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Personal Wellbeing Score (PWS) – a short version of ONS4: development and validation in social prescribing

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Abstract

Aims

Wellbeing is a key policy objective in health and care services. Our aim was to develop a short generic measure of personal (subjective) wellbeing for routine use as a performance measure in patient-centred care and healthcare quality improvement alongside other patient-reported outcome and experience measures.

Methods

The Personal Wellbeing Score (PWS) is a patient-reported outcome measure, based on the Office of National Statistics (ONS) four personal well-being questions (ONS4) and thresholds. PWS has the same look and feel as other measures in the R-Outcomes family of surveys. Word length and reading age were compared with eight other measures. Anonymous data from five social prescribing projects, were analysed. Internal structure was examined using distributions, intra-item correlations, Cronbach's alpha and exploratory factor analysis. Construct validity was assessed using hypothesised associations with health status, health confidence, patient experience, age, gender and medications. Scores on referral and after referral assessed responsiveness.

Results

Differences from ONS4 include brevity, fewer response options, positive wording and a summary score. PWS is short (42 words) with low reading age (9 years).

In this population (1,299 respondents, 60% female, average age 81 years), missing values were less than 2%. PWS showed good internal reliability (Cronbach's alpha = 0.90). Exploratory factor analysis suggested that the four PWS items relate to a single dimension. PWS summary scores correlate positively with health confidence (r=0.60), health status (r=0.58), patient experience (r=0.30) and age group (r=0.24). PWS is responsive to social prescribing intervention.

Conclusions

The Personal Wellbeing Score (PWS) is a short variant of ONS4. It is easy to use with good psychometric properties, suitable for routine use in quality improvement and health services research.

Background

Wellbeing is a key measure of social progress and goal of public policy,[1] especially for health and social services. Social wellbeing includes a range of factors known to support wellbeing, such as caring, freedom, generosity, honesty, health, income and governance.[2] Personal wellbeing, also known as subjective wellbeing, refers to how people experience and evaluate their lives and specific domains and activities in their lives.[3]

Personal wellbeing has facets: (1) evaluative wellbeing (a reflective assessment on a person's life); (2) eudemonic wellbeing (a sense of meaning and purpose in life, or good psychological functioning); and (3) experienced wellbeing or affect (a person's experiences that make life pleasant or unpleasant at that time). Experienced wellbeing is often sub-divided into positive experiences, such as happiness, and negative experiences, such as anxiety. Only the person involved can provide information about his or her personal wellbeing.

In 2009, the Stiglitz-Sen-Fitoussi *Commission on the Measurement of Economic Performance and Social Progress* recommended that national statistical agencies collect measures of subjective well-being.[4] In 2011, the UK Office of National Statistics (ONS) introduced a set of four personal wellbeing questions (ONS4) in the Annual Population Survey (APS).[5,6,7] These questions are designated National Statistics and are approved as a GSS (Government Statistical Service) Harmonised Principle.[8] The four ONS4 questions relate to evaluative wellbeing, eudemonic wellbeing and experienced wellbeing (positive and negative experiences).[9]

The Organisation for Economic Co-operation and Development (OECD) has developed a similar measure (OECD core questions), with an extra question about depression.[10]

The North-East Hampshire and Farnham (NEHF) NHS Vanguard project (known as *Happy, Healthy at Home*),[11] identified a requirement for a short measure of personal wellbeing to be used alongside other measures developed by R-Outcomes to measure health status (*howRu*),[12] patient experience (*howRwe*)[13] and health confidence (HCS).[14] These measures share a strong family resemblance, being generic (condition-independent), short and with a low reading age. Each measure has four response options, which are labelled, colour-coded and use emoji. They have four question items, although exceptions are permitted.

Methods

Development

We reviewed the wellbeing literature and determined to explore the feasibility of adapting the ONS4 questions to the R-Outcomes format. ONS encourages the use and adaption of ONS4 within other government departments, local government, charities and the private sector.[6]

Design criteria for person-reported outcome measures (PROMs) intended for clinical use include clarity, brevity, suitability for frequent use, multi-modality (suitability for use with multiple data collection modalities including smart-phones), responsiveness, good psychometric properties and easily understood scoring.[15,16] Results should be easy to understand, interpret and action by all stakeholders, and be comparable for benchmarking.

Initial draft versions of the Personal Wellbeing Score (PWS) were designed and the wording was refined in collaboration with NEHF staff, who asked patients to test different versions of the questionnaire. The final version of the survey evolved through twenty iterations over about eighteen months.

Length and Readability

The length and readability of PWS was compared with the standard version of ONS4[8] and OECD Core Questions[10] and six measures of wellbeing and related concepts used in the UK.[17,18] These are: ONS4 concise format,[17] General Health Questionnaire (GHQ-12),[19] Short Warwick-Edinburgh Mental Wellbeing Scale (SWEMWBS),[20] EuroQol EQ-5D,[21] ICECAP-A,[22] and Adult Social Care Outcomes Toolkit (ASCOT).[23] Readability was measured using the Flesch-Kincaid Readability Grade (FKG).[24] It has been recommended that patients should not be asked to complete questionnaires with a reading age of more than ten,[25] which corresponds approximately to readability grade FKG=5.

Testing and Validation

We performed secondary analysis of data collected as part of the evaluation of five social prescribing services in the Wessex region of England (Hampshire and surrounding districts) to examine the psychometric properties and construct validity of PWS.

Social prescribing is an intervention in health care, whereby a general practitioner (GP) or other health care practitioner refers patients with social or practical needs to a local provider of nonclinical services, via a link worker.[26,27,28]

The evaluations used a mixed methods approach[29] including economic, qualitative and survey methods. Each intervention was broadly similar but with minor differences in case mix, support skills and on-call availability. The choice of measures and method of data collection were agreed with each service in advance.

Each service used its own survey, which included PWS, howRu health status measure, howRwe patient experience measure, health confidence score (HCS), two items on service integration ('services talk to each other' and 'I don't have to repeat my story'), gender, age in deciles, and number of medications being taken.

All surveys were in English and all items were optional. All responses were anonymous. The data was collected during 2016 and early 2017. As a general rule, all people seen during the period of the evaluation were asked to complete the surveys. The number of people who declined to participate was not recorded but is believed to be very small.

Responses were collected: (1) 'on referral' at first visit to the patient's home, and (2) one or two months 'after referral' and after the intervention. The exact dates were not recorded. Some 'after referral' surveys were collected over the telephone in the home, but the mode of data collection was not recorded. Most responses were recorded on a paper copy and transcribed these later onto the R-Outcomes server. There was no linkage between responses 'on referral' and 'after referral'.

Sample size, missing data and distribution: We measured the number of responses and missing data 'on referral' and 'after referral'. A small number of responses without a record of 'on referral' or 'after referral' cohort were excluded. Response distributions and summary statistics (including overall summary score, means, standard deviations and proportion of responses in floor (lowest) and ceiling (highest) states) were calculated 'on referral', 'after referral', gender, age group and number of medications taken.

Internal consistency: The degree of interrelatedness among the items, assessed by correlations between the items, was expected to be in the range 0.4 to 0.6, with the strongest correlation between the pairs of items on positive and negative experience, then life evaluation and worthwhileness (convergent validity). We expected Cronbach's α to be between 0.7 and 0.9, which would support the use of an aggregate summary score.[30]

Factor analysis was applied to the whole data set (using an oblique rotation, Promax, as we expected constructs to be correlated) for the individual questions in PWS, howRu, HCS, howRwe and the two additional experience questions asked.

Construct validity is the degree to which the scores of an instrument are consistent with hypotheses, such as internal relationships, relationships to scores of other instruments or differences between relevant groups, based on the assumption that the instrument validly measures the construct to be measured.[31] This was assessed by the measure being sensitive to clinical interventions, such as the social prescribing service. We hypothesised that:

- Personal wellbeing would be lower 'on referral' than 'after referral'.
- There would be little difference in personal wellbeing between men and women.
- Personal wellbeing would be positively associated health status, health confidence and, less strongly, with patient experience.
- Personal wellbeing would be higher in older people, because older people tend to report higher wellbeing than those of working age.[32]
- Personal wellbeing would fall with the number of medications taken, because wellbeing is positively correlated with health.

Responsiveness is the ability of an instrument to detect change over time in the construct to be measured. This was assessed by comparing the results of the 'on referral' and 'after referral' cohorts.

Ethics Statement

We carried out secondary analysis of data collected as part of routine service evaluation of social prescribing services. The data was anonymous and undertaken to evaluate the current services without randomisation, so ethics approval was not required. No data was collected by the services until after patients had consented and there was no risk to individual participants.[33]

Results – The PWS Measure

The final version of the Personal Wellbeing Score (PWS) is shown in Figure 1.

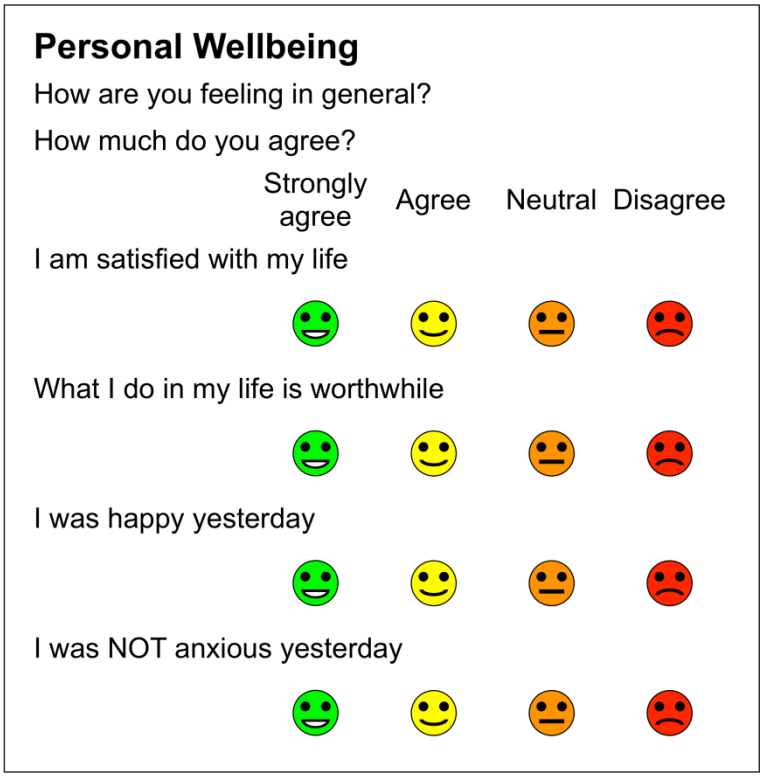

Figure 1 Personal Wellbeing Score

The principal differences between ONS4 and PWS and the reasons for these, are described below in terms of options, items and scoring.

The principal differences between ONS4 and PWS are described below under the headings of options, items and scoring.

Response Options

The scale was changed from an 11-point scale, anchored at *not at all* = 0 and *completely* = 10, to four options: *Strongly agree*, *Agree*, *Neutral* and *Disagree* as used in other R-Outcomes measures. There is no *strongly disagree* option, because scales should approximate the actual distribution of the characteristic in the population.[34] For example, a study, which used a 5-point variant of ONS4, found 2% of responses chose the option closest to *strongly disagree*.[35]

The PWS response options relate to the four threshold groups used in ONS4 publications.[8] For ONS4 life satisfaction, worthwhile and happiness scores, responses 9-10 are grouped as *Very high*, 7-8 as *High*, 5-6 as *Medium* and 0-4 as *Low*. For anxiety scores, responses 6-10 are grouped as *High*, 4-5 as *Medium,* 2-3 as *Low* and 0-1 as *Very low.*

The PWS response options are ordered left to right from best (*Strongly agree*) to worst (*Disagree*). However, in ONS4 the response options are ordered left to right from worst-to-best for three ONS4 items, but best-to-worst for anxiety.

PWS response options are usually colour-coded (*Strongly agree* is green, *Agree* is yellow, *Neutral* is orange and *Disagree* is red) and annotated with emoji. Colour and emoji are not

essential components of the measure. PWS items are optional and responses may be left blank.

Items

The ONS4 items were changed as follows.

The life evaluation question *Overall, how satisfied are you with your life nowadays?* became *I am satisfied with my life.*

The worthwhile (eudemonia) question *Overall, to what extent do you feel the things you do in your life are worthwhile?* became *What I do in my life is worthwhile*.

The positive experience question *Overall, how happy did you feel yesterday?* became *I was happy yesterday.*

The negative experience question *Overall, how anxious did you feel yesterday?* became *I was NOT anxious yesterday*. The scale direction was reversed from negative to positive by adding *NOT*. The potential problems of a double negative (not anxious) are offset by consistency between questions and simpler scoring and reporting.

Scoring

Each PWS item is scored as follows: *Disagree* = 0, *Neutral* = 1, *Agree* = 2 and *Strongly Agree* = 3. A high score is better than a low score.

The PWS calculates a summary score as the sum of the four item scores, giving a 13-point scale from 0 (4 x *Disagree*) to 12 (4 x *Strongly agree*). ONS4 does not provide a summary score.

For populations, the mean item scores and summary score are transformed to a 0-100 scale; for items: (mean item score)*100/3; for summary score: (mean summary score)*100/12.

A common 0-100 scale allows the mean item and summary scores to be compared on the same scale. A score of 100 is obtained when all respondents choose the highest possible score (ceiling) and 0 when all choose the lowest possible score (floor).

Results – Testing

Length and Readability

Table 1 shows the number of items, word count, Flesch-Kincaid Grade and estimated reading age for PWS and eight other measures. PWS is shortest with lowest word count (42) and reading age (9).

Table 1. Number of items, word count, Flesch Kincaid Grade and reading age for related measures.

Measure	Number of Items	Word count	Flesch Kincaid Grade	Reading Age
Personal Wellbeing Score (PWS)	4	42	3.7	9 years
ONS4 (standard version)	4	114	6.5	12 years
ONS4 (concise version)	4	62	6.5	12 years
OECD Core Questions	5	177	6.4	11 years
GHQ-12	12	324	6.3	11 years
S-WEMWBS	7	89	3.8	9 years
ICECAP-A	5	264	5.1	10 years
ASCOT	8	415	5.3	10 years
EQ-5D (including VAS)	6	263	5.9	11 years

Sample size, missing data and distribution

We analysed 1,324 responses, 647 'on referral' (49%) and 677 'after referral' (51%).

The frequency distribution for each PWS item is shown in Table 2. Missing values for individual items were between 0.8% and 1.3%. Missing data was identified in 25 (1.9%) PWS responses. The floor state accounted for 2.8% and the ceiling 15.2%. The distribution of responses covers the whole range, with no indication of problematic floor or ceiling effects.

Table 2 Frequency counts (%) for each PWS item (n=1324).

	Strongly agree	Agree	Neutral	Disagree	Missing items
I am satisfied with my life	315 (23.8%)	633 (47.8%)	239 (18.1%)	126 (9.5%)	11 (0.8%)
What I do in my life is worthwhile	311 (23.5%)	574 (43.4%)	325 (24.5%)	97 (7.3%)	17 (1.3%)
I was happy yesterday	312 (23.6%)	623 (47.1%)	234 (17.7%)	142 (10.7%)	13 (1.0%)
I was NOT anxious yesterday	303 (22.9%)	525 (39.7%)	276 (20.8%)	205 (15.5%)	15 (1.1%)

Internal Consistency

The highest inter-item correlations are between the two evaluative items *I am satisfied with my life* and *What I do in my life is worthwhile* (r=0.77) and the two experience items *I was happy yesterday* and *I was NOT anxious yesterday* (r=0.73). The lowest inter-item correlation is

between *I am satisfied with my life* and *I was NOT anxious yesterday* (r=0.51). Correlations between individual items and the summary PWS score are all in the range r=0.83 to r=0.88.

Cronbach's alpha = 0.90 at the top end of the expected range.

Factor analysis results are shown in Table 3. A scree plot implies four or six factors, while Kaiser's criterion implies four. This supports the use of 4 scales measuring distinct constructs: personal wellbeing (PWS), health status (howRu), health confidence (HCS) and patient experience (howRwe). In this population health status sub-divides howRu into 'disability' and 'distress', similar to Rosser's seminal classification of disability and distress.[36] The PWS items are related and distinct from other questions asked in the survey. Results were broadly the same when repeated on just the 'on referral' and 'after referral' data.

Table 3 Factor analysis results, using oblique rotation, Promax. Only weights over 0.3 are shown.

Item	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6
howRu 1				0.51		
howRu 2				0.51		
howRu 3					0.77	
howRu 4					0.82	
PWS 1			0.69			
PWS 2			0.67			
PWS 3			0.87			
PWS 4			0.82			
HCS 1		0.61				
HCS 2		0.46				
HCS 3		0.71				
HCS 4		0.71				
howRwe 1	0.85					
howRwe 2	0.91					
howRwe 3	0.88					
howRwe 4	0.91					
Services talk to each other	0.36					0.42
No need to repeat story	0.61					0.39

Construct Validity

The correlation between the PWS summary score and health status as measured by the howRu summary score r=0.58; with health confidence as measured by HCS summary score r=0.60; with patient experience as measured by the howRwe summary score r=0.30; with age decile r=0.24; with number of medications r=-0.05 (p=0.08). All correlations other than medications are significant (p<0.00001).

The number of women (60%) is greater than the number of men, but their mean summary PWS score is not statistically different (p=0.20).

Age is skewed to older age groups with 64% of participants over 80 years old and 16% over 90.

Older participants tend to report higher wellbeing than younger. In this population of people referred to social prescribing, the mean summary PWS score for participants under 70 is 44, which is low (n=146); for those over 70 summary PWS is 63 (n=1118).

Responsiveness

The means and 95% confidence intervals of the PWS summary score and each item on 0-100 scale 'on referral' and 'after referral' are shown in Table 4. The differences are all significant (2-tailed t-test, p<0.00001). The mean scores for people who have received social prescribing services were higher after the intervention (PWS = 65) than before (PWS = 56), which demonstrates responsiveness.

Table 4 Mean scores (95% Confidence Interval) on 0-100 scale for PWS summary and item scores, 'on referral' and 'after referral'.

Variable	**On referral mean (95% CI)**	**After referral mean (95% CI)**	**Mean difference**
n	633	666	
PWS Summary Score	56.0 (53.9 to 58.1)	64.6 (62.8 to 66.5)	8.6
I am satisfied with my life	57.9 (55.5 to 60.3)	66.3 (64.2 to 68.4)	8.4
What I do in my life is worthwhile	57.2 (54.9 to 59.6)	65.2 (63.2 to 67.3)	8.0
I was happy yesterday	56.7 (54.2 to 59.2)	66.0 (63.9 to 68.1)	9.3
I was NOT anxious yesterday	52.5 (49.8 to 55.2)	61.1 (58.8 to 63.5)	8.6

Discussion

Strengths and limitations

The Personal Wellbeing Score (PWS) was adapted from the Office of National Statistics ONS4 to work alongside other R-Outcomes measures. It is short (42 words) with a low reading age (9 years). People were happy to answer the PWS questions, as indicated by low numbers of missing values. It meets a need for a short practical measure of wellbeing that can be used routinely at the point of care.

High internal consistency, as measured by inter-item correlations and Cronbach's alpha, suggests that it is appropriate to use a single summary score for this instrument, as well as individual item scores.

Secondary analysis of anonymous data collected for a different primary purpose has a number of problems. Data collection methods did not capture whether any patients declined to participate. We only have 'on referral' and 'after referral' cohorts. Anonymous data does not allow test-retest reliability, inter-rater reliability or change within individuals to be estimated.

The 'on referral' ratings were collected face-to-face, but some 'after referral' ratings were collected by telephone. There is evidence that telephone surveys may elicit slightly higher ratings for wellbeing than face-to-face interviews,[37] but we have no data about the mode of administration.

The study population comprised people receiving social prescribing interventions, mostly over 80, with multiple conditions. Further work is needed to explore the performance of the PWS in other populations.

Comparison with existing literature

Our results are consistent with hypotheses to test construct validity. PWS summary scores are strongly related to health confidence and health status, moderately with age group, but not with number of medications taken or gender.

Analysis of ONS4 in the APS shows a strong relationship with self-reported health, employment status and living alone, and a moderate association with age.[32,38] Our results agree with this for self-reported health status and age, but we have no data about employment status or whether people lived alone (which may be a proxy for loneliness).

A strong association has been reported between subjective wellbeing and successful goal pursuit, which is likely to be closely associated with health confidence.[39] The PWS score for our data has a strong association with the health confidence, as measured by the HCS.

Personal wellbeing generally follows a U-shaped pattern, lower in middle age and higher as people get older.[32,40] We found this pattern in our population. The mean PWS of people under 70 years old was lower (43.6) than those over 70 (62.5). This age effect may be stronger in our population, because people are not referred to social prescribing unless they have problems that may benefit from social prescribing. Such referrals are less common in younger people.

The ONS4 anxiety item is worded negatively, but all PWS items are worded positively. Factor analysis on ONS4 data shows that positively and negatively worded items relate to different factors.[18]For the PWS data, factor analysis and internal correlations suggest that the anxiety item behaves in a way similar to other items and is not independent.[

Implications for practice

The PWS questions were asked within a longer survey covering health status, health confidence and patient experience as well as personal wellbeing. More than 68% of people who completed these surveys were aged over 80, and many were in poor health. This demonstrates the practicality of the PWS with these populations.

The PWS questions are generic and are worded positively. They are easy to use and unlike some other measures of mental wellbeing are highly acceptable, as indicated by the low numbers of missing values.[41]

The PWS is now being used routinely as a key performance indicator (KPI) in commissioned social prescribing programmes in the Wessex region.[42]

Conclusions

The Personal Wellbeing Score (PWS) is a short variant of ONS4, designed for routine collection of data about subjective wellbeing. It is shorter and has a lower reading age than other widely used instruments. In evaluation studies of social prescribing, it was responsive to the interventions, easy to use, with few missing values, good psychometric results, strong correlation with concurrent measures of health status and health confidence, and construct validity.

Abbreviations

APS	Annual Population Survey
ASCOT	Adult Social Care Outcome Tool
EQ-5D	EuroQoL health-related quality of life measure
FKG	Flesch-Kincaid Grade
GHQ-12	General Health Questionnaire
HCS	Health Confidence Score
ICECAP-A	ICEpop CAPability measure for Adults
KPI	Key Performance Indicator
NEHF	North-East Hampshire and Farnham
OECD	Organization for Economic Co-operation and Development
ONS	Office of National Statistics
ONS4	Office of National Statistics Personal Wellbeing Questions
PROMs	Patient-Reported Outcome Measures
PWS	Personal Wellbeing Score
SWEMWBS	Short Warwick Edinburgh Mental Wellbeing Scale
UK	United Kingdom

Competing interests

TB and AL are directors of R-Outcomes Ltd, which owns the copyright of the Personal Wellbeing Score and provides quality improvement and evaluation services using it. Please contact R-Outcomes Ltd if you wish to use the PWS.

HP has done consultancy work for Crystallise Ltd, unrelated to the work reported herein. The authors declare that they have no other conflicting interests.

Authors' contributions

TB designed the questionnaire and wrote the first draft of the paper. TB, HWWP and JS performed the analyses. JS and AL were actively involved in the data collection. All authors contributed to the final text, read and approved the final manuscript.

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