557) n=1199)	0.
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In summary, through the 5 rounds of item reduction evaluation and discussions, 20 out of 42 items were

deleted resulting in a short self-reported questionnaire to measure Positive Health consisting of four

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dimensions and 22 items, hereafter called the PH22. The dimensions were renamed by the research team into

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296 1) Physical fitness, 2) Contentment with life, 3) Daily life management, and 4) Future perspective (see Table 4). 297
Table 4. The 22 item self-reported Positive Health questionnaire (PH22)
 10 Item number of the dialogue tool Item 11 Physical fitness 12 IPH2 I feel fit 13 IPH3 I have no physical complaints or pain 14 IPH4 I sleep well 15 IPH5 I eat well 16 IPH6 I recover quickly after exercise, such as sports 17 Contentment with life 18 IPH12 I accept myself for who I am 19 IPH14 I feel in control of my life 20 IPH16 In the mornings. I look forward to the day ahead 21 IPH19 I accept life as it comes 22 I feel safe IPH26 23 IPH27 I am content with where and with whom I live 24 IPH29 I am in good contact with other people 25 IPH32 I have people who support me when I need it 26 IPH34 I consider my job or other activities to be meaningful 27 Daily life management 28 IPH36 I am well capable of looking after myself. for example with regard to 29 personal hygiene. getting dressed. shopping. cooking 30 IPH37 I know my limitations 31 32 IPH39 I am well capable of planning my day 33 IPH40 I am well capable of managing the money that I have each month 34 IPH42 I know how to apply for benefits or getting assistance from official 35 agencies when necessary 36 Future perspective 37 IPH13 I look for solutions to change difficult situations 38 IPH17 I have ideals that I would like to achieve 39 IPH21 I want to continue learning throughout my life 40 298 41 42 299 It was accepted for the PH22 in favour of keeping specific content that; 1) the factor 'Contentment with life' 43 44 300 had high CA (0.92), 2) the factor 'Physical fitness' contained two highly correlated items but with an adequate 45 46 301 CA of 0.78, and 3) the factor 'Daily life management' contained an item with low FL (also an adequate CA of 47 48 302 0.81). 49 50 303 51 52 304 Cross-validation 53 54 305 The four-factor structure of the PH22 had an acceptable fit in first and second order CFA; 1) significant X^2 55 56 306 (p≤0.001), CFI of 0.902, RMSEA of 0.079 with a 90% confidence interval of 0.076 to 0.082, and SMSR of 0.047, 57 58 59 60

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and 2) significant X^2 (p≤0.001), CFI of 0.901, RMSEA of 0.079 with a 90% confidence interval of 0.075 to 0.0782,

and SMSR of 0.047, respectively.

310 Scores of the developed short Positive Health questionnaire

- 311 The scores of the PH22 were interpreted normally distributed but with slightly more outliers for the lower
- 312 scores and higher frequency of scores around the mean, which was especially seen for the scores of the factor

313 'Daily life management'. No floor or ceiling effects were present (see Table 5).

Table 5. Descriptive statistics of the PH22 scores (n=1258)

	Contentment	Physical fitness	Daily life	Future	Total score
	with life		management	perpective	PH22
	9 items (score	5 items (score	5 items (score	3 items (score	22 items (score
	range 0-90)	range 0-50)	range 0-50)	range 0-30)	range 0-220)
Mean	69.72	34.91	41.36	21.68	167.67
Median	72	36	42	22	171
SD	12.916	8.265	6.275	4.906	27.612
Skewness	-0.909	-0.526	-0.93	-0.718	-0.733
Kurtosis	0.933	0.225	1.118	0.463	0.623
Minimum	17	5	14	3	59
Maximum	90	50	50	30	220
P15	56	26	35	17	139
P85	82	44	48	27	195

⁷ 317 **DISCUSSION**

In this study a relatively short questionnaire to measure self-reported Positive Health was composed and cross-validated among a general (Dutch) population. The questionnaire contains 22 items stemming from the original My Positive Health (MPH) dialogue tool with 42 items. Structural validity and internal consistency were satisfactory, supporting the use of this questionnaire for evaluative purposes in scientific or policy research. This questionnaire is called the PH22. The different methodological approaches of item reduction for the PH17(9) and PH22 resulted in a different set of items and measurement properties. Contrary to the development of the PH17, during the development of the PH22, the approach by De Vet et al.(12) was used for item reduction, which includes content discussion and judgement of internal consistency next to highest factor loadings. First, these steps are considered essential to the item reduction process to avoid withdrawing relevant items. Second, retaining

328 items with the highest factor loadings per factor without the other steps can lead to overlap, i.e. the answer to

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3 4	329	one question predicts the answer to the second, thus providing information as if it were merely one item.
5 6	330	Overall, the approach by De Vet et al. (12) most likely improves a questionnaire's discriminative ability, which
7 8	331	means that a tool is better able to generate different scores for populations with different levels of Positive
9 10	332	Health. This is considered an essential condition for a measurement instrument, particularly for instruments
11 12	333	aiming to evaluate interventions or follow cohorts. The too high internal consistency found for at least parts of
13 14	334	the PH17 dimensions might be a consequence of this. Looking at the PH17, internal inconsistency was high for
15 16	335	almost all dimensions, especially related to the low number of items per factor (2-3 items; Cronbach's alpha
17 18	336	(CA); 0.90, 0.89, 0.77, 0.93, 0.89, 0.84). More items result in higher CA by definition. For the PH22, the
19 20	337	dimension 'Contentment with life' also had too high internal consistency (CA=0.92), but the factor also
21 22	338	consisted of nine items, what might (partly) explain the high CA. The other dimensions of the PH22 showed
23 24	339	good internal consistency, with CA ranging from 0.74 to 0.81. Finally, both PH17(9) and PH22 development
25 26	340	started with the 42 items of the MPH dialogue, but the different methodological approaches resulted in other
27 28	341	sets of items; only eight items corresponded. When comparing the PH22 to the PH42(11), its internal
29 30	342	consistency and user-friendliness improved because of fewer items, at the expense of only a bit less explained
31 32	343	variance (62% and 68%, respectively).
33		
34	344	We presumed the 42 items of the MPH to be a content-valid basis to compose a measurement
35 36	344 345	We presumed the 42 items of the MPH to be a content-valid basis to compose a measurement instrument, reflecting 'health from the perspective of patients and citizens' as assessed by Huber et al(5). The
35 36 37 38		
35 36 37 38 39 40	345	instrument, reflecting 'health from the perspective of patients and citizens' as assessed by Huber et al(5). The
35 36 37 38 39 40 41 42	345 346	instrument, reflecting 'health from the perspective of patients and citizens' as assessed by Huber et al(5). The items of the MPH tool were formulated based on health indicators emerged from a large concept elicitation
35 36 37 38 39 40 41 42 43 44	345 346 347	instrument, reflecting 'health from the perspective of patients and citizens' as assessed by Huber et al(5). The items of the MPH tool were formulated based on health indicators emerged from a large concept elicitation interview study among various stakeholders including patients and citizens(5), generating a solid basis for its
35 36 37 38 39 40 41 42 43 44 45 46	345 346 347 348	instrument, reflecting 'health from the perspective of patients and citizens' as assessed by Huber et al(5). The items of the MPH tool were formulated based on health indicators emerged from a large concept elicitation interview study among various stakeholders including patients and citizens(5), generating a solid basis for its content. In the meantime, studies showed that scores from the PH17 and PH42 correlated with constructs like
35 36 37 38 39 40 41 42 43 44 45 46 47 48	345 346 347 348 349	instrument, reflecting 'health from the perspective of patients and citizens' as assessed by Huber et al(5). The items of the MPH tool were formulated based on health indicators emerged from a large concept elicitation interview study among various stakeholders including patients and citizens(5), generating a solid basis for its content. In the meantime, studies showed that scores from the PH17 and PH42 correlated with constructs like quality of life, resilience and recovery (10,11,24) and with level of education and healthcare use (24).
35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50	345 346 347 348 349 350	instrument, reflecting 'health from the perspective of patients and citizens' as assessed by Huber et al(5). The items of the MPH tool were formulated based on health indicators emerged from a large concept elicitation interview study among various stakeholders including patients and citizens(5), generating a solid basis for its content. In the meantime, studies showed that scores from the PH17 and PH42 correlated with constructs like quality of life, resilience and recovery (10,11,24) and with level of education and healthcare use (24). Moreover, the MPH was shown by various users as a relevant and comprehensible dialogue tool(3). We
35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52	345 346 347 348 349 350 351	instrument, reflecting 'health from the perspective of patients and citizens' as assessed by Huber et al(5). The items of the MPH tool were formulated based on health indicators emerged from a large concept elicitation interview study among various stakeholders including patients and citizens(5), generating a solid basis for its content. In the meantime, studies showed that scores from the PH17 and PH42 correlated with constructs like quality of life, resilience and recovery (10,11,24) and with level of education and healthcare use (24). Moreover, the MPH was shown by various users as a relevant and comprehensible dialogue tool(3) . We followed an inductive approach towards the development of the PH22. Thereby, four dimensions emerged
35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54	 345 346 347 348 349 350 351 352 	instrument, reflecting 'health from the perspective of patients and citizens' as assessed by Huber et al(5). The items of the MPH tool were formulated based on health indicators emerged from a large concept elicitation interview study among various stakeholders including patients and citizens(5), generating a solid basis for its content. In the meantime, studies showed that scores from the PH17 and PH42 correlated with constructs like quality of life, resilience and recovery (10,11,24) and with level of education and healthcare use (24). Moreover, the MPH was shown by various users as a relevant and comprehensible dialogue tool(3) . We followed an inductive approach towards the development of the PH22. Thereby, four dimensions emerged which we named; 'Physical fitness', 'Contentment with life', 'Daily life management' and 'Future perspective'
35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56	 345 346 347 348 349 350 351 352 353 	instrument, reflecting 'health from the perspective of patients and citizens' as assessed by Huber et al(5). The items of the MPH tool were formulated based on health indicators emerged from a large concept elicitation interview study among various stakeholders including patients and citizens(5), generating a solid basis for its content. In the meantime, studies showed that scores from the PH17 and PH42 correlated with constructs like quality of life, resilience and recovery (10,11,24) and with level of education and healthcare use (24). Moreover, the MPH was shown by various users as a relevant and comprehensible dialogue tool(3) . We followed an inductive approach towards the development of the PH22. Thereby, four dimensions emerged which we named; 'Physical fitness', 'Contentment with life', 'Daily life management' and 'Future perspective' aligning with the core elements of the dynamic concept of (positive) health by Huber et al.(2,5).
35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55	 345 346 347 348 349 350 351 352 353 354 	instrument, reflecting 'health from the perspective of patients and citizens' as assessed by Huber et al(5). The items of the MPH tool were formulated based on health indicators emerged from a large concept elicitation interview study among various stakeholders including patients and citizens(5), generating a solid basis for its content. In the meantime, studies showed that scores from the PH17 and PH42 correlated with constructs like quality of life, resilience and recovery (10,11,24) and with level of education and healthcare use (24). Moreover, the MPH was shown by various users as a relevant and comprehensible dialogue tool(3). We followed an inductive approach towards the development of the PH22. Thereby, four dimensions emerged which we named; 'Physical fitness', 'Contentment with life', 'Daily life management' and 'Future perspective' aligning with the core elements of the dynamic concept of (positive) health by Huber et al.(2,5).

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described above, in this study we chose the construct for the measurement tool to reflect the original concept of health by Huber et al (2) 'Health as the ability to adapt and to self-manage, in the face of social, physical and emotional challenges'. This concept closely fits a recently proposed description of positive health: 'reserve in capacities' (26). Recently, another Dutch research group published the 32-item Context-sensitive Positive Health Questionnaire (CPHQ)(27). This measurement tool aligns the concept of Positive Health with the 'Capability Approach' (28). Accordingly, they formulated the following construct definition for their measurement tool: "The extent to which one is capable to adapt and to thrive given one's physical, mental, social and contextual opportunities". As a result, the CPHQ included more context-related items than the PH22, such as items about feeling disadvantaged because of sexuality or cultural background or feeling represented by politics. Nevertheless, the PH22 and CPHQ also overlap, both including capabilities and functionings (beings and doings). For the methodological process of item reduction towards the 32 item CPHQ, similar as were for the PH17, the three items with highest factor loadings (>0.4 without cross-loadings) were leading, possibly hampering its discriminant validity. Last, contrary to the CPHQ, the PH22 consists only of original items from the MPH to keep recognizability with the Positive Health approach in practice. As 'Positive Health' is a novice approach, the discussion as to which construct or theoretical framework approximates best should continue. Moreover, Van Druten et al.(15) pointed out that conceptualization of health is person- and context-dependent, which necessitates the existence of various constructs. Therefore, different definitions and theoretical frameworks, such as Positive Health, Reserve Capacity Model(29) or Capability Approach(28), should exist side by side. At the moment the CPHQ is being further developed and assessed(30). One part of the research consists of comprehensive focus groups with various stakeholders discussing and prioritizing items anew with the aim to shorten the questionnaire and resulting in a broad supported instrument to assess the broad concept of health. It is of interest to explore how these instruments can supplement each other, or in other words, which instrument serves which aim and context best. Future choices of which tool to use should not only depend on the measurement properties and usability of each tool but also on which construct definition is preferred as the outcome to measure (8,15). The PH22 scores can add to evaluate positive health or patient centered interventions. Prior to the actual use of the PH22 as a measuring tool in evaluative research, it is essential to explore its test-retest reliability and responsiveness for change. Further research has to explore this so that differences in scores can be correctly interpreted. Last, it should be emphasized that the PH22 is not meant for dialogue purposes.

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- 3 4	387	Specifically, for	that aim the MPH dialogue tool was developed; to guide the conversation about someone's
5 6	388	Positive Health	and reflect on someone's personalized (positive) health-related goals over time in his or her
7 8	389	specific contex	t.
9 10	390		
11 12	391	CONCLUSIONS	
13 14	392	In this study a o	comprehensive methodological approach was applied using both content discussion and
15 16	393	statistical outp	ut aiming to develop a content valid measurement tool for evaluative purposes in scientific or
17 18	394	policy research	at positive health or patient centered interventions assessing self-reported Positive Health. A
19 20	395	relatively short	questionnaire containing 22 items distributed over four dimensions, the PH22, was developed
21 22	396	and cross-valid	ated among a general (Dutch) population. This study supports its structural validity. To apply this
23 24	397	questionnaire i	n evaluative research its test-retest reliability should be explored first, followed by
25 26	398	responsiveness	for change. Future research has to assess this.
27 28	399		
29 30	400	Additional mat	terial
31 32	401	Additional file ((.pdf); A. Items of the My Positive Health dialogue tool (MPH), B. Factor loadings of model with
33 34	402	42 MPH items;	PH42, C1-6. Interitem Correlations of factors PH42, D-E. Factor loadings with 30-item and 24 PH
35 36	403	model (round 2	2 and 3).
37 38	404		
39 40	405	List of abbrevia	ations
41 42	406	CA	Cronbach's alpha Confirmatory factor analysis
43 44	407	CFA	Confirmatory factor analysis
45 46	408	CFI	Comparative fit index
47 48	409	COSMIN	Reporting Guideline
49 50	410	CPHQ	Context-sensitive Positive Health Questionnaire
51 52	411	PCA	Principal component analysis
53 54	412	FL	Factor loading
55 56 57	413	IIC	Inter-item correlation
57 58 59	414	IPH	Item number from the MPH dialogue tool
60	415	КМО	Kaiser-Meyer-Olkin

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2 3 4	416	LISS panel	Longitudinal Internet studies for the Social Sciences – panel
5	417	METC	Medical ethical review board (Medisch ethische toetsingscommissie)
7 8	418	ML	Maximum likelihood
9 10	419	MPH	My Positive Health dialogue tool
11 12	420	PH17	Positive Health measurement scale with 17 items
13 14	421	PH22	Positive Health measurement scale with 22 items
15 16	422	PH42	Positive Health measurement scale with 42 items
17 18	423	PROM	Patient-reported outcome measures
19 20	424	RMSEA	Root mean square error of approximation
21 22	425	STMR	Standardized root mean square residual
23 24	426		
25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 56 47 48 9 50 51 52 354 55 60 59 60	427		Standardized root mean square residual

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A. Items of the My Positive Health dialogue tool (MPH)

Item number of the dialogue to	
BF1	I feel healthy
BF2	I feel fit
BF3	I have no physical complaints or pain
BF4	I sleep well
BF5	I eat well
BF6	I recover quickly after exercise, such as sports.
BF7	I find it easy to move, such as going up and down stairs, walking or cycling
MW8	I am good at remembering things
MW9	I am able to concentrate
MW10	I am able to see, hear, talk and read
MW11	I feel cheerful
MW12	I accept myself for who I am
MW13	I look for solutions to change difficult situations
MW14	I feel in control of my life
MF15	I have a meaningful life
MF16	In the mornings, I look forward to the day ahead
MF17	I have ideals that I would like to achieve
MF18	I feel confident about my own future
MF19	I accept life as it comes
MF20	I am grateful for what life offers me
MF21	I want to continue learning throughout my life
QL22	I enjoy my life
QL23	I am happy
QL24	I feel good
QL25	I feel my life is well-balanced
QL26	I feel safe
QL27	I am content with where and with whom I live
QL28	I have enough money to pay my bills
SP29	I am in good contact with other people
SP30	Other people take me seriously
SP31	I have people with whom I can do fun things with
SP32	I have people who support me when I need it
SP33	I feel that I 'belong' in my environment
SP34	I consider my job or other activities to be meaningful
SP35	I am interested in what happens in society
DF36	I am well capable of looking after myself, for example with regard to personal
	hygiene, getting dressed, shopping, cooking
DF37	I know my limitations
DF38	I know how I can look after my own health
DF39	I am well capable of planning my day
DF40	I am well capable of managing the money that I have each month
DF41	I am able to work in a job or do voluntary work
DF42	I know how to apply for benefits or getting assistance from official agencies whe
	necessary

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BF: bodily functions, MW: mental wellbeing, MF: meaningfulness, QL: quality of life, SP: social and societal participation, DF: daily functioning (https://vragenlijsten.mijnpositievegezondheid.nl/adults-en)

B. Factor loadings of model with 42 MPH items; PH42 (n=1199)¹

IPH25Feeling well-balancedIPH24Feeling goodIPH23Being happyIPH22EnjoymentIPH16Being high-spiritedIPH11Being cheerfulIPH19Accepting lifeIPH20Being gratefulIPH15Having a meaningful lifeIPH12Accepting yourselfIPH18Feeling confident about ownfutureIPH14IPH26Feeling safeIPH7ExerciseIPH6Physical condition	Acceptance. meaningfulness and satisfaction with life	Physical health and functioning	Self-management	Social network and societal roles	Personal development	Cognition
IPH23Being happyIPH22EnjoymentIPH16Being high-spiritedIPH11Being cheerfulIPH19Accepting lifeIPH20Being gratefulIPH15Having a meaningful lifeIPH12Accepting yourselfIPH18Feeling confident about ownfutureIPH14IPH26Feeling safeIPH7Exercise	0.751	0.064	0.129	0.053	0.047	0.036
IPH22 EnjoymentIPH16 Being high-spiritedIPH11 Being cheerfulIPH11 Being cheerfulIPH19 Accepting lifeIPH20 Being gratefulIPH15 Having a meaningful lifeIPH12 Accepting yourselfIPH18 Feeling confident about ownfutureIPH14 Having controlIPH26 Feeling safeIPH7 Exercise	0.708	0.235	-0.009	0.097	0.051	0.005
IPH16Being high-spiritedIPH11Being cheerfulIPH19Accepting lifeIPH20Being gratefulIPH15Having a meaningful lifeIPH15Having a meaningful lifeIPH12Accepting yourselfIPH18Feeling confident about ownfutureIPH14IPH14Having controlIPH26Feeling safeIPH7Exercise	0.699	0.082	-0.004	0.260	0.034	-0.023
IPH11Being cheerfulIPH19Accepting lifeIPH20Being gratefulIPH15Having a meaningful lifeIPH12Accepting yourselfIPH18Feeling confident about ownfutureIPH14IPH14Having controlIPH26Feeling safeIPH7Exercise	0.676	0.086	0.021	0.253	0.060	-0.013
IPH19 Accepting lifeIPH20 Being gratefulIPH15 Having a meaningful lifeIPH12 Accepting yourselfIPH18 Feeling confident about ownfutureIPH14 Having controlIPH26 Feeling safeIPH7 Exercise	0.673	0.105	0.046	0.129	0.102	0.033
IPH20Being gratefulIPH15Having a meaningful lifeIPH12Accepting yourselfIPH18Feeling confident about own futureIPH14Having controlIPH26Feeling safeIPH7Exercise	0.653	0.159	-0.040	0.154	0.089	0.102
IPH15 Having a meaningful lifeIPH12 Accepting yourselfIPH18 Feeling confident about own futureIPH14 Having controlIPH26 Feeling safeIPH7 Exercise	0.645	-0.039	0.165	0.048	0.135	0.087
IPH12 Accepting yourself IPH18 Feeling confident about own future IPH14 Having control IPH26 Feeling safe IPH7 Exercise	0.624	0.008	0.114	0.135	0.160	0.002
IPH18 Feeling confident about own future IPH14 Having control IPH26 Feeling safe IPH7 Exercise	0.573	0.049	0.045	0.249	0.183	0.005
future IPH14 Having control IPH26 Feeling safe IPH7 Exercise	0.572	0.037	0.206	0.054	0.043	0.145
IPH26 Feeling safe IPH7 Exercise	0.558	0.161	0.033	0.093	0.344	-0.019
IPH7 Exercise	0.534	0.026	0.201	0.105	0.163	0.123
IPH7 Exercise	0.393	0.074	0.185	0.256	0.028	0.078
IPH6 Physical condition	-0.107	0.877	0.061	0.049	0.109	-0.118
	0.069	0.783	0.046	0.021	0.048	-0.013
IPH2 Feeling fit	0.206	0.781	0.052	-0.039	-0.002	0.003
IPH1 Feeling healthy	0.195	0.769	0.027	-0.032	0.016	0.028
IPH41 Being able to work	-0.089	0.526	0.291	0.058	0.266	-0.223
IPH3 Having physical complaints or pain	-0.031	0.450	-0.097	0.062	-0.018	0.193
IPH4 Sleeping pattern	0.395	0.422	-0.061	0.022	-0.276	0.254
IPH5 Eating pattern	0.241	0.364	0.248	0.087	-0.250	0.197
IPH40 Managing money	0.147	-0.036	0.828	0.001	-0.069	-0.070
IPH37 Knowing your limitations	0.001	0.014	0.754	0.017	0.011	0.233
IPH38 Knowledge of health	-0.022	0.157	0.651	0.088	0.019	0.201
IPH39 Managing time	0.132	0.001	0.634	-0.062	0.073	0.238
IPH36 Looking after yourself	-0.171	0.290	0.633	0.052	0.092	0.065
IPH28 Having enough money	0.219	0.035	0.598	0.147	-0.121	-0.231
IPH42 Asking for help	0.065	-0.044	0.452	0.178	0.175	-0.154
IPH32 Having the support of others	-0.014	-0.013	-0.036	0.939	-0.038	0.015
IPH31 Doing fun things together	0.043	0.070	-0.070	0.899	-0.014	-0.043
IPH33 Belonging	0.099	-0.015	0.018	0.864	-0.070	-0.028
IPH30 Being taken seriously	-0.023	-0.021	0.047	0.792	0.081	0.092
IPH29 Social contacts	0.111	0.013	-0.038	0.786	0.013	0.051
IPH27 Living conditions	0.335	-0.044	0.224	0.423	-0.140	-0.017
IPH35 Being interested in society						1
IPH34 Doing meaningful things	0.011	-0.002	0.181	0.418	0.263	-0.011
IPH21 Continue learning IPH17 Wanting to achieve ideals						-0.011 -0.169 0.017

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization. Pattern matrix, rotation converged in 14 iterations.

1. van Druten VP, Metz MJ, Mathijssen JJP, et al. Measuring positive health using the My Positive Health (MPH) and Individual Recovery Outcomes Counter (I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch population. *Under Rev.* Published online 2024. doi:10.1101/2024.02.21.24301090

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Page 27 of 30 1 2 ê1. Interitem Correlations of factor <i>Acceptatic</i> 4	on, meanii	ngfulness a	nd satisfacti	on with life		Open model; PH42 [:]	1		mjopen-2024-091377 (d by copyright, includi				
5 6 7 8 9 10 11 12	IPH23 Being happy	IPH22 Enjoym ent	IPH25 Feeling well- balanced	IPH24 Feeling good	IPH16 Being high- spirited	IPH11 Being cheerful	IPH15 Having a meaningf ul life	IPH20 Being grateful	ng for uses related to	IPH19 Acceptin g life	IPH14 Having control	IPH12 Acceptin g yourself	IPH26 Feeling safe
13 TPH23 Being happy	1.000	0.893	0.811	0.844	0.784	0.815	0.769	0.756	wnbade of retrieved to the state of the sta	0.664	0.699	0.652	0.646
14 H22 Enjoyment	0.893	1.000	0.804	0.842	0.793	0.822	0.785	0.769		0.678	0.705	0.669	0.658
15 1PH25 Feeling well-balanced	0.811	0.804	1.000	0.831	0.764	0.755	0.733	0.702	0.	0.689	0.709	0.670	0.640
1 ¹ PH24 Feeling good	0.844	0.842	0.831	1.000	0.784	0.827	0.726	0.682		0.657	0.680	0.687	0.648
18PH16 Being high-spirited	0.784	0.793	0.764	0.784	1.000	0.773	0.770	0.697		0.670	0.669	0.635	0.597
19PH11 Being cheerful	0.815	0.822	0.755	0.827	0.773	1.000	0.721	0.691	j 0.723	0.654	0.676	0.653	0.634
² PH15 Having a meaningful life	0.769	0.785	0.733	0.726	0.770	0.721	1.000	0.716	≥0.7 <mark>≤</mark> 0	0.663	0.710	0.631	0.614
21 22 22 22 22	0.756	0.769	0.702	0.682	0.697	0.691	0.716	1.000	5 0.7 <mark>2</mark> 2	0.709	0.653	0.647	0.613
22 2₽H18 Feeling confident about own future	0.746	0.757	0.723	0.724	0.738	0.723	0.750	0.712	1.000	0.697	0.715	0.640	0.623
24PH19 Accepting life	0.664	0.678	0.689	0.657	0.670	0.654	0.663	0.709	ق 0.6 <mark>9</mark> 7	1.000	0.664	0.667	0.596
25PH14 Having control	0.699	0.705	0.709	0.680	0.669	0.676	0.710	0.653	a 0.7 8 5	0.664	1.000	0.670	0.639
2 PH12 Accepting yourself	0.652	0.669	0.670	0.687	0.635	0.653	0.631	0.647	≌ 0.6 	0.667	0.670	1.000	0.574
² 7PH26 Feeling safe	0.646	0.658	0.640	0.648	0.597	0.634	0.614	0.613		0.596	0.639	0.574	1.000
28									r te				

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of factor Physical		BMJ Open g of 42-item mod	del; PH42 ¹	ling			Page 28 of 3
IPH2 Feeling fit	IPH7 Exercise	IPH1 Feeling healthy	IPH6 Physical condition	able to work is c	pattern	IPH5 Eating pattern	IPH3 Having complaints or pain
1.000	0.704	0.945	0.725	gner ate	0.499	0.516	·
				0.490 0 3	0.488		0.361
0.704				0.548	0.395		0.312
0.845	0.682	1.000	0.674	0.518 X G	0.488	0.476	0.348
0.735	0.735	0.674	1.000	0.477 an eride	0.462	0.537	0.313
0.490	0.548	0.518	0.477	1.000 ded	0.283	0.294	0.184
0.488	0.395	0.488	0.462	0.283 at a	1.000	0.529	0.262
0.516	0.435	0.476	0.537	0.294 3.83	0.529	1.000	0.256
0.361	0.312	0.348	0.313	0.184	0.262	0.256	1.000
	PH2 Feeling fit 1.000 0.704 0.845 0.735 0.490 0.488 0.516	PH2 Feeling fit IPH7 Exercise 1.000 0.704 0.704 1.000 0.845 0.682 0.735 0.735 0.490 0.548 0.488 0.395 0.516 0.435	PH2 Feeling fitIPH7 ExerciseIPH1 Feeling healthy1.0000.7040.8450.7041.0000.6820.8450.6821.0000.7350.7350.6740.4900.5480.5180.4880.3950.4880.5160.4350.476	healthycondition1.0000.7040.8450.7350.7041.0000.6820.7350.8450.6821.0000.6740.7350.7350.6741.0000.4900.5480.5180.4770.4880.3950.4880.4620.5160.4350.4760.537	of factor Physical health and functioning of 42-item model; PH42 ¹ IPH2 Feeling fit IPH7 Exercise IPH1 Feeling healthy IPH6 Physical condition IPH41 Beißer able to were ended	PH2 Feeling fit IPH7 Exercise IPH1 Feeling healthy IPH6 Physical condition IPH41 Beitser able to work being able	of factor Physical health and functioning of 42-item model; PH421 Yet 2 Yet 30 Yet 30 <thyet 30<="" th=""> Yet 30 <thy< td=""></thy<></thyet>

C3. Interitem Correlations between items of factor *Self-management* of 42-item model; PH42¹

	IPH38 Knowledge of health	IPH36 Looking after yourself	IP ¥ 3977/lanaging	IPH28 Having enough money	IPH42 Asking for help
your limitations	or nearth	arter yoursen	ti <mark>d</mark> ie simil	enough money	Пер
0.569	0.570	0.503	0.354 L	0.690	0.443
1.000	0.779	0.656	0.628	0.403	0.393
0.779	1.000	0.666	0.2.02.	0.413	0.404
0.656	0.666	1.000	08018	0.359	0.305
0.628	0.602	0.501	1.000 m	0.388	0.417
0.403	0.413	0.359	0.388	1.000	0.379
0.393	0.404	0.305	0.417 3	0.379	1.000
	1.000 0.779 0.656 0.628 0.403	1.000 0.779 0.779 1.000 0.656 0.666 0.628 0.602 0.403 0.413	1.000 0.779 0.656 0.779 1.000 0.666 0.656 0.666 1.000 0.628 0.602 0.501 0.403 0.413 0.359	0.569 0.570 0.503 0.554 - 1.000 0.779 0.656 0.288 - 0.779 1.000 0.666 0.202 - 0.656 0.666 1.000 0.201 - 0.628 0.602 0.501 1.000 - 0.628 0.602 0.501 1.000 - 0.403 0.413 0.359 0.388 -	0.569 0.570 0.503 0.554 - 0.690 1.000 0.779 0.656 0.928 - 0.403 0.779 1.000 0.666 0.902 - 0.413 0.656 0.666 1.000 0.901 - 0.359 0.628 0.602 0.501 1.900 - 0.388 0.403 0.413 0.359 0.388 - 1.000 0.393 0.404 0.305 0.417 - 0.379

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	IPH31 Doing fun things together	IPH32 Having the support of	IPH33 Belonging	IPH29 Social contacts	IPH30 Being di taken seriou왥	or IPH34 Doing Meaningful Notes Not	IPH27 Living conditions	IPH35 Being interested in
		others			or u	[♣] things ≤		society
IPH31 Doing fun things together	1.000	0.822	0.774	0.734	0.694	n 0.598	0.538	0.492
IPH32 Having the support of others	0.822	1.000	0.779	0.695	0.678 a	0.557	0.582	0.467
IPH33 Belonging	0.774	0.779	1.000	0.743	0.711	0 ,	0.569	0.523
IPH29 Social contacts	0.734	0.695	0.743	1.000	0.724	0.607	0.509	0.481
IPH30 Being taken seriously	0.694	0.678	0.711	0.724	1.000	0.561	0.533	0.540
IPH34 Doing meaningful things	0.598	0.557	0.621	0.607	0.561 🙃	5 01.000	0.485	0.521
IPH27 Living conditions	0.538	0.582	0.569	0.509	0.533 nd	a 1.000 de 0.485	1.000	0.391
IPH35 Being interested in society	0.492	0.467	0.523	0.481		1 1 0.521	0.391	1.000

ir ii so being interested in society	0.492 0.407	0.525 0.461	0.540	
C5. Interitem Correlations between iter	ns of factor Personal developmer	nt of 42-item model; PH42 ¹		om http://t ABES) . a mining,
	IPH21 Continue learning	g IPH17 Wanting to achiev ideals	e IPH13 Being able to handle changes	omjope Al trair
IPH21 Continue learning	1.000	0.534	0.483	ling
IPH17 Wanting to achieve ideals	0.534	1.000	0.449	e, nj.
IPH13 Being able to handle changes	0.483	0.449	1.000	
C6. Interitem Correlations between iter	ns of factor Cognition of 42-item	model; PH42 ¹	O _D	v on Jur similar te
				<u> </u>

C6. Interitem Correlations between items of factor *Cognition* of 42-item model; PH42¹

IPH8 Being able to remember things 1.000 0.768 0.477 G IPH9 Being able to concentrate 0.768 1.000 0.452 G IPH10 Being able to communicate 0.477 0.452 G G van Druten VP, Metz MJ, Mathijssen JJP, et al. Measuring positive health using the My Positive Health (MPH) and Individual Recovery Outcomes Counter (I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch population. Under Rev. Published online 2024. doi:10.1101/2024.02.21.24301090			IPH8 Being able to remember things	IPH9 Being able to concentrate	IPH10 Being able to communicate	echno
IPH10 Being able to communicate 0.477 0.452 1.000 van Druten VP, Metz MJ, Mathijssen JJP, et al. Measuring positive health using the My Positive Health (MPH) and Individual Recovery Outcomes Counter (I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch population. Under Rev. Published online 2024.	IPH8	Being able to remember things	1.000	0.768	0.477	log
IPH10 Being able to communicate 0.477 0.452 1.000 van Druten VP, Metz MJ, Mathijssen JJP, et al. Measuring positive health using the My Positive Health (MPH) and Individual Recovery Outcomes Counter (I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch population. Under Rev. Published online 2024.	IPH9	Being able to concentrate	0.768	1.000	0.452	lies
(I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch population. Under Rev. Published online 2024.	IPH10	Being able to communicate	0.477	0.452	1.000	
	,	uan Drutan VP. Matz MJ. Mathiisson JIP. at al	Moscuring positivo boolth using the	My Positivo Hoolth (MPH) and Indi	vidual Pacavany Outcomos Countor	
	((I.ROC) dialogue tools: a panel study on measu	<u>.</u>			

	Factor ¹			
	Contentment	Daily life	Physical	Future
	with life	management	fitness	perspective
IPH32 Having the support of others	0.757	0.116	-0.196	0.045
IPH20 Being grateful	0.731	-0.027	0.114	0.129
IPH29 Social contacts	0.730	0.097	-0.107	0.097
IPH19 Accepting life	0.729	-0.022	0.136	0.064
IPH16 Being high-spirited	0.712	-0.049	0.246	0.116
IPH27 Living conditions	0.710	0.168	-0.046	-0.157
IPH24 Feeling good	0.692	-0.087	0.344	0.106
IPH30 Being taken seriously	0.674	0.194	-0.183	0.122
IPH26 Feeling safe	0.673	0.100	0.103	0.002
IPH12 Accepting yourself	0.666	0.045	0.217	-0.011
IPH14 Having control	0.629	0.111	0.156	0.121
IPH18 Feeling confident about own future	0.610	-0.038	0.197	0.350
IPH34 Doing meaningful things	0.472	0.187	0.079	0.260
IPH35 Being interested in society	0.399	0.263	-0.139	0.256
IPH9 Being able to concentrate	0.369	0.218	0.268	0.041
IPH40 Managing money	0.154	0.780	-0.031	-0.158
IPH37 Knowing your limitations	0.067	0.762	0.073	-0.049
IPH36 Looking after yourself	-0.107	0.750	0.161	0.096
IPH39 Managing time	0.041	0.693	0.118	0.033
IPH28 Having enough money	0.345	0.535	-0.043	-0.178
IPH42 Asking for help	0.166	0.502	-0.174	0.174
IPH41 Being able to work	-0.161	0.495	0.257	0.388
IPH2 Feeling fit	0.106	0.161	0.674	0.155
IPH6 Physical condition	0.031	0.193	0.648	0.197
IPH4 Sleeping pattern	0.364	-0.071	0.644	-0.204
IPH5 Eating pattern	0.316	0.238	0.511	-0.222
IPH3 Having physical complaints or pain	-0.052	0.064	0.485	0.107
IPH17 Wanting to achieve ideals	0.269	-0.083	0.152	0.663
IPH21 Continue learning	0.230	0.032	0.032	0.640
IPH13 Being able to handle changes	0.289	0.101	-0.016	0.465

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Extraction Method: Principal Component Analysis; Rotation Method: Oblimin with Kaiser Normalization; Pattern matrix, rotation converged in 16 iterations

¹ During the process of item reduction the names of the factors were Contentment with life, Self-management, Physical health and functioning, and Personal development. Afterwards these were renamed by the research team into Contentment with life, Daily life management, Physical fitness, and Future perspective.

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	Factor ¹			
	Contentment with	Physical	Daily life	Future
	life	fitness	management	perspective
IPH32 Having the support of	0.846	-0.136	0.023	0.009
others				
IPH29 Social contacts	0.806	-0.055	0.014	0.051
IPH27 Living conditions	0.773	-0.007	0.093	-0.157
IPH30 Being taken seriously	0.735	-0.126	0.101	0.105
IPH26 Feeling safe	0.654	0.125	0.079	0.041
IPH20 Being grateful	0.653	0.137	-0.015	0.196
IPH16 Being high-spirited	0.625	0.276	-0.032	0.165
IPH19 Accepting life	0.618	0.158	0.021	0.150
IPH14 Having control	0.543	0.158	0.136	0.200
IPH12 Accepting yourself	0.543	0.248	0.106	0.067
IPH34 Doing meaningful	0.531	0.120	0.081	0.210
things				
IPH4 Sleeping pattern	0.332	0.695	-0.084	-0.194
IPH2 Feeling fit	0.057	0.687	0.141	0.161
IPH6 Physical condition	-0.001	0.677	0.142	0.199
IPH5 Eating pattern	0.255	0.567	0.250	-0.182
IPH3 Having physical	-0.115	0.519	0.046	0.152
complaints or pain				
IPH37 Knowing your	0.022	0.033	0.855	-0.057
limitations				
IPH36 Looking after yourself	-0.088	0.117	0.791	0.030
IPH40 Managing money	0.106	-0.032	0.775	-0.082
IPH39 Managing time	-0.022	0.062	0.772	0.057
IPH42 Asking for help	0.208	-0.203	0.474	0.151
IPH21 Continue learning	0.090	0.020	0.044	0.758
IPH17 Wanting to achieve ideals	0.140	0.148	-0.047	0.701
IPH13 Being able to handle changes	0.158	-0.024	0.118	0.600

Faster leadings of 24 item DU model (round 2) (n-1100)

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization. Pattern matrix, rotation converged in 7 iterations.

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¹ During the process of item reduction the names of the factors were Contentment with life, Physical health and functioning, Selfmanagement, and Personal development. Afterwards these were renamed by the research team into Contentment with life, Physical fitness, Daily life management, and Future perspective.

Development and cross-validation of a short questionnaire to evaluate self-reported Positive Health; A cross sectional panel study of structural validity among a general Dutch population

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DEVELOPMENT AND CROSS-VALIDATION OF A SHORT QUESTIONNAIRE TO EVALUATE SELF-REPORTED POSITIVE HEALTH; A CROSS SECTIONAL PANEL STUDY OF STRUCTURAL VALIDITY AMONG A GENERAL DUTCH POPULATION

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DECLARATIONS

Ethical approval and consent to participate: The study was conducted in accordance with current public regulations, laws, and the principles of the Declaration of Helsinki. Informed consent was given by each participant to be included as a LISS-panel member. For more information see: https://www.lisspanel.nl/ethics. The Medical Ethics Committee of Brabant (Tilburg, the Netherlands) reviewed this study and declared that the Medical Research Involving Human Subjects Act (WMO) did not apply to this study (study number NW2024-15). Consent for publication: Not applicable

Availability of data and materials: The original dataset(s) supporting the conclusions of this article is(are) available from https://www.lissdata.nl/access-data upon request for researchers and policymakers.

Competing interests: MvV co-developed the MPH dialogue tool and works at the Institute for Positive Health. All other authors have no competing interest to declare.

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Author contributions: LNvV wrote the protocol and manuscript, and conducted the statistical analyses, and is guarantor. VvD contributed to the first part of the statistical analysis. BvdZ supervised the research, statistical analyses and the writing process. LNvV, BvdZ, MM and MvV participated at the research meetings concerning the item reduction process; content discussion and interpretation of the statistical output. MM and MvV contributed equally. All author's reviewed and approved the final manuscript.

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1	ABSTRACT
2	Objectives: In this study it was aimed to further develop and cross-validate a short questionnaire to measure
3	self-reported Positive Health in general (Dutch) populations for evaluative purposes, stemming from the
4	original 42 items of the My Positive Health dialogue tool (MPH). Positive Health refers to 'health from the
5	perspective of patients and citizens' following the concept of Huber et. al. Design and setting: A cross sectional
6	study was performed among a panel representative for the general adult Dutch population living at home.
7	Participants: Response rate was 76%, 1327 of a total of 2457 respondents were female, and mean age (year)
8	was 53.3 ± 17.8. Methods: First, item reduction was carried out through content discussions following
9	statistical output retrieved from factor structures and loadings, inter-item correlations (IIC) and internal
10	consistency (Cronbach's alphas). Next, among the other half of the study population, measurement properties
11	for the developed short questionnaire were calculated using goodness of fit indices from confirmatory factor
12	analyses (CFA). Results: The item reduction process (n=1199) resulted in a questionnaire of 22 items (PH22)
13	with a four-factor structure and explained variance of 62.4%. Cronbach's alphas were 0.84, 0.92, 0.81, and 0.78
14	for the renamed factors 'Physical fitness' (5 items), 'Contentment with self, others and life' (9 items), 'Daily life
15	management' (5 items) and 'Future perspective' (3 items), respectively. Cross validation (n=1258) showed
16	adequate goodness of fit indices of the PH22, based on both first- and second-order CFA. The scores of the
17	PH22 were normally distributed. No floor or ceiling effects were present. Conclusions: A short 22 item
18	questionnaire to measure self-reported Positive Health in a general (Dutch) population for evaluative purposes
19	such as scientific or policy research at Positive Health or patient-centered interventions was developed and
20	cross-validated, named PH22. This study supports its structural validity. To use this questionnaire in practice its
21	test-retest reliability and responsiveness should be known also. Future research has to reveal this.
22	
23	Strengths and limitations of this study
24	• The study is robust in terms of its large sample size, high response rate and representativeness of the
25	general Dutch population.
26	• The short Positive Health questionnaire was founded on the original items of the My Positive Health

dialogue tool, which is based on health indicators retrieved from a large study among various stakeholders.

1		
2 3 4	29	• The selection of items for the short Positive Health questionnaire was based on cyclical statistical
5 6	30	analyses combined with thorough content discussions.
7 8	31	• The results of the content discussions were thematized and each step of the item reduction process
9 10	32	thoroughly reported.
11 12	33	• The final short Positive Health questionnaire might have been more support-based if more
13 14	34	representatives were included in the content discussions, i.e., if also focus groups were organized
15 16	35	
17 18	36	Key words
19 20	37	Positive Health; patient-centered care; patient reported outcome measures; structural validity; factor analyses
21 22	38	INTRODUCTION
23 24	39	Since the concept of Positive Health was introduced in the Netherlands, a mind shift unrolled among
25 26 27	40	healthcare workers and beyond. The approach of health as a state of complete physical, mental and social well-
27 28 29	41	being as formulated in the constitution of the World Health Organization ¹ changed to a more dynamic
30 31	42	approach of health focusing on self-management and the ability to adapt to physical, mental and social
32 33	43	challenges during life ² . This new vision on health is being integrated among all kinds of domains and political
34 35	44	agendas within the Netherlands and abroad ³ .
36 37	45	To support the applicability of this vision on health in daily healthcare practice, the dialogue tool My
38 39	46	Positive Health (MPH) ⁴ was developed. The content of this dialogue tool was derived from a large mixed
40 41	47	methods study with interviews into the perceptions about health among different stakeholder groups such as
42 43	48	patients, citizens, and healthcare professionals ⁵ . This inductive, bottom- up approach enabled the researchers
44 45	49	to gain a thorough insight into the perceptions about health. From these perceptions 32 aspects emerged,
46 47	50	representing indicators for (positive) health ⁵ . Accordingly, these aspects were thematized among six
48 49	51	dimensions named: bodily functions, mental functions and perception, spiritual existential dimension, quality
50 51	52	of life, social and societal participation and daily functioning. This operationalization of health was called
52 53	53	Positive Health, and from here the 42-item MPH dialogue tool was developed. This MPH tool aims to support
54 55	54	the conversation about Positive Health between patient and care worker and stimulate self-reflection ⁴ .
56 57	55	At an individual, organizational, community, regional and national level, the concept (broad and
58 59	56	dynamic vision on health) and method (MPH tool and dialogue) are increasingly integrated. The Dutch
60	57	government considers Positive Health a promising approach to promoting well-being and handle the increasing

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burden of disease⁶. To assess the effectiveness of working with this Positive Health approach, the need for an
instrument to measure self-reported Positive Health has been arising^{7,8}. Although the MPH is a relevant
dialogue tool for the conversation about health³, it should be emphasized that the MPH is not obviously useful
for measuring purposes; the item grouping among the six dimensions of the MPH tool was not the result of a
study aiming to assess structural validity in order to develop an outcome measure instrument.

To our knowledge, two instruments were developed for this measuring purpose; the Positive Health measurement scale with 17 items (PH17)^{9,10} and the Positive Health measurement tool using all 42 dialogue items (PH42)¹¹. These two instruments face some limitations. Although measurement properties for the PH17 seemed adequate¹⁰.the initial item selection of the PH17 took place among citizens in just one part of the Netherlands and response rate was low (25%)⁹, questioning the generalizability of their results. Even more important, the methodological approach for item reduction included judgement of factor loadings, but without, simultaneously, content discussion and judgement of inter-item correlations and maintaining acceptable internal consistencies as recommended by others¹². Without these steps relevant items might be deleted, and shortchange its content and discriminant validity. The other instrument, the PH42, was developed among a representative general population¹¹, but consists of 42 items which might not be preferable for all practices. From practical and methodological perspectives, it is preferable to use a shorter questionnaire, which requires less effort and results in higher response rates, especially important during repeated measurements needed to evaluate (positive) health or patient-centred interventions.

The aim of this study was to develop a short and valid questionnaire to measure self-reported Positive Health in general populations. This questionnaire is meant for evaluation purposes among groups to assess the effectiveness of working with the person-centered Positive Health approach. For example, scientific or policy research. at Positive Health promoting, or patient-centered interventions. The conditions set for the short questionnaire were that the questionnaire had to contain the original items of the MPH dialogue tool to retain its recognizability with daily practice and with Positive Health as operationalised by Huber et. al.⁵, referring to 'health from the perspective of patients and citizens'. To optimize its content and discriminative validity the more extensive method for item reduction using statistical output combined with content discussions was applied among a representative study population. Finally, its structural validity was investigated.

86 METHODS

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87 Study design and participants

88 In this paper, we make use of data from the LISS panel (Longitudinal Internet studies for the Social Sciences) 89 managed by the non-profit research institute Centerdata (Tilburg University, the Netherlands). The LISS panel 90 consists of a representative sample of approximately 7,000 individuals from 5,000 households from the general 91 Dutch population. The panel is based on a true probability sample of households drawn from the population 92 register by Statistics Netherlands¹³. LISS panel members complete monthly online questionnaires and are paid 93 for each completed questionnaire. To become a LISS panel member, at least one person in the household has 94 to be proficient in the Dutch language. To minimize selection bias, households were provided with a computer 95 and internet connection if they could otherwise not participate. Response rates for this panel are high (>80%). 96 More information about the LISS panel can be found at: www.lissdata.nl¹⁴.

97

1 2 3

> 98 To answer our research question a cross sectional study was performed among a random selection of members 99 from the LISS panel. From this panel, 2,500 adults (≥18 years), one per household, were randomly selected to 100 participate. The process of item reduction and cross-validation were carried out in two randomly split samples 101 of this study population. Ethical review was conducted by the METC Brabant (Tilburg, the Netherlands, study 102 number NW2024-15).

103

107

104 This study was reported according to the COSMIN Reporting Guideline¹⁵ recommended for studies that 105 evaluate the measurement properties of patient-reported outcome measures (PROMs), and the STROBE 106 statement for cross-sectional studies¹⁶. The terms dimension and factor are used interchangeably.

108 Data collection and administration

109 During November 2020 the selected study population was asked to complete the original 42 items of the My 110 Positive Health questionnaire (MPH) (see Supplemental A) receiving one reminder after 2 weeks. The same as 111 the original MPH dialogue tool the items were introduced per dimension using the original introduction, 112 answer options and icons of the dialogue tool⁴. In contrast to the original tool the respondents did not see their 113 results among a spiderweb. Respondents completed the electronic questionnaire at home using the regular 114 internet platform of LISS receiving a private link. Characteristics of the study population such as gender, age,

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2 3	115	level of education and health care use were available from the regular LISS panel HEALTH survey
4 5	116	(https://www.lissdata.nl/research/liss-core-study) ¹⁴ .
6 7	117	
8 9	118	My Positive Health (MPH) dialogue tool
10 11	119	The MPH consists of 42 statements about Positive Health, representing the 32 indicators for (positive) health
12 13	120	as assessed by Huber et al. ⁵ . For practical use, they were formulated to a simple language level (B1). The
14 15	121	statements are scored on an 11-point Likert scale ranging from 0 'completely disagree' to 10 'completely
16 17	122	agree'. Higher scores indicate better health. Also, the six dimensions (bodily functions, mental functions and
18 19	123	perception, spiritual existential dimension, quality of life, social and societal participation and daily functioning)
20 21	123	are visualised in a spider web with six axes, representing the dimensions and ranging from value 0 (in the
22 23		
24 25	125	centre for poor) to 10 (on the periphery, for excellent). The self-reported MPH questionnaire takes 10-20
26 27	126	minutes to complete. Over the last years it was shown by various users (citizens, patients and professionals)
28	127	that the MPH was a relevant dialogue tool including comprehensiveness and comprehensibility of the items,
29 30	128	response options, and instructions ³ .
31 32	129	
33 34	130	Preconditions for the short Positive Health questionnaire to be developed
35 36	131	Preconditions formulated by the research team for an useful self-reported questionnaire to measure Positive
37 38	132	Health were; 1) a multidimensional structure was held to ensure a broad representation of health conform
39 40	133	literature ^{5,17} , 2) items were not reformulated to keep recognizability with the specific Positive Health dialogue
41 42	134	approach according to MPH ⁴ , 3) to hold model stability each dimension contained at least three items ¹² , and 4)
43 44	135	the short questionnaire contained a maximum of about 20 items to be user-friendly.
45 46	136	
47 48	137	Statistical analyses
49 50	138	Development: Process of item reduction
51 52	139	Prior to this study, Van Druten et al. developed the measurement tool PH42 ¹¹ . They assessed the factor
53 54 55	140	structure of the 42 original items of the dialogue tool MPH. This resulted in a model with a six-factor structure
55 56 57	141	including all 42 items with an explained variance of 68%, no inter-items correlations > 0.9, factor loadings
58 59	142	ranging from 0.36 to 0.94, Cronbach's alpha's ranging from 0.74 up to 0.97, and acceptable fit indices . This
60	143	study of Van Druten et al. was based on the same dataset as our study. Their results (see Supplemental B and

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C) were the starting point for the item reduction process of our study. We used the same settings to assess dimensionality during the process of item reduction: extraction method; Principal Component Analysis (PCA)¹⁸⁻ ²⁰, rotation method; Oblimin with Kaiser Normalisation, and eigen value >1.0 using SPSS V27.0. Analyses were performed on similar randomly split half of the study population (n=1199).

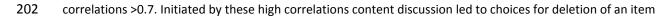
The following steps of the item reduction process were taken conform the methodology published by De Vet and Terwee ^{12,15}. Content discussions initiated through statistical output were performed in different rounds with experts taking part in the research team. First, the items of the PH42 were assessed per factor on low (<0.2; i.e. possibly unrelated to the construct) and high (>0.7; i.e. possibly overlapping and thus redundant in the construct) inter-item correlations¹². Based on content discussion low or highly correlated items were held or removed. Then, PCA was performed. Items that hardly loaded at all on any of the factors were considered for deletion. A minimum factor loading of 0.5 was taken as threshold¹². Also, items loading >0.32^{12,21} on more than one factor were discussed. Based on content discussion, items were held or removed. Content was leading, meaning that for some items, high correlations or low factor loadings might be accepted. Items were deleted one by one repeating PCA every step, because deletion of one item might change structures or loadings of other items¹². Final decisions to delete an item were combined with judgement of consequences for internal consistencies (Cronbach's alpha) aimed between 0.7-0.9¹².

Cross validation

To assess goodness of fit of the developed short Positive Health questionnaire, confirmatory factor analyses (CFA) was performed in the second half of the study population (n=1258) CFA for normal continuous data with maximum likelihood (ML) as estimation method was used (R Lavaan 0.6.14)²². Goodness of fit indices included; chi-square (X^2) (a non-significant X^2 is desirable, however in a large sample, the X^2 is usually significant), comparative fit index (CFI), root mean square error of approximation (RMSEA) and standardized root mean square residual (SRMR). Indicators of model fit were^{12,23}; CFI values between 0.90 and 0.95 with >0.95 indicating superior model fit, RMSEA values <0.05 represent good fit, 0.05-0.08 acceptable fit, >0.08 medium fit and >0.1 poor fit, and SRMR value of <0.08 representing good fit. To assess if the item scores of the questionnaire fit the factor sum scores first-order CFA was executed. To investigate if the factor sum scores fit the total sum score of the questionnaire as well, second-order CFA was executed^{12,22}.

2 3	173	Scores of the developed questionnaire
4 5 6	174	Last, the distribution of the total and factor sum scores of the developed questionnaire were described; mean,
6 7 8	175	median, standard deviation, minimum, maximum, skewness and kurtosis (< -1 and > 1), and floor and ceiling
9 10	176	effects (\geq 15% of the respondents scores lowest or highest possible scores, respectively ²⁴).
11 12	177	
13 14	178	Sample size calculation
15 16	179	Size of both randomly split subgroups (n=1199, n=1259) ¹¹ was adequate to apply PCA and CFA; rule of thumb
17 18	180	is that four to ten respondents per item of the questionnaire are included, with a minimum of 100 25 .
19 20	181	
21 22	182	Patient and public involvement
23 24	183	Patients or the public were not involved in the design, or conduct, or reporting, or dissemination plans of our
25 26	184	research.
27 28	185	
29 30	186	RESULTS
31 32	187	Participants
33 34	188	The response rate was 76% with 777 respondents not responding. Twelve respondents not completing the
35 36	189	questionnaire completely were excluded, leaving 2457 respondents for the analyses; 54% female, mean age
37 38	190	(years) 53.3 \pm 17.8, 39.9% high level of education, and 39.8% visited a medical specialist at the hospital,
39 40 41	191	psychiatrist, psychologist or psychotherapist last 12 months. Next, the study population was randomly split:
42 43	192	n=1199 and n=1258, in which the process of item reduction and cross-validation was carried out, respectively.
44 45	193	
46 47	194	Development: Process of item reduction
48 49	195	LNvV, BvdZ, MM and MvV participated at six research meetings of an hour between May and August 2023
50 51	196	concerning the item reduction process; content discussion and interpretation of the statistical output. During
52 53	197	round 1 interitem correlations were explored for the six-factor structure of the PH42 (see Supplemental C ; .
54 55	198	From all factors four contained half or more items that were too highly (>0.7) correlated to another item:
56 57	199	Factor 1 (11 out of 13), factor 2 (4/8), factor 3 (2/7), factor 4 (5/8), factor 5 (0/3) and factor 6 (2/3),
58 59	200	respectively. Two of all items correlated low (<0.2) with each other but adequately with the other items; factor
60	201	2 (2/8). First, the items with interitem correlations >0.8 were discussed on their content, next those items with

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for various reasons such as inadequate formulation of the statement, not being inclusive or (not) being specific.

In Table 1 detailed information about the choices made per item are shown.

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Table 1. Process of item reduction with the PH42 questionnaire as starting point

25 26	215		Round 1		1	Round 2		Round 3	Round 5			
27 28 29 30											2 (V) 6d (R)	
31 32				Item deleted	int ^{1,2}	0	 Item deleted Content^{1,2} 	FL eltem deleted	IIC, CA • Item deleted	int ^{1,2}	Final Items PH22 (v) Or round deleted (R)	
33 34 35			IC	-	Content ^{1,2}	H	•Item dele Content ^{1,2}	FL eltem del6 Content12	IIC, CA	Content ^{1,2}	Final Or ro	
35 36		Acceptance, meaningfulness	and sat	isfac		th life						
	IPH25	Feeling well-balanced	>0.8	•	A,D						R1	
37	IPH24	Feeling good	>0.8	•	F	Loads double	• C,D				R2	
38	IPH23	Being happy	>0.8	•	A,D						R1	
39	IPH22	Enjoyment	>0.8	•	A,D						R1	
40	IPH16	Being high-spirited	0.7-0.8	٠	F						V	
41	IPH11	Being cheerful	0.7-0.8	•	A,D				0.7.0.0	_	R1	
42	IPH19	Accepting life	0.7-0.8	٠	F				0.7-0.8	F	√ ■	
	IPH20	IPH20 Being grateful	0.7-0.8	•	F				0.7-0.8 •	A,C	R4	
43	IPH15 IPH12	Having a meaningful life	0.7-0.8	•	A,D						R1	
44	IPH12 IPH18	Accepting yourself Feeling confident about own future	0.7-0.8		F	Loads double	• B				R2	
45		Having control	0.7-0.8	•	F	Loads double	• B				KZ √	
46	IPH14 IPH26	Feeling safe	0.7-0.8	•	F						 	
47	IPHZO										V	
48		Physical health and										
49		functioning								_		
	IPH7	Exercise	0.7-0.8	•	С						R1	
50	IPH6	Physical condition	0.7-0.8	•	F				0.7-0.8 •	F	√	
51	IPH2	Feeling fit	>0.8	•	F				0.7-0.8 •	F	V	
52	IPH1	Feeling healthy	>0.8	•	A,D						R1	
53	IPH41	Being able to work				FL<0.5, Loads double					R2	
54	IPH3	Having physical complaints or pain				FL<0.5	• F	Landa da bita la l	•		/	
55	IPH4	Sleeping pattern				Loads double	• F	Loads double • F	-		/	
	IPH5	Eating pattern									V	
56		Self-management										
57	IPH40	Managing money									V	
58	IPH37	Knowing your limitations	0.7-0.8	•	F						V	
59	IPH38	Knowledge of health	0.7-0.8	•	E						R1	
60	IPH39	Managing time									V	
00	IPH36	Looking after yourself									V	

IPH28 IPH42					Loads double	• A, E					R2			
	Having enough money Asking for help				Loaus double	• A, E	FL<0.5	• F			√			
	Social network and societal						1 2 1010							
	roles													
IPH32	Having the support of others	>0.8	•	F							٧			
IPH31	Doing fun things together	>0.8	•	А							R			
IPH33	Belonging	0.7-0.8		A							R			
IPH30 IPH29	Being taken seriously Social contacts	0.7-0.8 0.7-0.8	•	F F					0.7-0.8	 A,D F 	R			
IPH29 IPH27	Living conditions	0.7-0.8	•	F					0.7-0.8	• F				
IPH35	Being interested in society				FL<0.5	• D					R			
IPH34	Doing meaningful things										١			
	Personal development													
IPH21	Continue learning										۱			
IPH17	Wanting to achieve ideals										۱			
IPH13	Being able to handle changes				FL<0.5	• F					١			
IDUIO	Cognition	0700		•		_		_		_				
IPH8 IPH9	Being able to remember things Being able to concentrate	0.7-0.8	•	A F	FL<0.5	• B					R			
IPH10	Being able to communicate	0.7-0.8	•	E	120.5	• 0					R			
214	IPH; Item number of the original N	lvPositive	Health		e tool (See Supll.1)									
215	¹ Results content discussion expres						measuremei	nt properti	ies: ICC; in	teritem				
216	correlations, FL; factor loadings, C			-										
217	² A to F; A Content is sufficiently re			-			-			-				
218	inclusive, D Wording not specific e	nough, to	o broa	id, E Unc	lear wording, may	not be prop	erly understo	od, F Reta	lined for s	pecific cor	ntent.			
219														
220														
221	For the factor 'Cognition' th	e conte	nt dis	scussio	n resulted in th	at only or	ie item wa	is retain	ed. It wa	is accep	ted b			
222	the research team that this	factor w	vould	l not co	ontinue to exist	as dimen	sion of Po	sitive He	alth. In t	total, in				
223	round 1 12 out of 42 items,	originat	ing f	rom ea	ich of the six fa	ctors, wer	e deleted.	For the	remaini	ng item	s			
224	(n=30) PCA was applied.													
	(n=30) PCA was applied.													
	(n=30) PCA was applied.													
225	(n=30) PCA was applied. At round 2 PCA wit	:h 30 ite	ms re	esulted	l in a four-facto	r structur	e with exp	lained va	ariance d	of 60.7%	ő (see			
		:h 30 ite	ms re	esulted	l in a four-facto	r structur	e with exp	lained va	ariance o	of 60.7%	ő (see			
225	At round 2 PCA wit										-			
											-			
225 226	At round 2 PCA wit Supplemental D for factor le	oadings)	. Kais	ser-Me	yer-Olkin (KMC)) and Bar	tlett's test	was sta	tistically	signific	ant			
225	At round 2 PCA wit	oadings)	. Kais	ser-Me	yer-Olkin (KMC)) and Bar	tlett's test	was sta	tistically	signific	ant			
225 226 227	At round 2 PCA wit Supplemental D for factor lo (0.96; p ≤.001). Factor loadi	ວadings) ngs ranຍຼ	. Kais ged fi	ser-Me	yer-Olkin (KMC 369 to 0.780. A)) and Bar new facto	tlett's test or with 15	was sta items ar	tistically ose fron	signific n the for	ant rmer			
225 226	At round 2 PCA wit Supplemental D for factor le	ວadings) ngs ranຍຼ	. Kais ged fi	ser-Me	yer-Olkin (KMC 369 to 0.780. A)) and Bar new facto	tlett's test or with 15	was sta items ar	tistically ose fron	signific n the for	ant rmer			
225 226 227 228	At round 2 PCA with Supplemental D for factor lo (0.96; p ≤.001). Factor loadi factor 'Acceptance, meanin	oadings) ngs rang gfulness	. Kais ged fi and	ser-Me rom 0.3 satisfa	yer-Olkin (KMC 369 to 0.780. A ction with life')) and Bar new facto and the fa	tlett's test or with 15 actor 'Socia	was sta items ar al netwo	tistically ose fron ork and s	signific n the for ocietal n	ant rmer roles'			
225 226 227	At round 2 PCA wit Supplemental D for factor lo (0.96; p ≤.001). Factor loadi	oadings) ngs rang gfulness	. Kais ged fi and	ser-Me rom 0.3 satisfa	yer-Olkin (KMC 369 to 0.780. A ction with life')) and Bar new facto and the fa	tlett's test or with 15 actor 'Socia	was sta items ar al netwo	tistically ose fron ork and s	signific n the for ocietal n	ant rmer roles'			
225 226 227 228 229	At round 2 PCA with Supplemental D for factor loc (0.96; $p \le .001$). Factor loading factor 'Acceptance, meaning of the PH42. Based on the c	oadings) ngs rang gfulness content o	. Kais ged fi and of the	ser-Me rom 0.3 satisfa ese iter	yer-Olkin (KMC 369 to 0.780. A ction with life' ms this new cor) and Bar new facto and the fa nbined fa	tlett's test or with 15 actor 'Socia ctor was re	was sta items ar al netwo enamed	tistically ose fron ork and s by the r	signific n the for ocietal n esearch	ant rmer roles' team			
225 226 227 228	At round 2 PCA with Supplemental D for factor lo (0.96; p ≤.001). Factor loadi factor 'Acceptance, meanin	oadings) ngs rang gfulness content o	. Kais ged fi and of the	ser-Me rom 0.3 satisfa ese iter	yer-Olkin (KMC 369 to 0.780. A ction with life' ms this new cor) and Bar new facto and the fa nbined fa	tlett's test or with 15 actor 'Socia ctor was re	was sta items ar al netwo enamed	tistically ose fron ork and s by the r	signific n the for ocietal n esearch	ant rmer roles' team			
225 226 227 228 229 230	At round 2 PCA with Supplemental D for factor let $(0.96; p \le .001)$. Factor loading factor 'Acceptance, meaning of the PH42. Based on the co and further called 'Content	oadings) ngs rang gfulness content o ment wi	. Kais ged fi and of the th life	ser-Me rom 0.3 satisfa ese iter e' (15 i	yer-Olkin (KMC 369 to 0.780. A ction with life' ms this new cor tems). The othe) and Bar new facto and the fa nbined fa er factors	tlett's test or with 15 actor 'Socia ctor was re were com	was sta items ar al netwo enamed parable	tistically ose fron ork and s by the r to rounc	signific n the for ocietal n esearch I 1 (i.e.,	ant rmer roles' team to the			
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225 226 227 228 229 230 231 232 233	At round 2 PCA with Supplemental D for factor left (0.96; p ≤.001). Factor loading factor 'Acceptance, meaning of the PH42. Based on the co and further called 'Content PH42 model), except that the 'being able to work', loaded 'Physical health and function	oadings) ngs rang gfulness content o ment wi ne factor I highest ning'. Th	. Kais ged fi and of the th life r Cog t, but	ser-Me rom 0.3 satisfa ese iter e' (15 i nition c low (0 em abo	yer-Olkin (KMC 369 to 0.780. A action with life' ms this new cor tems). The othe was no longer p 0.495), on the fa ut concentratic) and Bar new facto and the fa nbined fa er factors part of the actor 'Self on (IPH9),	tlett's test or with 15 actor 'Socia ctor was re were com model. A managem kept from	was sta items ar al netwo enamed parable lso, one nent' inst the form	tistically ose fron ork and s by the r to round item; IP tead of t ner facto	signific n the for ocietal i esearch d 1 (i.e., H41 abc he facto or Cogni	ant rmer roles' team to the out or tion,			
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specific content that should be held for the measurement tool. For similar reasons item IPH13 (being able to
handle changes) was kept. In total, in round 2 6 out of 30 items were deleted. In addition, the items selected to
delete during round 2 were ranked by the expert team to process the order of item reduction in subsequent
PCA. First those items with low factor loadings <0.5 were deleted from the model (in following order; IPH9,
IPH35, IPH41). Next those items with also a high factor loading (> 0.32) on another factor were deleted (IPH18,
IPH28, IPH24). PCA was executed and checked per deleted item. No changing structures were seen.

244In round 3, PCA with 24 items resulted in a similar four-factor structure as round 2 with explained245variance of 62.4% (see Supplemental E for factor loadings). KMO and Bartlett's test was statistically significant246(0.96; p ≤.001). Factor loadings ranged from 0.474 to 0.855. Overall, there was 1 item with a low factor loading247(<0.5), and 1 item with factor loadings >0.32 on more than one factor. It concerned the item about sleeping248pattern (IPH4), similar to the results of round 2, and the item about asking for help from official institutes249(IPH42). Both items were retained because of its specific and relevant content. In this round no items were250deleted.

At round 4 interitem correlations and Cronbach's alpha (CA) were judged for this four-factor structure with 24 items. For the factor 'Contentment with life' 4/11 items were highly correlated (>0.7 but <0.8) and CA was high (0.94). Two additional items were deleted from this factor. There was some doubt about the content of item IPH26 (feeling safe) and its fit among the factor Contentment with life. It was decided to retain this item because it was the only item about this specific subject and considered to be an important aspect of Positive Health. For the factor 'Physical health and functioning' two items were highly correlated, but both were kept because of its specific content and good CA of the factor (n=5, CA=0.78). No high interitem correlations nor CA were present among the other factors Self-management (n=5, CA =0.81) and Personal development (n=3, CA=0.74). In total, in round 4, 2 out of 24 items were deleted. For the remaining items (n=22) PCA was applied again. At round 5, PCA with 22 items showed similar four-factor structure with explained variance of 62.4% (see Table 2 for factor loadings and Table 3A-D for Interitem correlations). KMO and Bartlett's test was

statistically significant (0.95; $p \le .001$). The factor Self-management contained the only item with low FL (0.476).

56 264 Based on the statistical output and its content no further items were deleted.

Table 2. Factor loadings of PH model of 22 items (round 5) (n=1199)

	Factor ¹			
	Contentment	Physical	Daily life	Future
	with life	fitness	management	perspective
IPH32 Having the support of others	0.800	-0.139	0.042	0.057
IPH27 Living conditions	0.785	-0.049	0.098	-0.124
IPH29 Social contacts	0.753	-0.047	0.032	0.096
IPH26 Feeling safe	0.669	0.088	0.083	0.063
IPH16 Being high-spirited	0.648	0.236	-0.028	0.181
IPH19 Accepting life	0.630	0.114	0.037	0.162
IPH14 Having control	0.566	0.124	0.134	0.216
IPH12 Accepting yourself	0.566	0.209	0.113	0.076
IPH34 Doing meaningful things	0.538	0.106	0.074	0.237
IPH2 Feeling fit	0.079	0.689	0.134	0.153
IPH6 Physical condition	0.019	0.686	0.132	0.191
IPH4 Sleeping pattern	0.385	0.667	-0.101	-0.193
IPH3 Having physical complaints or pain	-0.145	0.560	0.052	0.153
IPH5 Eating pattern	0.295	0.545	0.240	-0.184
IPH37 Knowing your limitations	0.033	0.026	0.855	-0.062
IPH36 Looking after yourself	-0.087	0.123	0.793	0.021
IPH40 Managing money	0.101	-0.036	0.781	-0.081
IPH39 Managing time	-0.018	0.067	0.768	0.054
IPH42 Asking for help	0.190	-0.198	0.476	0.169
IPH21 Continue learning	0.060	0.040	0.053	0.760
IPH17 Wanting to achieve ideals	0.153	0.147	-0.061	0.705
IPH13 Being able to handle changes	0.171	-0.018	0.094	0.610

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization. Pattern matrix. rotation converged in 8 iterations

¹During the process of item reduction the names of the factors were Contentment with life, , Physical health and functioning, Self-

management and Personal development. Afterwards these were renamed by the research team into Contentment with self, others and life, Physical fitness, Daily life management, and Future perspective.

Table 3A. Interitem correlation matrix of factor *Contentment* with life¹ of the 22 item PH model (n=1199)

	IPH12	IPH14	IPH16	IPH19	IPH26	IPH27	IPH29	IPH32	IPH34
IPH12 Accepting yourself	1.000	0.670	0.635	0.667	0.574	0.479	0.517	0.485	0.527
IPH14 Having control	0.670	1.000	0.669	0.664	0.639	0.545	0.591	0.516	0.583
IPH16 Being high-spirited	0.635	0.669	1.000	0.670	0.597	0.558	0.590	0.548	0.628
IPH19 Accepting life	0.667	0.664	0.670	1.000	0.596	0.492	0.512	0.506	0.524
IPH26 Feeling safe	0.574	0.639	0.597	0.596	1.000	0.605	0.523	0.552	0.521
IPH27 Living conditions	0.479	0.545	0.558	0.492	0.605	1.000	0.509	0.582	0.485
IPH29 Social contacts	0.517	0.591	0.590	0.512	0.523	0.509	1.000	0.695	0.607
IPH32 Having support of others	0.485	0.516	0.548	0.506	0.552	0.582	0.695	1.000	0.557
IPH34 Doing meaningful things	0.527	0.583	0.628	0.524	0.521	0.485	0.607	0.557	1.000

Table 3B. Interitem correlation matrix of factor Physical fitness¹ of the 22 item PH model (n=1199)

IPH2	IPH3	IPH4	IPH5	IPH6
1.000	0.361	0.488	0.516	0.735
0.361	1.000	0.262	0.256	0.313
0.488	0.262	1.000	0.529	0.462
0.516	0.256	0.529	1.000	0.537
0.735	0.313	0.462	0.537	1.000
1	L.000).361).488).516	1.0000.3610.3611.0000.4880.2620.5160.256	I.000 0.361 0.488 0.361 1.000 0.262 0.488 0.262 1.000 0.516 0.256 0.529	1.0000.3610.4880.5160.3611.0000.2620.2560.4880.2621.0000.5290.5160.2560.5291.000

Table 3C. Interitem correlation matrix of factor Daily life management¹ of the 22 item PH model (n=1199)

			IPH36	IPH37	IPH39	IPH40	IPH42
I	IPH36	Looking after yourself	1.000	0.656	0.501	0.503	0.305
I	IPH37	Knowing your limitations	0.656	1.000	0.628	0.569	0.393

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IPH39 Managing time	0.501	0.628	1.000	0.554	0.417
IPH40 Managing money	0.503	0.569	0.554	1.000	0.443
IPH42 Asking for help	0.305	0.393	0.417	0.443	1.000

Table 3D. Interitem correlation matrix of factor Future perspective¹ of the 22 item PH model (n=1199) IPH13 IPH17 IPH21 IPH13 Being able to handle changes 1.000 0.449 0.483 IPH17 Wanting to achieve ideals 0.449 1.000 0.534 **IPH21** Continue learning 0.483 0.534 1.000 ¹During the process of item reduction the names of the factors were Contentment with life, , Physical health and functioning, Self-management and Personal development. Afterwards these were renamed by the research team into Contentment with self, others and life, Physical fitness, Daily life management, and Future perspective. In summary, through the 5 rounds of item reduction evaluation and discussions, 20 out of 42 items were deleted resulting in a short self-reported questionnaire to measure Positive Health consisting of four dimensions and 22 items, hereafter called the PH22. The dimensions were renamed by the research team into 1) Physical fitness, 2) Contentment with self, others and life, 3) Daily life management, and 4) Future perspective (see Supplemental F). It was accepted for the PH22 in favour of keeping specific content that; 1) the factor 'Contentment with life' had high CA (0.92), 2) the factor 'Physical fitness' contained two highly correlated items but with an adequate CA of 0.78, and 3) the factor 'Daily life management' contained an item with low FL (also an adequate CA of 0.81). Cross-validation The four-factor structure of the PH22 had an acceptable fit in first and second order CFA; 1) significant X² (p≤0.001), CFI of 0.902, RMSEA of 0.079 with a 90% confidence interval of 0.076 to 0.082, and SMSR of 0.047, and 2) significant X^2 (p \leq 0.001), CFI of 0.901, RMSEA of 0.079 with a 90% confidence interval of 0.075 to 0.0782, and SMSR of 0.047, respectively. Scores of the developed short Positive Health questionnaire

- The scores of the PH22 were interpreted normally distributed but with slightly more outliers for the lower
 - scores and higher frequency of scores around the mean, which was especially seen for the scores of the factor
- 'Daily life management'. No floor or ceiling effects were present (see Table 4).

Table 4. Descriptive statistics of the PH22 scores (n=1258)

	Contentment	Physical fitness	Daily life	Future	Total score
	with life		management	perpective	PH22
	9 items (score	5 items (score	5 items (score	3 items (score	22 items (score
	range 0-90)	range 0-50)	range 0-50)	range 0-30)	range 0-220)
Mean	69.72	34.91	41.36	21.68	167.67
Median	72	36	42	22	171
SD	12.916	8.265	6.275	4.906	27.612
Skewness	-0.909	-0.526	-0.93	-0.718	-0.733
Kurtosis	0.933	0.225	1.118	0.463	0.623
Minimum	17	5	14	3	59
Maximum	90	50	50	30	220
P15	56	26	35	17	139
P85	82	44	48	27	195

DISCUSSION

In this study a relatively short questionnaire to measure self-reported Positive Health was composed and cross-validated among a general (Dutch) population. The questionnaire contains 22 items stemming from the original My Positive Health (MPH) dialogue tool with 42 items. Structural validity and internal consistency were satisfactory, supporting the use of this questionnaire for evaluative purposes in scientific or policy research. This questionnaire is called the PH22. The different methodological approaches of item reduction for the PH17⁹ and PH22 resulted in a different set of items and measurement properties. Contrary to the development of the PH17, during the development of the PH22, the approach by De Vet et al.¹² was used for item reduction, which includes content

discussion and judgement of internal consistency next to highest factor loadings. First, these steps are

considered essential to the item reduction process to avoid withdrawing relevant items. Second, retaining

- items with the highest factor loadings per factor without the other steps can lead to overlap, i.e. the answer to
- one question predicts the answer to the second, thus providing information as if it were merely one item.
 - Overall, the approach by De Vet et al.¹² most likely improves a questionnaire's discriminative ability, which
- means that a tool is better able to generate different scores for populations with different levels of Positive
- Health. This is considered an essential condition for a measurement instrument, particularly for instruments

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aiming to evaluate interventions or follow cohorts. The too high internal consistency found for at least parts of the PH17 dimensions might be a consequence of this. Looking at the PH17, internal inconsistency was high for almost all dimensions, especially related to the low number of items per factor (2-3 items; Cronbach's alpha (CA); 0.90, 0.89, 0.77, 0.93, 0.89, 0.84). More items result in higher CA by definition. For the PH22, the dimension 'Contentment with life' also had too high internal consistency (CA=0.92), but the factor also consisted of nine items, what might (partly) explain the high CA. The other dimensions of the PH22 showed good internal consistency, with CA ranging from 0.74 to 0.81. Finally, both PH17⁹ and PH22 development started with the 42 items of the MPH dialogue, but the different methodological approaches resulted in other sets of items; only eight items corresponded. When comparing the PH22 to the PH42¹¹, its internal consistency and user-friendliness improved because of fewer items, at the expense of only a bit less explained variance (62% and 68%, respectively).

We presumed the 42 items of the MPH to be a content-valid basis to compose a measurement instrument, reflecting 'health from the perspective of patients and citizens' as assessed by Huber et al⁵. The items of the MPH tool were formulated based on health indicators emerged from a large concept elicitation interview study among various stakeholders including patients and citizens⁵, generating a solid basis for its content. In the meantime, studies showed that scores from the PH17 and PH42 correlated with constructs like quality of life, resilience and recovery ^{10,11,26} and with level of education and healthcare use ²⁶. Moreover, the MPH was shown by various users as a relevant and comprehensible dialogue tool³. We followed an inductive approach towards the development of the PH22. Thereby, four dimensions emerged which we named; 'Physical fitness', 'Contentment with self, others and life', 'Daily life management' and 'Future perspective' aligning with the core elements of the dynamic concept of (positive) health by Huber et al.^{2,5}.

During the development of the dynamic concept by Huber et al.² and during its elaboration into Positive Health⁵, a deliberate choice was made to strive for an open concept instead of a more demarcated definition. Nevertheless, when creating a measurement instrument, it is important to establish a clear construct²⁷. It should be noted that no widely agreed construct for Positive Health exists so far ^{27,28}. As described above, in this study we chose the construct for the measurement tool to reflect the original concept of health by Huber et al ² 'Health as the ability to adapt and to self-manage, in the face of social, physical and emotional challenges'. This concept closely fits a recently proposed description of positive health: 'reserve in capacities'²⁸. Recently, another Dutch research group published the 32-item Context-sensitive Positive Health

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Questionnaire (CPHQ)²⁹. This measurement tool aligns the concept of Positive Health with the 'Capability Approach' ³⁰. Accordingly, they formulated the following construct definition for their measurement tool: "The extent to which one is capable to adapt and to thrive given one's physical, mental, social and contextual opportunities". As a result, the CPHQ included more context-related items than the PH22, such as items about feeling disadvantaged because of sexuality or cultural background or feeling represented by politics. Nevertheless, the PH22 and CPHQ also overlap, both including capabilities and functionings (beings and doings). For the methodological process of item reduction towards the 32 item CPHQ, similar as were for the PH17, the three items with highest factor loadings (>0.4 without cross-loadings) were leading, possibly hampering its discriminant validity. Last, contrary to the CPHQ, the PH22 consists only of original items from the MPH to keep recognizability with the Positive Health approach in practice. As 'Positive Health' is a novice approach, the discussion as to which construct or theoretical framework approximates best should continue. Moreover, Van Druten et al.¹⁷ pointed out that conceptualization of health is person- and context-dependent, which necessitates the existence of various constructs. Therefore, different definitions and theoretical frameworks, such as Positive Health, Reserve Capacity Model³¹ or Capability Approach³⁰, should exist side by side. At the moment the CPHQ is being further developed and assessed³². One part of the research consists of comprehensive focus groups with various stakeholders discussing and prioritizing items anew with the aim to shorten the questionnaire and resulting in a broad supported instrument to assess the broad concept of health. It is of interest to explore how these instruments can supplement each other, or in other words, which instrument serves which aim and context best. Future choices of which tool to use should not only depend on the measurement properties and usability of each tool but also on which construct definition is preferred as the outcome to measure 8,17. The PH22 scores, reflecting the outcome measure self-reported Positive Health, can add to evaluate

Ine PH22 scores, reflecting the outcome measure self-reported Positive Health, can add to evaluate
 positive health and patient centered interventions during treatment and care. Person centered treatment and
 care is more and more the standard for (health care) practices. In line with the new perspective on health it is
 not possible to assess the effect of person centered care with disease oriented questionnaires alone. The
 assessment of person centered care requires new tools focusing on Positive Health. The PH22 questionnaire
 provides in this need. It is founded on the Positive Health indicators retrieved from a robust study among divers
 stakeholders including patients and citizens⁵. From here the widely used MPH dialogue tool was developed.
 Successively, the short PH22, derived from the MPH dialogue tool and developed through thorough methods,

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3 4	387	serves the purpose as measurement tool for person centered care and practices. Last, it should be emphasized
5 6	388	that the PH22 is not meant for dialogue purposes. Specifically, for that aim the MPH dialogue tool was
7 8	389	developed; to guide the conversation about someone's Positive Health and reflect on someone's personalized
9 10	390	(positive) health-related goals over time in his or her specific context.
11 12	391	Prior to the actual use of the PH22 as a measuring tool in evaluative research, it is essential to explore
13 14	392	its test-retest reliability and responsiveness for change. Future research has to explore this so that differences
15 16	393	in scores can be correctly interpreted. Other aspects mentioned by the COSMIN guidelines important to further
17 18	394	develop the PH22 are research at its construct or criteria validity by hypotheses testing, in which the PH22
19 20	395	scores are related to other similar constructs, as was also done for the PH17 and PH42 ^{9,10,26} . Moreover, to
21 22	396	assign qualitative meaning to the differences in PH22 scores, it is of major interest to define clinical and
23 24	397	commonly understood self-reported outcomes and align these. This will further improve the interpretability of
25 26	398	the PH22.
27 28	399	
29 30	400	CONCLUSIONS
31 32	401	In this study a comprehensive methodological approach was applied using both content discussions and
33 34	402	statistical output aiming to develop a content valid measurement tool for evaluative purposes in scientific or
35 36	403	policy research at positive health or patient centered interventions assessing self-reported Positive Health. A
37 38	404	relatively short questionnaire containing 22 items distributed over four dimensions, the PH22, was developed
39 40	405	and cross-validated among a general (Dutch) population. This study supports its structural validity. To apply this
41 42	406	questionnaire in evaluative research its test-retest reliability should be explored first, followed by
43 44	407	responsiveness for change. Future research has to assess this.
45 46	408	
47 48	409	Additional material
49 50	410	Supplemental material file (.pdf); A. Items of the My Positive Health dialogue tool (MPH), B. Factor loadings of
51 52	411	model with 42 MPH items; PH42, C1-6. Interitem Correlations of factors PH42, D-E. Factor loadings with 30-
53 54 55	412	item and 24 PH model (round 2 and 3); F. The 22 item self-reported Positive Health questionnaire (PH22)
55 56 57	413	
58	414	List of abbreviations
59 60	415	CA Cronbach's alpha

1			
2 3	416	CFA	Confirmatory factor analysis
4 5	417	CFI	Comparative fit index
6 7			
8	418	COSMIN	Reporting Guideline
9 10	419	CPHQ	Context-sensitive Positive Health Questionnaire
11 12	420	PCA	Principal component analysis
13 14	421	FL	Factor loading
15 16	422	IIC	Inter-item correlation
17 18	423	IPH	Item number from the MPH dialogue tool
19 20	424	кмо	Kaiser-Meyer-Olkin
21 22	425	LISS panel	Longitudinal Internet studies for the Social Sciences – panel
23 24	426	METC	Medical ethical review board (Medisch ethische toetsingscommissie)
25 26	427	ML	Maximum likelihood
27 28	428	MPH	My Positive Health dialogue tool
29 30	429	PH17	Positive Health measurement scale with 17 items
31 32	430	PH22	Positive Health measurement scale with 22 items
33 34	431	PH42	Positive Health measurement scale with 42 items
35 36	432	PROM	Patient-reported outcome measures
37 38	433	RMSEA	Root mean square error of approximation
39 40	434	STMR	Standardized root mean square residual
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Item number of the dialogue too	ol Item
BF1	I feel healthy
BF2	I feel fit
BF3	I have no physical complaints or pain
BF4	I sleep well
BF5	l eat well
BF6	I recover quickly after exercise, such as sports.
BF7	I find it easy to move, such as going up and down stairs, walking or cycling
MW8	I am good at remembering things
MW9	I am able to concentrate
MW10	I am able to see, hear, talk and read
MW10 MW11	I feel cheerful
MW12	l accept myself for who I am
MW12 MW13	I look for solutions to change difficult situations
MW13 MW14	I feel in control of my life
MF15	I have a meaningful life
-	
MF16	In the mornings, I look forward to the day ahead
MF17	I have ideals that I would like to achieve
MF18	I feel confident about my own future
MF19	l accept life as it comes
MF20	I am grateful for what life offers me
MF21	I want to continue learning throughout my life
QL22	I enjoy my life
QL23	I am happy
QL24	I feel good
QL25	I feel my life is well-balanced
QL26	I feel safe
QL27	I am content with where and with whom I live
QL28	I have enough money to pay my bills
SP29	I am in good contact with other people
SP30	Other people take me seriously
SP31	I have people with whom I can do fun things with
SP32	I have people who support me when I need it
SP33	I feel that I 'belong' in my environment
SP34	I consider my job or other activities to be meaningful
SP35	I am interested in what happens in society
DF36	I am well capable of looking after myself, for example with regard to personal
	hygiene, getting dressed, shopping, cooking
DF37	I know my limitations
DF38	I know how I can look after my own health
DF39	I am well capable of planning my day
DF40	I am well capable of managing the money that I have each month
DF41	I am able to work in a job or do voluntary work
DF42	I know how to apply for benefits or getting assistance from official agencies wh
-	necessary

(https://vragenlijsten.mijnpositievegezondheid.nl/adults-en)

B. Factor loadings of model with 42 MPH items; PH42 (n=1199)¹

Item number of the My Positive Health dialogue tool (MPH) (Expressed as IPH)	Acceptance. meaningfulness and satisfaction with life	Physical health and functioning	Self-management	Social network and societal roles	Personal development	Cognition
IPH25 Feeling well-balanced	0.751	0.064	0.129	0.053	0.047	0.036
IPH24 Feeling good	0.708	0.235	-0.009	0.097	0.051	0.005
IPH23 Being happy	0.699	0.082	-0.004	0.260	0.034	-0.023
IPH22 Enjoyment	0.676	0.086	0.021	0.253	0.060	-0.013
IPH16 Being high-spirited	0.673	0.105	0.046	0.129	0.102	0.033
IPH11 Being cheerful	0.653	0.159	-0.040	0.154	0.089	0.102
IPH19 Accepting life	0.645	-0.039	0.165	0.048	0.135	0.087
IPH20 Being grateful	0.624	0.008	0.114	0.135	0.160	0.002
IPH15 Having a meaningful life 🛛 📈	0.573	0.049	0.045	0.249	0.183	0.005
IPH12 Accepting yourself	0.572	0.037	0.206	0.054	0.043	0.145
IPH18 Feeling confident about own future	0.558	0.161	0.033	0.093	0.344	-0.019
IPH14 Having control	0.534	0.026	0.201	0.105	0.163	0.123
IPH26 Feeling safe	0.393	0.074	0.185	0.256	0.028	0.078
IPH7 Exercise	-0.107	0.877	0.061	0.049	0.109	-0.118
IPH6 Physical condition	0.069	0.783	0.046	0.021	0.048	-0.013
IPH2 Feeling fit	0.206	0.781	0.052	-0.039	-0.002	0.003
IPH1 Feeling healthy	0.195	0.769	0.027	-0.032	0.016	0.028
IPH41 Being able to work	-0.089	0.526	0.291	0.058	0.266	-0.223
IPH3 Having physical complaints or pain	-0.031	0.450	-0.097	0.062	-0.018	0.193
IPH4 Sleeping pattern	0.395	0.422	-0.061	0.022	-0.276	0.254
IPH5 Eating pattern	0.241	0.364	0.248	0.087	-0.250	0.197
IPH40 Managing money	0.147	-0.036	0.828	0.001	-0.069	-0.070
IPH37 Knowing your limitations	0.001	0.014	0.754	0.017	0.011	0.233
IPH38 Knowledge of health	-0.022	0.157	0.651	0.088	0.019	0.201
IPH39 Managing time	0.132	0.001	0.634	-0.062	0.073	0.238
IPH36 Looking after yourself	-0.171	0.290	0.633	0.052	0.092	0.065
IPH28 Having enough money	0.219	0.035	0.598	0.147	-0.121	-0.231
IPH42 Asking for help	0.065	-0.044	0.452	0.178	0.175	-0.154
IPH32 Having the support of others	-0.014	-0.013	-0.036	0.939	-0.038	0.015
IPH31 Doing fun things together	0.043	0.070	-0.070	0.899	-0.014	-0.043
IPH33 Belonging	0.099	-0.015	0.018	0.864	-0.070	-0.028
IPH30 Being taken seriously	-0.023	-0.021	0.047	0.792	0.081	0.092
IPH29 Social contacts	0.111	0.013	-0.038	0.786	0.013	0.051
IPH27 Living conditions	0.335	-0.044	0.224	0.423	-0.140	-0.017
IPH35 Being interested in society	0.011	-0.002	0.181	0.418	0.263	-0.011
IPH34 Doing meaningful things IPH21 Continue learning	0.228 0.182	0.212 0.118	0.103 0.020	0.401 0.002	0.181	-0.169 0.017

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization. Pattern matrix, rotation converged in 14 iterations.

1. van Druten VP, Metz MJ, Mathijssen JJP, van Vliet M, Rudd B, de Vries E, Nahar -van Venrooij L.M.W. Measuring positive health using the My Positive Health (MPH) and Individual Recovery Outcomes Counter (I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch population. Applied Research in Quality of Life. Vol.21, 2024. https://doi.org/10.1007/s11482-024-10356-3

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ê1. Interitem Correlations of factor <i>Acceptatic</i> 4	on, meanin	ngfulness ai	nd satisfactio	on with life	of 42-item ı	model; PH42 ¹	L		1377 cluc				
5	IPH23	IPH22	IPH25	IPH24	IPH16	IPH11	IPH15	IPH20		IPH19	IPH14	IPH12	IPH26
6	Being	Enjoym	Feeling	Feeling	Being	Being	Having a	Being	Q Fee	Acceptin	Having	Acceptin	Feeling
7	happy	ent	well-	good	high-	cheerful	meaningf	grateful	ក្លីcensiden	g life	control	g	safe
8			balanced		spirited		ul life		Ktagb ut			yourself	
9 10									2023 Biging related				
11									e fortune				
12									. Downຜິລດີເອດິຈິກ ment Slipejzeliz (d to text and dat				
13 19 19 19 19 19 19 19 19 19 19 19 19 19	1.000	0.893	0.811	0.844	0.784	0.815	0.769	0.756	#057∰6	0.664	0.699	0.652	0.646
IPH22 Enjoyment	0.893	1.000	0.804	0.842	0.793	0.822	0.785	0.769		0.678	0.705	0.669	0.658
15 H22 Enjoyment 16 H25 Feeling well-balanced	0.811	0.804	1.000	0.831	0.764	0.755	0.733	0.702	a05723	0.689	0.709	0.670	0.640
1 PH24 Feeling good	0.844	0.842	0.831	1.000	0.784	0.827	0.726	0.682	ata mini	0.657	0.680	0.687	0.648
18PH16 Being high-spirited	0.784	0.793	0.764	0.784	1.000	0.773	0.770	0.697		0.670	0.669	0.635	0.597
19PH11 Being cheerful	0.815	0.822	0.755	0.827	0.773	1.000	0.721	0.691	2 0.723	0.654	0.676	0.653	0.634
20PH15 Having a meaningful life	0.769	0.785	0.733	0.726	0.770	0.721	1.000	0.716	≥ 0.7 <mark>5</mark> 0	0.663	0.710	0.631	0.614
21 21 22 22	0.756	0.769	0.702	0.682	0.697	0.691	0.716	1.000	ភ្ល៊ 0.7 <mark>2</mark> 2	0.709	0.653	0.647	0.613
22 2₩H18 Feeling confident about own future	0.746	0.757	0.723	0.724	0.738	0.723	0.750	0.712	1.0 <mark>0</mark> 0	0.697	0.715	0.640	0.623
24PH19 Accepting life	0.664	0.678	0.689	0.657	0.670	0.654	0.663	0.709	0.69 7	1.000	0.664	0.667	0.596
25PH14 Having control	0.699	0.705	0.709	0.680	0.669	0.676	0.710	0.653	a 0.7 8 5	0.664	1.000	0.670	0.639
26PH12 Accepting yourself	0.652	0.669	0.670	0.687	0.635	0.653	0.631	0.647	≌ 0.6 [≩] 0	0.667	0.670	1.000	0.574
² 7PH26 Feeling safe	0.646	0.658	0.640	0.648	0.597	0.634	0.614	0.613	SID.640	0.596	0.639	0.574	1.000
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2. Interitem Correlations between it	ems of factor <i>Physica</i> .	l health and functioni	BMJ Open	del; PH42 ¹	hijopen-zoz4-o91377 on z4 by copyright, including fo			Page 28 of
	IPH2 Feeling fit	IPH7 Exercise	IPH1 Feeling	IPH6 Physical	IPH41 Bei	IPH4 Sleeping	IPH5 Eating	IPH3 Having
			healthy	condition	able to we relat	pattern	pattern	complaints or pain
IPH2 Feeling fit	1.000	0.704	0.845	0.735	0.490 8 9	0.488	0.516	0.361
PH7 Exercise	0.704	1.000	0.682	0.735	0.548 to the	0.395	0.435	0.312
PH1 Feeling healthy	0.845	0.682	1.000	0.674	0.518	0.488	0.476	0.348
PH6 Physical condition	0.735	0.735	0.674	1.000	0.477 an er a	0.462	0.537	0.313
PH41 Being able to work	0.490	0.548	0.518	0.477	0.518 ft Superior 0.477 and care 1.000 data 0.283 ta	0.283	0.294	0.184
IPH4 Sleeping pattern	0.488	0.395	0.488	0.462	0.283 ar (A	1.000	0.529	0.262
PH5 Eating pattern	0.516	0.435	0.476	0.537	0.294 <u>3</u> .8	0.529	1.000	0.256
IPH3 Having complaints or pain	0.361	0.312	0.348	0.313	0.184 P. 0	0.262	0.256	1.000

C3. Interitem Correlations between items of factor *Self-management* of 42-item model; PH42¹

90 0.443	
<i>J</i> U 0.445	0.690
03 0.393	0.403
13 0.404	0.413
59 0.305	0.359
88 0.417	0.388
00 0.379	1.000
79 1.000	0.379
0	1.00

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of 31 2 4. Interitem Correlations between iter	ms of factor <i>Social ı</i>	network and societ(BMJ Oper al roles of 42-item mo		by copyright, incl			
	IPH31 Doing fun things together	IPH32 Having the support of others	IPH33 Belonging	IPH29 Social contacts	IPH30 Being taken serious	meaningful things	IPH27 Living conditions	IPH35 Being interested in society
IPH31 Doing fun things together	1.000	0.822	0.774	0.734	0.694	D.607	0.538	0.492
IPH32 Having the support of others	0.822	1.000	0.779	0.695	0.678 7	e .557	0.582	0.467
IPH33 Belonging	0.774	0.779	1.000	0.743	0.711	De 0 2 0 . 621	0.569	0.523
IPH29 Social contacts	0.734	0.695	0.743	1.000	0.724	B 0.607	0.509	0.481
IPH30 Being taken seriously	0.694	0.678	0.711	0.724	1.000	₩ 0.561	0.533	0.540
IPH34 Doing meaningful things	0.598	0.557	0.621	0.607	0.561	금 <u>0</u> 1.000	0.485	0.521
IPH27 Living conditions	0.538	0.582	0.569	0.509	0.533 a	erie 0.485	1.000	0.391
IPH35 Being interested in society	0.492	0.467	0.523	0.481			0.391	1.000

C5. Interitem Correlations between items of factor <i>Personal development</i> of 42-item model; PH42 ¹				
	IPH21 Continue learning	IPH17 Wanting to achieve ideals	IPH13 Being able to handle changes	Al trair
IPH21 Continue learning	1.000	0.534	0.483	ling
IPH17 Wanting to achieve ideals	0.534	1.000	0.449	<u> </u>
IPH13 Being able to handle changes	0.483	0.449	1.000	nd

IPH8Being able to remember things1.0000.7680.477OIPH9Being able to concentrate0.7681.0000.452CIPH10Being able to communicate0.4770.452C	IPH8 Being able to remember things 1.000 0.768 0.477 Q IPH9 Being able to concentrate 0.768 1.000 0.452 g IPH10 Being able to communicate 0.477 0.452 g van Druten VP, Metz MJ, Mathijssen JJP, van Vliet M, Rudd B, de Vries E, Nahar-van Venrooij L.M.W Measuring positive health using the My Positive Health (MPH) and Individual Recovery Outcomes Counter (I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch		IPH8 Being able to remember things	IPH9 Being able to	IPH10 Being able to communicate	ر
IPH10 Being able to communicate 0.477 0.452 1.000 van Druten VP, Metz MJ, Mathijssen JJP, van Vliet M, Rudd B, de Vries E, Nahar-van Venrooij L.M.W Measuring positive health using the My Positive Health (MPH) and Individual Recovery Outcomes Counter (I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch	IPH10 Being able to communicate 0.477 0.452 1.000 van Druten VP, Metz MJ, Mathijssen JJP, van Vliet M, Rudd B, de Vries E, Nahar-van Venrooij L.M.W Measuring positive health using the My Positive Health (MPH) and Individual Recovery Outcomes Counter (I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch	IPH8 Being able to remember things	0	concentrate		nolo
van Druten VP, Metz MJ, Mathijssen JJP, van Vliet M, Rudd B, de Vries E, Nahar-van Venrooij L.M.W Measuring positive health using the My Positive Health (MPH) and Individual Recovery Outcomes Counter (I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch	van Druten VP, Metz MJ, Mathijssen JJP, van Vliet M, Rudd B, de Vries E, Nahar-van Venrooij L.M.W Measuring positive health using the My Positive Health (MPH) and Individual Recovery Outcomes Counter (I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch					gies
(MPH) and Individual Recovery Outcomes Counter (I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch	(MPH) and Individual Recovery Outcomes Counter (I.ROC) dialogue tools: a panel study on measurement properties in a representative general Dutch	IPH10 Being able to communicate	0.477	0.452	1.000	
				,	c ,	
		(MPH) and Individual Recovery Outcom	es Counter (I.ROC) dialogue tools: a panel	study on measurement properties in	c ,	

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	Factor ¹			
	Contentment	Daily life	Physical	Future
	with life	management	fitness	perspective
IPH32 Having the support of others	0.757	0.116	-0.196	0.045
IPH20 Being grateful	0.731	-0.027	0.114	0.129
IPH29 Social contacts	0.730	0.097	-0.107	0.097
IPH19 Accepting life	0.729	-0.022	0.136	0.064
IPH16 Being high-spirited	0.712	-0.049	0.246	0.116
IPH27 Living conditions	0.710	0.168	-0.046	-0.157
IPH24 Feeling good	0.692	-0.087	0.344	0.106
IPH30 Being taken seriously	0.674	0.194	-0.183	0.122
IPH26 Feeling safe	0.673	0.100	0.103	0.002
IPH12 Accepting yourself	0.666	0.045	0.217	-0.011
IPH14 Having control	0.629	0.111	0.156	0.121
IPH18 Feeling confident about own	0.610	-0.038	0.197	0.350
future				
IPH34 Doing meaningful things	0.472	0.187	0.079	0.260
IPH35 Being interested in society	0.399	0.263	-0.139	0.256
IPH9 Being able to concentrate	0.369	0.218	0.268	0.041
IPH40 Managing money	0.154	0.780	-0.031	-0.158
IPH37 Knowing your limitations	0.067	0.762	0.073	-0.049
IPH36 Looking after yourself	-0.107	0.750	0.161	0.096
IPH39 Managing time	0.041	0.693	0.118	0.033
IPH28 Having enough money	0.345	0.535	-0.043	-0.178
IPH42 Asking for help	0.166	0.502	-0.174	0.174
IPH41 Being able to work	-0.161	0.495	0.257	0.388
IPH2 Feeling fit	0.106	0.161	0.674	0.155
IPH6 Physical condition	0.031	0.193	0.648	0.197
IPH4 Sleeping pattern	0.364	-0.071	0.644	-0.204
IPH5 Eating pattern	0.316	0.238	0.511	-0.222
IPH3 Having physical complaints or	-0.052	0.064	0.485	0.107
pain	0.000	0.000	0.170	
IPH17 Wanting to achieve ideals	0.269	-0.083	0.152	0.663
IPH21 Continue learning	0.230	0.032	0.032	0.640
IPH13 Being able to handle changes xtraction Method: Principal Component Analysis;	0.289	0.101	-0.016	0.465

Factor loadings of 20 item DLL model (round 2) (n-1100)

Extraction Method: Principal Component Analysis; Rotation Method: Oblimin with Kaiser Normalization; Pattern matrix, rotation converged in 16 iterations

¹ During the process of item reduction the names of the factors were Contentment with life, Self-management, Physical health and functioning, and Personal development. Afterwards these were renamed by the research team into Contentment with life, Daily life management, Physical fitness, and Future perspective.

	Factor1Contentment with	Physical	Daily life	Future
	life	fitness	management	perspective
IPH32 Having the support of others	0.846	-0.136	0.023	0.009
IPH29 Social contacts	0.806	-0.055	0.014	0.051
IPH27 Living conditions	0.773	-0.007	0.093	-0.157
IPH30 Being taken seriously	0.735	-0.126	0.101	0.105
IPH26 Feeling safe	0.654	0.125	0.079	0.041
IPH20 Being grateful	0.653	0.137	-0.015	0.196
IPH16 Being high-spirited	0.625	0.276	-0.032	0.165
IPH19 Accepting life	0.618	0.158	0.021	0.150
IPH14 Having control	0.543	0.158	0.136	0.200
IPH12 Accepting yourself	0.543	0.248	0.106	0.067
IPH34 Doing meaningful C	0.531	0.120	0.081	0.210
IPH4 Sleeping pattern	0.332	0.695	-0.084	-0.194
IPH2 Feeling fit	0.057	0.687	0.141	0.161
IPH6 Physical condition	-0.001	0.677	0.142	0.199
IPH5 Eating pattern	0.255	0.567	0.250	-0.182
IPH3 Having physical complaints or pain	-0.115	0.519	0.046	0.152
IPH37 Knowing your limitations	0.022	0.033	0.855	-0.057
IPH36 Looking after yourself	-0.088	0.117	0.791	0.030
IPH40 Managing money	0.106	-0.032	0.775	-0.082
IPH39 Managing time	-0.022	0.062	0.772	0.057
IPH42 Asking for help	0.208	-0.203	0.474	0.151
IPH21 Continue learning	0.090	0.020	0.044	0.758
IPH17 Wanting to achieve ideals	0.140	0.148	-0.047	0.701
IPH13 Being able to handle changes	0.158	-0.024	0.118	0.600

E. Factor loadings of 24-item PH model (round 3) (n=1199)

Extraction Method: Principal Component Analysis. Rotation Method: Oblimin with Kaiser Normalization. Pattern matrix, rotation converged in 7 iterations.

¹ During the process of item reduction the names of the factors were Contentment with life, Physical health and functioning, Selfmanagement, and Personal development. Afterwards these were renamed by the research team into Contentment with life, Physical fitness, Daily life management, and Future perspective.

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Item number of the dialogue tool	Item
	Physical fitness
IPH2	I feel fit
IPH3	I have no physical complaints or pain
IPH4	I sleep well
IPH5	l eat well
IPH6	I recover quickly after exercise, such as sports
	Contentment with self, others and life
IPH12	I accept myself for who I am
IPH14	I feel in control of my life
IPH16	In the mornings. I look forward to the day ahead
IPH19	I accept life as it comes
IPH26	I feel safe
IPH27	I am content with where and with whom I live
IPH29	I am in good contact with other people
IPH32	I have people who support me when I need it
IPH34	l consider my job or other activities to be meaningful
	Daily life management
IPH36	I am well capable of looking after myself. for example with regard to
	personal hygiene. getting dressed. shopping. cooking
IPH37	I know my limitations
IPH39	I am well capable of planning my day
IPH40	I am well capable of managing the money that I have each month
IPH42	I know how to apply for benefits or getting assistance from official
	agencies when necessary
	Future perspective
IPH13	I look for solutions to change difficult situations
IPH17	I have ideals that I would like to achieve
IPH21	I want to continue learning throughout my life