Quality of Life Research, 5, pp. 419–425

Evaluating the psychometric characteristics of the Psychological General Well-Being Index with a new response scale

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The purpose of this study was to evaluate the psychometric characteristics of a revised version of the Psychological General Well-Being Index (PGWB), the PGWB-R, using a standardized response option suitable for use in telephone surveys. Sixty patients (42 women and 18 men) from two gastroenterology specialty clinics participated in the study. Patients were administered the PGWB or PGWB-R and the Gastrointestinal Symptom Rating Scale (GSRS) by telephone or face-to-face interview. Internal consistency reliability levels of the PGWB and PGWB-R were comparable, with Cronbach's alpha coefficients between 0.93–0.96 for the total scale across method of administration. Intraclass correlations between the two methods were high (0.66–0.84). Pearson correlations between the GSRS and the PGWB and PGWB-R were similar to one another and to coefficients reported in the literature. Results suggest the PGWB-R may be useful for studies requiring telephone interviews.

Key words: Gastrointestinal disorders; measurement; psychological well-being; Psychological General Well-Being Index (PGWB); quality of life.

Introduction

The Psychological General Well-Being (PGWB) index has been used as a measure of health-related quality of life and an outcome indicator in clinical trials. The instrument was designed for administration through face-to-face interview, with later adjustments made for self-administration. Although telephone interviews can be a less costly alternative for gathering health-related quality of life outcomes data, the variation in response scales in the PGWB makes it difficult to administer by this method. The purpose of this study was to evaluate the psychometric properties of a revised version of the PGWB, the PGWB-R, using a standardized response option suitable for use in telephone surveys. The internal consistency reliability and construct validity of the PGWB-R were evaluated and compared with the original PGWB under two methods of administration: face-to-face and telephone interview.

Financial support for this study was provided by Astra-Merck.

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Background

The Psychological General Well-Being index is a 22-item questionnaire designed to measure 'self-representations of intrapersonal affective or emotional states reflecting a sense of subjective well-being or distress.'[1] Six affective states are assessed through six subscales: anxiety, depressed mood, positive well-being, self-control, general health and vitality. Response options for each item are individualized according to the given affective experience. Respondents are asked to rate the intensity or frequency of the experience during the past month on a 6-point Likert scale.[1] The most negative option is given a value of 0 and the most positive a value of 5.

Reliability estimates indicate the PGWB is internally consistent, with α coefficients averaging 0.92 across four early studies (range = 0.90–0.94).[1] Alpha levels for the subscales were reported as follows: anxiety (0.82), depressed mood (0.89), positive well-being (0.88), self-control (0.76), general health (0.61) and vitality (0.85). One-week test–retest reliability levels ranged from 0.71–0.86. As one would expect, retest correlations for longer intervals, 2–6 months, have been weaker (0.50–0.66).[1]

Validity data for the PGWB have been provided through several cross-national studies and community-based investigations. In the National Health Examination study (n = 6,913), for example, scores on

the PGWB index were significantly correlated with a number of items comprising the survey, including those dealing with felt needs, utilization of mental health services and medical history.[1] Significant relationships were also found between the PGWB index and psychosocial items from the RAND Health Insurance Study. The instrument's sensitivity to psychoneurotic subjective distress has been demonstrated through its relationship to 14 different mental health scales, with correlations ranging from –0.52 to –0.80.[1]; Kammann's Affectometer, an indicator of general happiness or well-being, has been found to correlate with the PGWB ($r = 0.74$, $n = 57$), while another study of college students found a significant correlation between the index and depression rating (–0.47, $n = 195$).[1] High correlations between the PGWB and standard indices of mental health, such as the Zung Depression Inventory (–0.75), Hopkins Symptom Checklist (SCL-90) (–0.77) and the Minnesota Multiphasic Personality Inventory (MMPI) (–0.55) have also been reported.[2] Total and general health and vitality subscale scores have been shown to be responsive to disease-specific change in patients with upper gastrointestinal symptoms.[3,4]

Despite the accumulated evidence supporting the reliability and construct validity of the PGWB as a self-administered questionnaire, the structure of the instrument and the complexity of the response options make self-administration of the PGWB more difficult and time consuming and the option of telephone administration more difficult. Ware and colleagues reduced the PGWB response options to two 6-point Likert scales.[5,6] This revision of the PGWB, called the General Well-Being Adjustment Scale, has shown evidence of internal-consistency reliability (0.94 for the total score), discriminant validity and responsiveness, and has been used in a number of investigations, including the Rand Health Insurance Study[5,6] and several studies of antihypertensive therapy[7,8,9,10] and gastrointestinal disorders.[4,11,12] A selection of items were also included in the Mental Health scale of the Medical Outcomes Study Short-Form (SF-36).[13] Further simplification of the PGWB is needed in order to utilize the instrument in telephone surveys.

Methods

Sample

Sixty patients with gastrointestinal disorders (42 women and 18 men) were recruited from two private gastroenterology specialty practices. Twenty subjects (33%) had gastroesophageal reflux disease (GERD), 14 (23%) were experiencing abdominal pain, with the remainder being seen in the clinics for a variety of gastrointestinal problems, including constipation, colitis, polyps, hepatitis, Crohn's disease, and abdominal ulcers. Mean age of the sample was 46.02 years (SD = 16.65; range = 19–80 years).

Measures

Psychological General Well-Being (PGWB) Index—Revised Version. To create the PGWB-R, several changes were made in the PGWB. Six item stems were changed to the interview 'you' format. Eight item stems were altered to request information concerning the frequency with which the given aspect of well-being was experienced. Finally, the response options in 16 items were altered to reflect frequency of experience. Like the original, the 6-point Likert scale was scored from 0–5, yielding summative subscale scores ranging from 0–15, 20 or 25 depending upon the number of items in the subscale, and a total scale score ranging from 0–110. The complete PGWB-R is reproduced in the Appendix.

Gastrointestinal Symptom Rating Scale (GSRS). The Gastrointestinal Symptom Rating Scale (GSRS) was used to evaluate the construct validity of the PGWB-R and PGWB, under the premise that well-being is related to physical health state, in this case day-to-day gastrointestinal symptomatic distress.[3,12] The GSRS is a 15-item questionnaire asking subjects to rate, on a 7-point scale, the extent to which they have experienced gastrointestinal discomfort during the past week, e.g., stomach ache, heartburn, bloating or diarrhea. Three symptom subscales are embedded in the instrument: dyspeptic, indigestion and bowel dysfunction, with internal consistency reliability levels of 0.74, 0.82, and 0.83, respectively.[3] Pearson correlation coefficients between subscales of the GSRS and PGWB (self-administered) in gastrointestinal patients ($n = 146$) have been reported, with moderate correlations between PGWB total score and the dyspeptic, indigestion and bowel dysfunction subscales of the GSRS (–0.59, –0.44 and –0.46, respectively).[3]

In the present study, internal consistency reliability (Cronbach's α coefficients) of the GSRS were as follows: dyspeptic subscale, $\alpha = 0.83$; indigestive subscale, $\alpha = 0.76$; bowel dysfunction, $\alpha = 0.79$; total score, $\alpha = 0.91$. Sample means and standard deviations (SD) for the three subscales, respectively, were: 2.15 (SD = 1.19), 2.29 (SD = 1.17), 1.90 (SD = 0.97),

with the dyspeptic and indigestion subscales successfully differentiating GERD and non-GERD patients ($t_{59} = -3.20$, $p < 0.01$; $t_{59} = -2.42$, $p < 0.05$). Analysis of variance (ANOVA) indicated no main site, order or method effects for the GSRS.

Procedures

All interviews were administered by a single interviewer. The initial method of administration, face-to-face or telephone, was determined randomly. Respondents completed the GSRS first (an original or revised version was completed; only the original version is discussed in this paper). This was followed by either the PGWB-R or PGWB, determined randomly. Subjects completed the alternative form of the GSRS and PGWB during the second interview, which took place an average of four days after the first (range = 1–21 days).

Data analysis

Cronbach's formula for coefficient alpha was used to estimate internal consistency reliability of the PGWB and PGWB-R subscales and total scales under the two methods of administration.[14] Coefficients were compared within method of administration using the Feldt approach for independent samples, where the test statistic W is equal to $(1-r_1)/(1-r_2)$, and is distributed as the product of two independent central F variables and approximates a single F with N_1-1 and N_2-1 degrees of freedom.[15,16,17] Because this distribution is dependent upon the number of items (k), subscale estimates are subject to error and should be considered exploratory.

ANOVA procedures were used to test for site, order, method and interaction effects. PGWB and PGWB-R subscale and total scale scores were compared across the two methods of administration using paired t-tests ($p < 0.007$; *a priori* Bonferroni adjustment). Intraclass correlation coefficients (ICC) between the PGWB and PGWB-R were calculated to assess concordance between the two measures, using a one-way random effects model.[18,19] Finally, Pearson correlation coefficients were used to describe the relationship between the GSRS and the PGWB original and revised versions across the two methods of administration. Coefficients were compared using the formula for inferences about $\rho_{xy}-\rho_{xz}$ using dependent samples.[20]

Results

Internal consistency reliability estimates for the PGWB and PGWB-R are shown in Table 1. Coefficients for the original index differed by method of administration from 0.01 (self-control) to 0.22 (vitality), while coefficients for the revised version varied from 0.02 (anxiety) to 0.19 (self-control). For face-to-face interviews, anxiety and vitality subscale reliability levels for the PGWB and PGWB-R were significantly different ($W_{31,27} = 2.00$, $p < 0.05$ and $W_{31,27} = 2.89$, $p < 0.01$, respectively). For telephone interviews, self-control and vitality reliability level differences were significant ($W_{31,27} = 2.07$, $p < 0.05$ and $W_{27,31} = 3.44$, $p < 0.01$, respectively). Internal consistency reliability for PGWB total scores and PGWB-R total scores were

Table 1. Internal consistency reliability (Cronbach's α) for PGWB* and PGWB-R† by method of administration

Subscale	No. of items	Method of administration and PGWB version			
		Face-to-face interview		Telephone interview	
		PGWB ($n = 32$)	PGWB-R ($n = 28$)	PGWB ($n = 28$)	PGWB-R ($n = 32$)
Anxiety	5	0.93	0.86	0.88	0.88
Depressed mood	3	0.84	0.76	0.79	0.87
Positive well-being	4	0.81	0.87	0.77	0.76
Self-control	3	0.72	0.63	0.73	0.44
General health	3	0.62	0.61	0.73	0.79
Vitality	4	0.91	0.74	0.69	0.91
PGWB—total	22	0.96	0.93	0.94	0.95

* PGWB = Psychological General Well-Being Scale

† PGWB-R = Psychological General Well-Being Scale—Revised

Table 2. Mean and standard deviations for PGWB* and PGWB-R† subscale and total scores across by method of administration

Subscale	Method of administration and PGWB version			
	Face-to-face interview		Telephone interview	
	PGWB* ($n = 32$)	PGWB-R† ($n = 28$)	PGWB* ($n = 28$)	PGWB-R† ($n = 32$)
Anxiety	16.25 (5.73)	17.68 (5.44)	17.68 (5.64)	16.59 (5.74)
Depressed mood	12.47 (2.88)	13.18 (2.48)	13.39 (2.44)	12.53 (3.25)
Positive well-being	12.53 (3.55)	12.68 (4.50)	12.32 (3.92)	12.50 (3.95)
Self-control	12.50 (2.59)	12.93 (2.54)	12.86 (2.51)	13.00 (2.06)
General health	9.91 (2.89)	10.25 (2.85)	9.75 (3.01)	10.63 (3.11)
Vitality	11.66 (4.62)	11.82 (4.00)	12.00 (3.67)	10.28 (5.43)
Total	75.31(19.27)	78.54 (17.86)	78.00 (17.64)	75.53 (19.87)

* PGWB = Psychological General Well-Being Scale, 0–5 scaling

† PGWB-R = Psychological General Well-Being Scale—Revised, 0–5 scaling

all greater than 0.90, with no significant differences.

Mean subscale and total scale values for the two versions of the PGWB are provided in Table 2. Site, order, method and interaction effects were not significant, nor were there significant differences between mean values of the PGWB and PGWB-R in any of the subscales or the total scale. Means and standard deviations for subscale and total scale differences were as follows: anxiety, 0.18 (3.23); depression, –0.07 (2.07); well-being, 0.15 (2.69); self-control, 0.30 (1.83); general health, 0.62 (2.20); vitality, –0.82 (3.68) and total, 0.37 (10.81). Although the difference in general health subscale scores was noteworthy ($t_{59} = 2.17$, $p = 0.034$), it was not significant under the Bonferroni adjustment. Intraclass correlation coefficients between the two versions across method of administration were as follows: anxiety, 0.84; depression, 0.73; well-being, 0.77; self-control, 0.71; general health, 0.71; vitality, 0.66; total scale, 0.83.

Correlations coefficients describing the relationship between the GSRS and the PGWB original and revised versions across method of administration are shown in Table 3. The correlation between PGWB total score and GSRS total score was –0.58, while the correlation between PGWB-R total score and GSRS total score was –0.50. Correlations between GSRS total scores and PGWB subscale scores ranged from –0.29 (self-control) to –0.62 (general health), while correlations between GSRS total score and PGWB-R subscale scores ranged from –0.29 (positive well-being) to –0.62 (general health). Four coefficients were significantly different ($p < 0.05$), three involving depressed mood and one involving well-being.

Discussion

The internal consistency reliability of the PGWB and PGWB-R total scales were consistent with those reported by Dupuy.[1] The PGWB-R total scale was very reliable across methods of administration, exceeding Nunnally's[21] criterion for use in applied settings. These results suggest the revised instrument may be useful in situations in which the total score is of primary interest. Subscale reliabilities were somewhat lower for both versions. However, because the magnitude of the alpha coefficient is dependent on the number of items in a given scale, one would expect coefficients to be lower in scales involving only three to five items. The low reliability of the PGWB-R self-control subscale by telephone administration is disconcerting, particularly in light of the relatively high coefficients for the other PGWB-R subscales. Historically, the PGWB self-control subscale has been the least reliable, with α coefficients between 0.59–0.73 in cross-national samples of hypertensives.[22] This suggests the content or wording of the items comprising the subscale, rather than the response option *per se*, may be a source of difficulty. Item 14 may need additional revision. This item had the lowest item–total correlation in telephone interview (0.12, compared with 0.30 and 0.41 for items 4 and 18 respectively) but was not problematic in personal interview or the PGWB original administered by either method.

Mean subscale and total scale scores of the PGWB and PGWB-R total scores were not significantly different from one another, indicating no inherent

Table 3. Pearson product-moment correlation coefficients between the Gastrointestinal Symptom Rating Scale (GSRS) and the PGWB[a] and PGWB-R[b]

	PGWB version and GSRS subscale							
	PGWB[a]				PGWB-R[b]			
Subscale	Dys[c] ($n = 60$)	Ind[d] ($n = 60$)	BD[e] ($n = 60$)	GSRS total ($n = 60$)	Dys[c] ($n = 60$)	Ind[d] ($n = 60$)	BD[e] ($n = 60$)	GSRS total ($n = 60$)
Anxiety	–0.38**	–0.50***	–0.37**	–0.47***	–0.39**	–0.52***	–0.42***	–0.50***
Depressed mood	–0.40***[f]	–0.56***[f]	–0.37**	–0.50***[f]	–0.22	–0.36**	–0.29*	–0.32*
Positive well-being	–0.34**	–0.45***[f]	–0.41**	–0.44***	–0.24	–0.26*	–0.28*	–0.29*
Self-control	–0.25	–0.27*	–0.25	–0.29*	–0.21	–0.30*	–0.35**	–0.32*
General health	–0.53***	–0.53***	–0.56**	–0.62***	–0.49***	–0.65***	–0.50***	–0.62***
Vitality	–0.52***	–0.55***	–0.44**	–0.58***	–0.39**	–0.41**	–0.29*	–0.41**
PGWB-total	–0.48***	–0.57***	–0.47**	–0.58***	–0.40**	–0.51***	–0.43***	–0.50***

[a] PGWB = Psychological General Well-Being Scale; [b] PGWB-R = Psychological General Well-Being Scale—Revised; [c] Dys = Dyspeptic Syndrome; [d] Ind = Indigestive Syndrome; [e] BD = Bowel Dysfunction Syndrome

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$; [f] PGWB and PGWB-R coefficients significantly different, $p < 0.05$

bias in the revised version of the index. Consistent with results reported by Wiklund *et al.*,[22] mean PGWB and PGWB-R scores for the gastrointestinal patients in this study were lower than those of the general population and patients with mild to moderate hypertension.[8,12,23,24,25] Scores were also lower than those of hypertensive patients on the General Well-Being Adjustment Scale version of the PGWB.[7] In contrast, well-being scores for all of these groups were higher than those of adults with hypopituitary short stature due to impaired growth hormone secretion, people who have experienced life-long challenges to well-being.[26] Thus, both versions of the PGWB performed as expected, relative to patients with other disease states.

As one would expect, mean total scale scores in this stable sample were higher than previously reported scores of patients with acute upper gastrointestinal symptoms. Using 1–6 scaling to yield a summative range of 22–132, Dimenäs and colleagues[3] reported a mean total scale score of 91.8 and Hallerbäck[11] reported mean values ranging from 81–85 in patients referred for upper endoscopy; Glise[4] reported a mean PGWB score of 86.1 in untreated peptic ulcer patients. Mean scores for the present sample were nearly identical to GERD patients from Denmark (97.3), Sweden (96.8), and the United Kingdom (98.3), using 1–6 scaling,[22] supporting the use of the PGWB and PGWB-R in cross-national studies.

Intraclass correlations between the PGWB and PGWB-R suggested very good to excellent agreement between the measures. Because there was no systematic bias in mean scores, these values were identical to Pearson coefficients for four subscales and the total scale. Pearson correlation coefficients for general health and vitality were 0.72–0.68, respectively.

Correlations between the GSRS and the two versions of the PGWB were fairly comparable to one another and similar to those reported by Dimenäs.[3] Exploratory analyses suggested the revised version performs better than the original when administered by telephone, with correlations of –0.32 to –0.89 for the PGWB-R (57% significant, $p < 0.05$) and from –0.20 to –0.63 for PGWB (24% significant). Although the small sample size ($n = 15$) and the large number of coefficients make these findings tenuous, they suggest further study is warranted.

To summarize, internal consistency levels of the PGWB and PGWB-R were comparable, with some indication that PGWB subscales are more reliable in face-to-face interviews while the PGWB-R is more reliable in telephone administration. Alpha coefficients for the total scales were high for both versions of the instrument across the two methods of administration. Intraclass correlations were also high and mean subscale and total scale scores were not significantly different by method of administration. Finally, correlation coefficients between the GSRS and the two versions of the PGWB offer support for the construct validity of both versions of the PGWB. Results of the study suggest the PGWB-R may be useful for studies that require telephone interview.

Acknowledgements

The authors gratefully acknowledge the assistance of

Howard Goldberg, MD of Wheaton, Maryland, and Pradeep Gupta, MD of Springfield, Virginia with subject enrollment and data collection. The assistance of the following members of the MEDTAP research staff is also appreciated: Anne M. Rentz, MSPH for SAS programming and Barbara Suggs for secretarial support.

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(Received 12 January 1996; accepted 19 April 1996)

Appendix A. The Psychological General Well-Being Index—Revised Version

1. Did you feel in good spirits?† (DURING THE PAST WEEK)
2. Have you been bothered by any illness, bodily disorder, aches or pains?‡ (DURING THE PAST WEEK)
3. Have you felt depressed?† (DURING THE PAST WEEK)
4. Have you been in firm control of your behaviour, thoughts, emotions or feelings?‡ (DURING THE PAST WEEK)
5. Have you been bothered by nervousness or your 'nerves'?† (DURING THE PAST WEEK)
6. Did you have a lot of energy, pep or vitality?‡ (DURING THE PAST WEEK)
7. Have you felt downhearted and blue?† (DURING THE PAST WEEK)
8. Have you been generally tense or did you feel any tension?‡ (DURING THE PAST WEEK)
9. Have you been happy, satisfied, or pleased with your personal life?† (DURING THE PAST WEEK)
10. Did you feel healthy enough to carry out the things you like to do or had to do?‡ (DURING THE PAST WEEK)
11. Have you felt sad, discouraged, hopeless, or had so many problems that you wondered if anything was worthwhile?† (DURING THE PAST WEEK)
12. Have you been waking up feeling fresh and rested?‡ (DURING THE PAST WEEK)
13. Have you been concerned, worried or had any fears about your health?† (DURING THE PAST WEEK)
14. Have you had any reason to wonder if you were losing your mind, or losing control over the way you act, talk, think, feel or of your memory?‡ (DURING THE PAST WEEK)
15. Has your daily life been full or things that were interesting to you?† (DURING THE PAST WEEK)
16. Did you feel dull or sluggish?‡ (DURING THE PAST WEEK)
17. Have you been anxious, worried, or upset?† (DURING THE PAST WEEK)
18. Have you been feeling emotionally stable and sure of yourself?‡ (DURING THE PAST WEEK)
19. Did you feel relaxed and at ease?† (DURING THE PAST WEEK)
20. Have you felt cheerful and lighthearted?‡ (DURING THE PAST WEEK)
21. Have you felt tired, worn out, used up, or exhausted?† (DURING THE PAST WEEK)
22. Have you been under, or felt you were under any strain, stress or pressure?‡ (DURING THE PAST WEEK)

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† Response options: None of the time; A little of the time; Some of the time; A good bit of the time; Most of the time; All of the time

‡ Response options: All of the time; Most of the time; A good bit of the time; Some of the time; A little of the time; None of the time

Scoring: Reverse items 3, 4, 5, 6, 7, 10, 11, 12, 13, 17, 18, 20, 21

Subscale composition: Anxiety — 5, 8, 17, 19, 22; Depressed Mood — 3, 7, 11; Positive Well-Being — 1, 9, 15, 20; Self-Control — 4, 14, 18; General Health — 2, 10, 13; Vitality — 6, 12, 21.