Normative data for persons over 65 on the Penn State Worry Questionnaire

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Normative data are presented for the Penn State Worry Questionnaire (PSWQ) from 255 healthy New Zealanders over the age of 65. The PSWQ was administered during the course of a two-year trial of the effect on cognition and mood of lowering homocysteine levels using vitamin and folate supplements. The scale proved to have good internal consistency, and there were no significant effects of sex, age, or premorbid IQ on the PSWQ scores. Mean scores and percentiles are presented for both the abbreviated an 8-item short-form (PSWQ-A) developed for use with the elderly by Hopko et al. (2003) and for the total score. Confirmatory factor analyses were conducted and provided evidence for the construct validity of both the short-form and the total scale score as single-factor measures of worry. The results of this study, taken together with findings from other studies in the literature suggest that a score on the PSWQ above 50 from a client above the age of 65 is suggestive of a need to assess further for generalised anxiety disorder.

The Penn State Worry Questionnaire (PSWQ) was developed by Meyer, Miller, Metzger, and Borkovec (1990) as a means of measuring the propensity to worry excessively, the core symptom of generalised anxiety disorder (GAD). Worry is a significant cognitive component of anxiety and as such is a frequent target for change in many cognitive therapies (e.g., Wells, 1995; 2005). The defining characteristic of worry is the presence of thoughts indicating a heightened anticipation of future personal or emotional threat, accompanied by an inability to resolve or exclude these cognitions (Borkovec, Shadick, & Hopkins, 1991; Matthews, 1990; Rapee, 1991). Although worrying is often considered to have the adaptive function of preparing for possible danger, when this thinking does not lead to a useful outcome or begins to involve scenarios which are unlikely to arise, worrying can be seen as pathological. Persons with GAD are assumed to be excessively sensitive to cues indicative of threat, or to have a maladaptive emotional or cognitive response to threat cues (Mathews, 1990).

The PSWQ is a 16-item measure with a 5-point response scale ranging from 1 (not all like me) to 5 (very typical of me) and a maximum score of 80, widely used in clinical psychology practice. Eleven of the items are positive for the presence of worry ("Once I start worrying I cannot stop") and five, which are reverse scored, have content indicating an absence of worry ("I never worry about anything"). The psychometric characteristics of the PSWQ have been investigated in a number of studies and generally found to be satisfactory. In the series of eight studies in which the initial test construction process was described (Meyer et al., 1990), good evidence for the internal consistency (alpha > .90), retest stability (r > .74 over two to four weeks), and discriminative validity of the scale was presented. In subsequent studies, the internal consistency of the scales has been consistently found to be excellent, with estimates ranging from .80 to .95 (Brown, Antony, & Barlow, 1992; Crittendon & Hopko, 2006; Fresco, Mennin, Heimberg, & Turk, 2002; Stanley, Novy, Bourland, Beck, & Averill, 2001; Wetherell, Gatz, & Craske, 2003). Retest reliability has been found to be acceptable for younger college samples but more modest (r = .54) for older adults (Stanley et al., 2001). The convergent validity of the scale has been demonstrated in several studies (e.g., Brown et al. 1992; Davey, 1993; Stanley et al. 2001; Wetherell et al., 2003). In their study of 436 persons with anxiety disorders (including 50 persons with GAD), Brown et al. (1992) found that the PSWQ had good concurrent validity and was able to distinguish GAD from other anxiety disorders.

For most research and clinical purposes, the sum of the scores on all 16 items is usually calculated and the scale treated as unidimensional. Initial exploratory factor analyses supported this approach, with both Meyer et al. (1990) and Brown et al. (1992) reporting that although two factors with

eigenvalues greater than 1.0 emerged, the first factor was so large that given the high internal consistency estimates for the total scale, a 1-factor solution was to be preferred. Subsequently, other researchers have preferred 2-factor solutions (e.g., Fresco et al., 2002), where the first factor is made up of the 11 items relevant to worry symptoms, and the second factor, which is often interpreted as a measure of absence of worry, comprises the five reversed items. Recently, confirmatory factor analysis (CFA) has been use to explore the latent structure of responses to the items of the PSWQ. In a study of 160 older adults over the age of 60 with GAD, Hopko et al. (2003), found that the data did not fit well with either the 1- or 2-factor models; as a consequence they systematically modified the single factor model by eliminating items until a good fit with the data was obtained. On this basis they identified an abbreviated version of the PSWQ (the PSQW-A) comprising eight symptom-oriented items, which correlated highly (r = .92) with the full version, and also retained the other positive indicators of reliability and validity established for 16-item scale. Crittendon and Hopko (2006) confirmed the reliability of the PSWQ-A, reporting internal consistency and retest reliability estimates in excess of .85 in samples of older and younger adults. In addition, they reported further support for both the unidimensional structure and the convergent validity of the scale, and concluded that it may be an efficient means of assessing worry in both older and younger adults.

Brown (2003) took a different approach to the use of CFA with the PSWQ. He observed that items on psychological scales frequently divide into factors on the basis of positive and negative wording and that this may simply reflect differences in response style; that is, the separation of items into two factors is a method artefact. Furthermore, he argued that the factor "absence of worry" has little substance as a clinically distinctive or useful construct, and that scores from a single-factor solution would be easier to interpret. Accordingly, he fit the data from 1200 consecutive outpatient admissions to an anxiety clinic to a model in which it was assumed that there was a single latent factor and that the residuals of the five reversed-scored items covaried. This latter assumption was designed to account for the effects of method. This model was shown to have a good fit to the data, and Brown (2003) concluded that the most parsimonious interpretation of the pattern of covariance of the 16-item PSQW is that a single construct underpins responses to the scale.

With the greater numbers of elderly in the population as the post-depression baby boom cohort in Western nations reach old age (Boston & Davey, 2006), the assessment and treatment of mental health disorders in older adults has become an increasingly significant priority. Although much of the research on mental health issues in this age group has focused on dementia and depression, a substantial number of older persons have late-life anxiety, and GAD has been identified as the most common form of anxiety in this population (Flint, 1994). For example, in a large representative sample of community-dwelling older persons aged between 65 and 84 in the Netherlands (Schoevers, Beekman, Deeg, Jonker, & van Tilburg, 2003), the prevalence of GAD uncomplicated by comorbid depression was found to be 2.9%. As a consequence, attention has turned to developing and evaluating procedures for treating GAD in later life. In the implementation of therapy programmes, both the PSWQ and the PSWQ-A have been found to be a reliable means of assessing the severity of symptoms and the outcome of treatment in older clients (e.g., Stanley et al., 2003; Wetherell et al., 2003).

The aim of the present report is to provide local norms and psychometric data that would support and facilitate the use of the PSWQ as a means of assessing worry symptomatology in older New Zealanders. Although their scores are likely to be comparable to those of older individuals in similar Western countries, older adults in New Zealand have experienced different social, health, and educational circumstances during their lifetimes that may have had some impact on their propensity to develop or express anxiety symptoms. The data came from a sample of 255 healthy older adults taking part in a trial of the effect on cognition of dietary supplements, who were administered the PSWQ six months after the baseline assessment. Since no evidence was found for the efficacy of the treatment regimen over the two-year clinical trial period (McMahon et al., 2006), the findings from all participants in the study were used to construct local norms for the questionnaire.

Method

Participants

The present data came from the first follow-up phase of a 2-year clinical trial assessing the effects of lowering plasma homocysteine concentration by the administration of folate and vitamins B12 and B6, on the cognitive function of healthy older persons. The outcome of the trial provided no evidence that lowering plasma homocysteine concentration improved cognitive performance in the elderly (McMahon et al., 2006) and accordingly the data from both groups collected after the baseline testing could be validly combined. The general procedure for this trial and results from some of the baseline testing have been reported elsewhere (Knight, McMahon, Green, & Skeaff, 2004; Knight, McMahon, Skeaff, & Green, 2006) and only a brief summary will be given here. The PSQW data came from the testing session completed six months after the baseline data were recorded and the treatment initiated. The participants in the trial were persons over the age of 65 with a total plasma homocysteine concentration ≥ 13 μmol/L and a normal creatinine clearance (133 μmol/L in men and 115 μmol/L in women). Before the trial commenced, all volunteers attended a screening session after which persons were excluded from further participation if they had any evidence of disease where the disorder, or its treatment, might affect homocysteine levels or cognitive test scores. Participants were also excluded if they were taking medications known to interfere with folate metabolism (e.g., oral hypoglycemics, antiepiletics, and antidepressants), were taking any vitamin supplements containing folic acid, or vitamin B12, or B6, had Centre for Epidemiologic Studies–Depression (CES-D; Radloff, 1977) scores greater than 16, or reported any prior history of renal disease, diabetes, major depression,

psychosis, and cancer. As a further check on a possible diagnosis of dementia, all participants completed the Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) at baseline and all had a score greater 24 (M = 29.18, SD = 1.01).

Of the 276 persons who entered the trial, 255 completed the PSWQ at the 6-month testing session. The sample was composed of a total of 113 males (44%) and 142 (56%) females with an average age of 73.59 (SD = 5.72; range = 65-90). The gender ratio for the sample corresponded precisely to the gender ratio for the New Zealand population over the age of 65 in 2004 (Statistics New Zealand, 2007). All but 1% of the baseline sample described their ethnic origin as European (approximately 92% of the New Zealand population over age of 65 are European; Statistics New Zealand, 2007). Participants were asked about their highest educational attainment. In all, 10% had no high school education, 27% had less than 3 years high school education, 12% had more than 3 years high school education, 38% had attained vocational qualifications (e.g., in trades or nursing), and 14% had attended university. No data on the educational attainment of adults over 65 in New Zealand are available, however, the relatively high percentage of persons in the sample with some University education suggests that this sample was better educated than the general population of older persons in the country. Their average National Adult Reading Test-II (NART; Nelson & Willison, 1991) predicted Full Scale Wechsler IQ (WAIS-R) score was 113.23 (SD = 8.63). The skewness of the distribution of this variable was within acceptable limits for normality (skewness = .78, SE = .15). It should be noted that the estimated FSIQ values are based on regression equations that have not been validated on New Zealand samples and the mean score on this scale should be interpreted cautiously. The main purpose for administering the scale was to determine whether PSWQ scores were predicted by individual differences in vocabulary knowledge, assumed to reflect general intellectual ability.

Procedure

At baseline, all participants were randomly assigned to either the supplement treatment or placebo conditions, and a battery of neuropsychological tests and personality measures were administered (Knight et al., 2004). Six months later, a further appointment was made for them to attend an abbreviated clinical session in order to take a further blood sample to assess homocysteine, folate and vitamin levels, to check adherence to the treatment regimen, and to measure weight. The opportunity was also taken to readminister the self-report questionnaires assessing mood, the Geriatric Depression Scale (Yesavage et al., 1983), and the CES-D, and to administer the PSWQ for the first time. Participants were posted copies of the GDS, CES-D, and the PSWQ to complete and bring with them to the testing session. On arrival these forms were collected and participants then completed a questionnaire asking about exercise levels, consumption of tea, coffee, and alcohol, and changes in medication.

Results and Discussion

Normative scores A total scale score based on all 16 items (with positive items reverse scored), and a PSWQ-A score composed of the 8 items identified by Hopko et al. (2003), were calculated. The data were first examined for possible difference resulting from the supplement treatment. There were no significant treatment group effects at the 6-month point for either the PSWQ, t (253) = 1.72, or PSWQ-A, t (253) = 1.31. Since the clinical trial did not produce treatment effects for the neuropsychological tests or the mood scales at the subsequent outcome evaluation points, the results from both groups were combined (Table 1). The distributions of both scores were positively skewed as expected (given that pathological scores on personality measures are infrequent in healthy community samples) but were within acceptable limits for a normal distribution. For the PSWQ scores, skewness = .73, SE = .15, kurtosis = .90, SE = .31; for the PSWQ-A, skewness = .92, SE = .15, kurtosis = .30, SE = .30. The internal consistency of the 16-item form (alpha = 0.89) and the short form (alpha = .92) were high for the full sample.

Before computing norms, the possible effects of the demographic variables on the questionnaire scores were examined. For the education variable, a one factor (Education Group) analysis of variance (ANOVA) was conducted with PSWQ and PSWQ-A scores entered separately as dependent variables; neither group main effect was significant (F < 1.00 in both cases). There was no significant correlation between age and PSWQ (r = -.07) or PSWQ-A (r = -.07) scores, or between the NART-II error scores and the PSWQ (r = -.09) or the PSWQ-A (r = -.01) scores. The scores on the PSWQ and PSWQ data were then analysed using separate two-way factorial ANOVAs, where one factor was Sex and the other Age (with participants divided into two groups: Age 65 to 74; Age 75 +). For the PSWQ and the PSWQ there were no significant Sex, Age group, or interaction effects (F < 1.00 in each case).

In Table 1, means scores for the PSWQ and the PSWQ-A are provided along with scores at the 10th, 5th, and 1st percentiles. As the PSWQ is most commonly used in clinical practice to screen clients for the presence of worry symptoms that might be indicative of GAD, these percentiles are given to facilitate the use of this measure with older clients. (Similar data have previously been published in this form for the GDS and the Cognitive Failures Questionnaire; Knight et al., 2004). Based on this table, a score from an older adult in excess of 61 on the total PSWQ or 32 on the PSWQ, for example, would be found in less than 1% of this normative sample and therefore this may warrant further clinical assessment. The absence of any significant effects from the correlational analysis and the ANOVAs suggests that it is appropriate for the purposes of normative comparisons to apply the mean scores and percentiles for the total sample, however, a breakdown by sex and age (above and below 75) is also provided.

Correlations The correlation between the total and short-form scores of the PSWQ was .91. The correlation between the PSWQ scores, and the GDS and the CES-D administered concurrently were 0.49 and 0.36, respectively.

Table 1. Summary statistics for the PSWQ total and short form scores

	N	M	SD	Percentiles 10	5	1
PSWQ Total Score						
Age 65-74	151	36.51	11.98	51.84	56.16	64.42
Age 75+	104	36.71	9.07	48.32	51.58	57.84
Male	113	36.30	10.68	49.97	53.82	61.18
Female	142	36.82	11.04	50.95	54.93	62.54
Total	255	36.59	10.87	50.50	54.41	61.92
PSWQ-A						
Age 65-74	151	16.14	7.49	25.73	28.42	33.59
Age 75+	104	15.77	6.28	23.81	26.07	30.40
Male	113	15.96	6.91	24.08	27.29	32.06
Female	142	16.01	7.12	25.12	27.69	32.60
Total	255	15.99	7.01	24.96	27.48	32.32

Note: PSWQ = Penn State Worry Questionnaire; PSWQ-A = Hopko et al. (2003) 8-item abbreviated form of the PSWQ

Confirmatory factory analysis

To investigate the construct validity of the single factor and the Hopko et al. abbreviated forms of the PSWQ, CFAs were conducted on the full sample data via the structural equation modelling programme in STATISTICA. The analyses used Generalised Least Squares (for 5 iterations) followed by the Maximum Likelihood methods to determine the parameter estimates that minimized the discrepancy functions. Factor models were evaluated using the Bentler comparative fit index (CFI), the Jöreskog goodness-of-fit index (GFI) and adjusted GFI, root mean squared error of approximation (RMSEA), and the standardised root mean squared residual (SRMSR). The values of these indices that show there is a good fit between the data and the proposed model are a matter of some difference in opinion, but the values adopted by Hopko et al. (2003), Brown (2003), and Fresco et al. (2002), following Hu and Bentler (1999), suggest that cut-offs for acceptable model fit be set at about .95 and above for the CFI and GFI (adjusted GFI .85), at .08 and below for the RMSEA, and at .05 and below for SRMR. The first model tested was the single factor solution with no correlations between the residuals of the 16 items; the second was the 2-factor solution of Fresco et al. (2002), with the positive and negative items designated as separate factors. The third model comprised Hopko et al.'s 8-item symptomatic scale, and the final model was a single factor model with residual correlations specified between the five reverse-scored items, based on Brown (2003). The results of these analyses are given in Table 2.

None of the models had impressive goodness-of-fit estimates, however, this may be a function of analysing data from a normal sample with reduced item score variance; both Brown (2003) and Hopko et al. (2003) used large samples of persons with anxiety symptoms in their analyses. The best fit was for the Hopko et al. (2003) short form, which comprised a set of eight symptom-based items with a high degree of internal consistency. The model proposed by Brown et al., which assumed a single factor with correlated residuals for the five positively worded items, also fitted relatively well, and provided support for the use of the total scale score. The use of the full scale has the advantage of including both positive and negative items, which may inhibit participants from developing a biased response style. Although the 2-factor model also performed well, we would agree with Brown that there is no rationale for considering that the absence of worry factor is anything other than the result of a method effect and has no substantial value as a separate clinical construct.

The principal aim of this report is to provide some New Zealand norms for the PSWQ for older persons based

Table 2. Results of the confirmatory factor analyses

	Single Factor	Two Factor	Single Factor Hopko et al	Single Factor Correlated residuals
χ^2 (df)	551.5 (104)	329.3 (104)	104.0 (20)	290.3 (94)
Bentler CFI	.49	.90	.93	.91
Jöreskog GFI	.75	.86	.90	.87
Jöreskog AGFI	.68	.81	.82	.81
Steiger-Lind RMSEA	.14	.10	.13	.09
(90% CI)	(.13 - .16)	(.08 - .11)	(.11 - .16)	(.08 - .11)
SRMR	.11	.10	.04	.05

Note: CFI = comparative fit index; GFI = goodness of fit; AGFI = adjusted goodness of fit; RMSEA = root mean square error of approximation; 90% CI

on data collected during the course of a clinical trial. The data collected in this study were comparable to the findings for 115 predominately Caucasian persons from East Tennessee (average age 71.6) reported by Crittendon and Hopko (2006). Their sample had a mean PSWQ score of 36.6 (*SD* = 9.8) and a mean PSWQ-A score of 14.9 (*SD* = 6.8), remarkably similar to the data in Table 1. These results are considerably lower than the mean scores on the PSWQ for groups of older adults with GAD (Brown et al., 1992: *M* = 68.11, *SD* = 9.59; Hopko et al., 2003: *M* = 62.9, *SD* = 9.8; Stanley et al., 2001: *M* = 62.5, *SD* = 8.95). Taken together, these results suggest a cut off score of 50 or above on the PSWQ for screening for GAD; this is at the 10th percentile of the healthy older adult sample and about two standard deviations below the mean for older persons with GAD.

Some cautions in the interpretation of the data should be acknowledged. The data came from a group of urban, well-educated volunteers, who were predominately European. There were, however, no significant differences in PSWQ scores on the basis of gender or educational attainment, and a correlational analysis indicated that there was no association between either age or NART-II estimates of premorbid IQ and PSWQ scores. There is no reason to suspect that the supplement-based treatment had any effect on the questionnaire scores, since there was no significant difference between treatment groups on the PSWQ. It should be noted, however, that there were too few Polynesian or Asian participants to determine any differences due to ethnicity. In addition, as noted previously (Knight et al., 2004), these data came from a sample who had no clinical evidence or physical, psychiatric, or neurological conditions, and so these norms can not be used to determine whether a particular score is abnormal for a person with a significant health-related problem.

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