Factor Structure of the Penn State Worry Questionnaire

Examination of a Method Factor

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The Penn State Worry Questionnaire (PSWQ) was originally designed as a unifactorial measure of pathological trait worry. However, recent studies supported a two-factor solution with positively worded items loading on the first factor and reverse-scored items loading on a second factor. The current study compared this two-factor model to a negative wording method factor solution among college students. A method factor model with all PSWQ items loading on a single worry factor and reverse-scored items loading on a negative wording method factor provided as good a fit as the two-factor model. This method factor alone did not predict a generalized anxiety disorder diagnosis. Finally, the psychometric properties of an abbreviated scale containing only positively worded items were examined. The PSWQ appears to measure a single unitary construct, but response patterns differ between positively worded and reverse-scored items. Theoretical implications for pathological worry and assessment-related issues are discussed.

Keywords: worry; Penn State Worry Questionnaire; factor structure; structural equation modeling

Worry is the cognitive process during anxiety that aims to prepare the individual for and, if possible, ward off future threat (Barlow, 1988; Craske, 1999). Scores on the Penn State Worry Questionnaire (PSWQ; Meyer, Miller, Metzger, & Borkovec, 1990) are consistently reliable and valid. This self-report trait measure of excessive and uncontrollable worry (Brown, Antony, & Barlow, 1992; Davey, 1993; Meyer et al., 1990; Molina & Borkovec, 1994; Stanley, Novy, Bourland, Beck, & Averill, 2001) assesses a construct separate from anxiety and depression (Meyer et al., 1990). Individuals with generalized anxiety disorder (GAD), the anxiety disorder characterized by excessive and uncontrollable worry, have elevated scores on the PSWQ (see Molina & Borkovec, 1994, for a review). This measure also discriminates GAD from other anxiety disorder diagnoses, such as panic disorder, social phobia, specific phobia, obsessive-compulsive disorder (Brown et al., 1992), and posttraumatic stress disorder (Meyer et al., 1990). For these reasons, the PSWQ has become a widely used measure in clinical anxiety research.

The PSWQ was originally developed as a unifactorial measure of worry (Meyer et al., 1990), with 11 positive direction items (e.g., "My worries overwhelm me") and 5

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Assessment, Volume 11, No. 4, December 2004 361-370
DOI: 10.1177/1073191104269872

negative direction items (e.g., "If I do not have enough time to do everything, I do not worry about it"). All items are rated on a Likert-type scale from 1 (*not at all typical*) to 5 (*very typical*). The 5 negatively worded items are reverse scored and added to the remaining 11 items to obtain a total score. Although authors of two subsequent exploratory factor analysis studies retained a unifactorial solution, their results suggested that the 11 positively worded items and the 5 negatively worded items may make up two separate factors. Brown et al. (1992) found that a principal components analysis of the 16 PSWQ items with varimax rotation produced these two factors with eigenvalues greater than 1.0 but chose a single factor solution after examining the scree plot and finding high internal consistency. In a Dutch sample, van Rijsoort, Emmelkamp, and Vervaeke (1999) reported that although their scree plot suggested a two-factor solution, they favored a unifactorial solution because of the high internal consistency and the field's acceptance of the PSWQ as measuring a unidimensional construct.

Other investigators have proposed that the two-factor solution provides a better fit to the data. For example, Stöber (1995) found a two-factor solution among German university students completing a German translation of the PSWQ. In a sample of older Americans (ages 55-81), Beck, Stanley, and Zebb (1995) found a two-factor solution in both clinical GAD and control populations. Fresco, Heimberg, Mennin, and Turk (2002) recently compared the unifactorial solution to the two-factor solution directly using structural equation modeling confirmatory factor analysis techniques. They found that although the single-factor model provided a poor fit to the data, the two-factor solution (with the 11 positively worded items loaded on the first factor and the 5 negatively worded items on the second factor) yielded a good fit, which was significantly better than the one-factor model. They also found that although these two factors were related by a higher order general worry construct, the first factor was the better predictor of clinical anxiety and depression measures.

Although Fresco et al. (2002) concluded that the PSWQ measures two lower order constructs, Worry Engagement and Absence of Worry, an alternative interpretation has not been investigated: The second factor may simply reflect method variance resulting from the negatively worded, reverse direction nature of those five items. In other words, these five items may not represent a conceptually distinct worry dimension but rather represent a different pattern of responding to items worded in the negative, rather than affirmative, direction. Factors are considered latent variables because they are indirectly measured by the shared variance of individual measured variables (e.g., questionnaire items). Separate factors are useful when the items associated with each reflect theoretically meaningful distinctions between qualitatively different constructs (Ullman, 2001). However, separate factors also can emerge because items group together statistically resulting from method of measurement. A unidimensional construct could spuriously appear as two constructs if participants' differential response patterns to negatively worded and positively worded items were not taken into consideration. The Worry Engagement and Absence of Worry factors found among PSWQ items might not reflect two qualitatively different phenomena but rather a unidimensional construct (i.e., worry) and an additional method factor.

The current investigation is based on the prior empirical work of Fresco et al. (2002), who proposed two substantively different types of worry: Worry Engagement and Absence of Worry. Because the PSWQ was originally designed as a unidimensional scale, the Absence of Worry factor was examined more closely. This factor was composed of only the negatively worded items in the Fresco et al. study. Therefore, method variance specific to these items was selected for the focus of the current investigation. The aims of the current study were to replicate the results of Fresco et al. and to test an alternative method factor model that retains the unidimensional nature of the PSWQ yet accounts for method variance. In Study 1, the unifactorial and two-factor models were compared to a negative wording method factor model, in which all items loaded on the general factor and the five reverse direction items loaded on a method factor. Study 2 was conducted to replicate Study 1 in a second sample. Figure 1a illustrates the proposed negative wording method factor model and contrasts it with the two-factor model tested by Fresco et al. (Figure 1b). These two samples were then combined to examine the relative contributions of the general factor and the negative wording method factor to GAD diagnostic status (Study 3). Study 4 examined the psychometric properties of an abbreviated scale, including only the 11 positively worded items.

STUDY 1

Method

Participants and Procedure

A total of 503 undergraduate students at the University of California, Los Angeles, completed the PSWQ and a measure of GAD diagnostic status as part of a larger questionnaire packet during a mass testing session. Students received research credit in their introductory psychology class for participation. The majority of participants were women (64.4%), and the average age was 18.8 years (*SD* =

FIGURE 1A
Hypothesized Negative Wording Method Factor Model

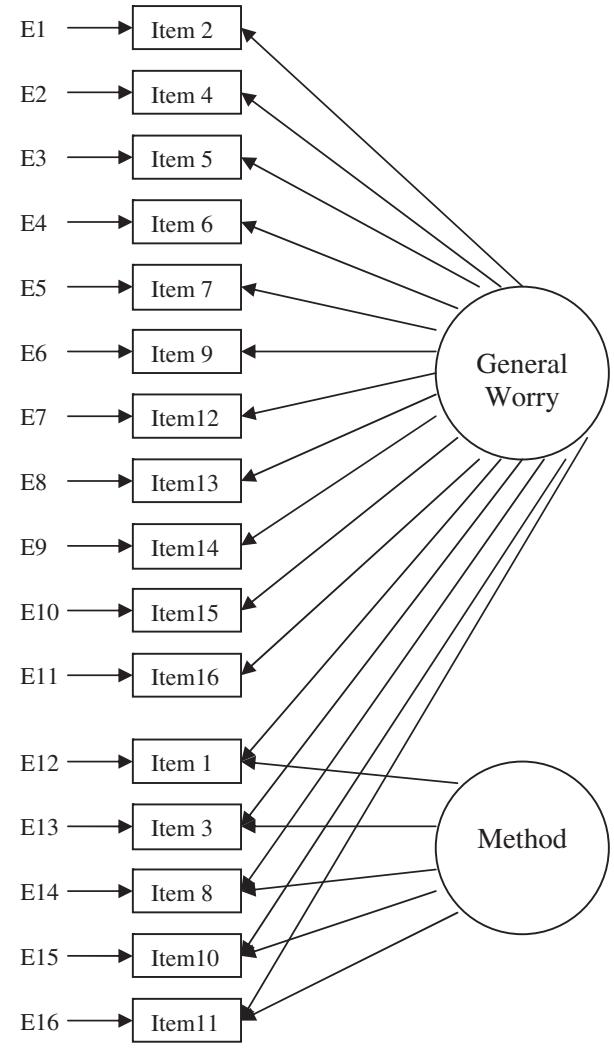
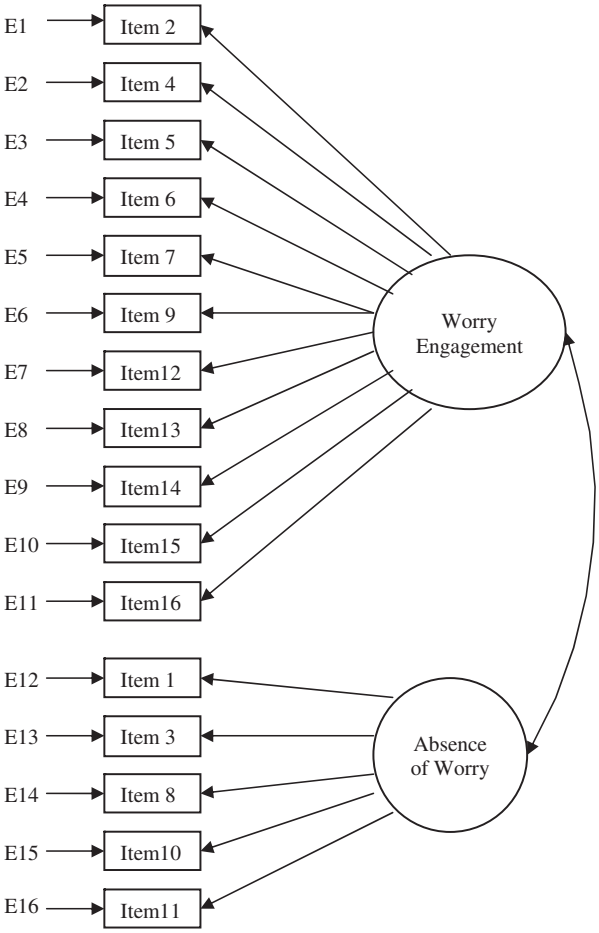


FIGURE 1B
Previously Tested Two-Factor Model



2.4). Ethnic composition was approximately 42.1% Asian, 32.4% Caucasian/White, 8.1% Middle Eastern, 5.2% Latino/Hispanic, 3.1% African American/Black, 0.2% Native American, and 9% other or mixed ethnic identity.

Measures

The PSWQ (Meyer et al., 1990) is a widely used measure of pathological worry, described as excessive in intensity and frequency and difficult to control. Strong reliability and validity have been reported for PSWQ scores in several investigations (see Molina & Borkovec, 1994, for a review).

The Generalized Anxiety Disorder Questionnaire (GAD-Q-IV; Newman et al., 2002) is a self-report diagnostic measure of GAD with demonstrated reliability and validity that accurately identified individuals meeting diagnostic criteria for GAD according to the fourth edition of the *Diagnostic and Statistical Manual of Mental Disorders* (*DSM-IV*, American Psychiatric Association, 1994) following an extensive diagnostic clinical interview and reliably distinguished GAD from panic disorder and social phobia. Newman et al. reported that the GAD-Q-IV showed 89% specificity (11% false positive rate) and 83% sensitivity (i.e., false negative rate of 17%).

Results

All analyses were conducted using maximum likelihood (ML) estimation. In addition to the chi-square test statistic, the Comparative Fit Index (CFI) and root mean

TABLE 1
Study 1 Standardized and Unstandardized Penn State Worry Questionnaire (PSWQ) Item Factor Loadings for Single-Factor, Two-Factor, and Method Factor Models

	Single-Factor Model	*Two-Factor Model*		*Negative Method Factor Model*		*Negative and Positive Method Factors Model*		
PSWQ Item	*Single Factor*	*Worry Absence*	*Engagement of Worry*	*General Worry*	*Method Factor*	*General Worry*	*Negative*	*Positive*
2	.79 (.94)	.78 (.94)		.78 (.94)		.78 (.93)		.14 (.16)
4	.77 (.92)	.77 (.92)		.77 (.92)		.77 (.92)		.12 (.15)
5	.74 (1.02)	.74 (1.02)		.74 (1.02)		.77 (1.06)		.03 (.04) *ns*
6	.69 (.81)	.68 (.80)		.68 (.80)		.76 (.90)		–.12 (–.14) *ns*
7	.82 (1.01)	.84 (1.02)		.84 (1.02)		.74 (.91)		.44 (.54)
9	.69 (.82)	.69 (.82)		.69 (.82)		.65 (.78)		.23 (.27)
12	.75 (1.00)	.75 (1.01)		.75 (1.01)		.69 (.92)		.31 (.42)
13	.77 (.98)	.77 (.98)		.77 (.98)		.73 (.93)		.22 (.28)
14	.76 (.92)	.77 (.92)		.77 (.92)		.72 (.86)		.26 (.31)
15	.83 (.93)	.84 (.94)		.84 (.95)		.73 (.82)		.54 (.60)
16	.64 (.81)	.64 (.81)		.64 (.81)		.65 (.82)		.06 (.08) *ns*
1	–.48 (–.56)		.59 (.69)	–.45 (–.53)	.39 (.45)	–.50 (–.58)	.32 (.38)	
3	–.64 (–.79)		.79 (.98)	–.60 (–.75)	.51 (.63)	–.63 (–.78)	.48 (.59)	
8	–.53 (–.61)		.62 (.72)	–.50 (–.58)	.34 (.39)	–.49 (–.57)	.34 (.40)	
10	–.57 (–.58)		.72 (.74)	–.53 (–.54)	.53 (.54)	–.58 (–.59)	.46 (.47)	
11	–.46 (–.60)		.54 (.70)	–.44 (–.57)	.28 (.37)	–.44 (–.57)	.28 (.37)	

NOTE: Unstandardized factor loadings are in parentheses. PSWQ items are as follows: 1. If I don't have enough time to do everything, I don't worry about it. 2. My worries overwhelm me. 3. I don't tend to worry about things. 4. Many situations make me worry. 5. I know I shouldn't worry about things, but I just can't help it. 6. When I am under pressure, I worry a lot. 7. I am always worrying about something. 8. I find it easy to dismiss worrisome thoughts. 9. As soon as I finish one task, I start to worry about everything else I have to do. 10. I never worry about anything. 11. When there is nothing more I can do about a concern, I don't worry about it any more. 12. I've been a worrier all my life. 13. I notice that I have been worrying about things.14. Once I start worrying, I can't stop. 15. I worry all the time.16. I worry about projects until they are all done.

squared error of approximation (RMSEA) were selected to determine fit (Hu & Bentler, 1999), as chi-square test statistics may be poor indices of fit when sample sizes are large (Hu, Bentler, & Kano, 1992). Although PSWQ total scores were normally distributed, examination of the individual items as measured variables revealed that assumptions of multivariate and univariate normality were violated (Mardia's normalized estimate = 15.46, $p < .001$). Given the non-normality of these variables, Satorra-Bentler Scaled test statistic was employed (Bentler & Dijkstra, 1985; Satorra & Bentler, 1988, 1994). Assumptions of linearity among measured variables were verified through inspection of scatter plots.

Confirmatory factor analyses were conducted using the structural equation modeling software program EQS, Version 6.0 (Bentler, 2003). In the first analysis, a model in which all 16 PSWQ items were indicators of a single latent factor was tested. A poor fit for this model was indicated by a significant chi-square statistic, Satorra-Bentler scaled $\chi^2(104) = 531.82$, $p < .0001$; an inadequate CFI (.898); and a high RMSEA (.091) (Hu & Bentler, 1999).

In the second analysis, the two-factor solution suggested by Fresco et al. (2002) was tested with the 11 positively worded items as indicators of the first latent factor and the five negatively worded items (Item numbers 1, 3, 8, 10, and 11) as indicators of the second latent factor. Although this analysis also yielded a significant chi-square statistic, Satorra-Bentler scaled $\chi^2(103) = 365.76$, $p < .0001$, fit indices indicated a good fit, CFI = .94, RMSEA = .07.

In the third analysis, a negative wording method factor model was tested with all 16 items as indicators of a worry latent factor and the five negatively worded items as indicators of a method latent factor. No correlation between the factors was included, because there was no theoretical reason to expect that method variance would be associated with worry. Although this analysis again yielded a significant chi-square statistic, Satorra-Bentler scaled $\chi^2(99) = 360.71$, $p < .0001$, fit indices again indicated a good fit, CFI = .94, RMSEA = .07.

A fourth model examined the hypothesis that the factor structure underlying the scale is composed of two method factors (positive wording and negative wording) and a general worry factor. Although there was evidence of a good fit for the model, Satorra-Bentler scaled $\chi^2(88) = 241.97$, $p < .0001$; CFI = .96; RMSEA = .06, three of the hypothesized indicators of the positive method wording factor did not significantly load on the positive method factor, and the overall absolute magnitude of the loadings on the positive method factor was small. Table 1 presents the factor loadings for each PSWQ item across these four analyses.

Discussion

Although results from the first two analyses are consistent with the findings of Fresco et al. (2002), results from the third analysis offer a viable alternative explanation of the data. The negative wording method factor model provided an adequate fit to the data without forcing negatively worded items to compose a separate latent factor, suggesting that the PSWQ measures worry as a unidimensional construct despite a differential response pattern to negatively worded items. It might also be the case that there are two method factors (i.e., positive and negative wording), reflected in the fourth model. Although the model fit, the positive wording method factor could be considered weak. Additional investigation into the structure of this factor is warranted. Each of these analyses was conducted in a second sample for replication.

STUDY 2

Method

Participants and Procedure

A total of 303 undergraduate students at the University of California, Los Angeles, completed the same measures described in Study 1 (PSWQ and GAD-Q-IV), following the same procedures. The majority of participants were women (64.5%), and the average age was 18.7 years (SD = 2.1). Ethnic composition was approximately 41.8% Caucasian/White, 30.8% Asian, 9.9% Middle Eastern, 7.8% Latino/Hispanic, 1.7% African American/Black, 0.3% Native American, and 7.5% other or mixed ethnic identity.

Results and Discussion

The same three analyses using the 16 items of the PSWQ described in Study 1 were conducted. Tests of assumptions again revealed violations of normality without violations of linearity. Analyses were conducted as before, using ML estimation with Satorra-Bentler Scaled test statistic and correction to standard errors (Bentler & Dijkstra, 1985; Satorra & Bentler, 1988, 1994) and using CFI and RMSEA fit indices (Hu & Bentler, 1999).

The first analysis again revealed a poor fit of the single factor model to the data, Satorra-Bentler scaled $\chi^2(104) = 365.49$, $p < .0001$; CFI = .905; RMSEA = .091. The second analysis involving the original two-factor solution again revealed a good fit to the data, Satorra-Bentler scaled $\chi^2(103) = 237.93$, $p < .0001$; CFI = .951; RMSEA = .066. However, the third analysis also demonstrated a good fit of the alternative negative wording method factor model to the data, Satorra-Bentler scaled $\chi^2(99) = 229.95$, $p < .0001$; CFI = .952; RMSEA = .066. A fourth model examined the hypothesis that the factor structure underlying the scale is composed of two method factors (positive wording and negative wording) and a general worry factor. Although there was evidence of a good fit for the model, Satorra-Bentler scaled $\chi^2(88) = 128.09$, $p < .003$; CFI = .98; RMSEA = .04, this model should be interpreted with caution due to the error residual for Item 15 ("I worry all the time") being constrained at zero to avoid estimating a negative variance. Two of the hypothesized indicators of the positive method wording factor did not significantly load on the positive method factor, and the overall absolute magnitude of the loadings on the positive method factor was small. For these reasons, this factor again appeared to be rather weak, although further investigation of this issue is certainly warranted. Table 2 presents the factor loadings for each PSWQ item across these four analyses.

Study 2 replicated the pattern of results seen in Study 1. Although the single factor model does not provide a good fit to the data, the second factor composing the five negative direction items may be explained by the difference in response style rather than the existence of a separate worry construct. The equivalence in fit for the two-factor model (i.e., the two different sets of items loaded separately on two latent factors) compared to the negative method factor model (i.e., all 16 items loaded on the first factor with the five reversed items loading on a method factor) supports this more parsimonious explanation. Again, in the fourth model the positive loading factor was considered weak and resulted in an estimation problem. Although further investigation of this factor structure is warranted, we limited further analyses to only the Negative Wording Method factor and the General Worry factor.

Further support for this alternative Negative Wording Method factor model would be obtained if the General Worry factor predicts another variable representative of the construct of pathological worry, whereas the method factor does not. Therefore, the samples from Studies 1 and 2 were combined to conduct a new set of analyses investigating the predictive value of the General Worry factor and the Negative Wording Method factor to the generalized anxiety disorder measure.

STUDY 3

Method

Participants and Procedure

A total of 790 participants from Studies 1 and 2 provided complete data on the GAD-Q-IV. These two groups

TABLE 2
Study 2 Standardized and Unstandardized Penn State Worry Questionnaire (PSWQ) Item Factor Loadings for Single-Factor, Two-Factor, and Method Factor Models

	Single-Factor Model	*Two-Factor Model*		*Negative Method Factor Model*		*Negative and Positive Method Factors Model*		
PSWQ Item	*Single Factor*	*Worry Absence*	*Engagement of Worry*	*General Worry*	*Method Factor*	*General Worry*	*Negative*	*Positive*
2	.79 (.95)	.79 (.96)		.79 (.96)		.76 (.93)		.20 (.24)
4	.77 (.94)	.77 (.94)		.77 (.94)		.76 (.93)		.13 (.16)
5	.82 (1.13)	.82 (1.13)		.82 (1.13)		.81 (1.12)		.14 (.19)
6	.62 (.73)	.62 (.73)		.62 (.73)		.66 (.78)		–.02 (–.02) *ns*
7	.80 (.98)	.81 (1.00)		.81 (1.00)		.73 (.90)		.37 (.45)
9	.70 (.84)	.70 (.84)		.70 (.84)		.69 (.83)		.14 (.16)
12	.69 (.89)	.69 (.89)		.69 (.89)		.68 (.86)		.17 (.22)
13	.79 (.99)	.80 (.99)		.79 (.99)		.79 (.99)		.12 (.15)
14	.82 (.96)	.82 (.98)		.83 (.98)		.76 (.90)		.32 (.37)
15	.82 (.87)	.84 (.89)		.84 (.89)		.69 (.74)		.72 (.77)
16	.59 (.73	.59 (.73)		.59 (73)		.61 (.76)		.03 (.04) *ns*
1	–.44 (–.52)		.52 (.61)	–.40 (–.48)	.33 (.39)	–.44 (–.53)	.27 (.32)	
3	–.71 (–.89)		.85 (1.05)	–.67 (–.84)	.52 (.65)	–.70 (–.87)	.48 (.60)	
8	–.68 (–.82)		.75 (.90)	–.64 (–.78)	.35 (.42)	–.67 (–.81)	.30 (.37)	
10	–.65 (–.71)		.79 (.86)	–.60 (–.65)	.54 (.59)	–.65 (–.71)	.47 (.52)	
11	–.46 (–.61)		.54 (.73)	–.42 (–.57)	.34 (.46)	–.41 (–.55)	.36 (.49)	

NOTE: Unstandardized factor loadings are in parentheses. PSWQ items are as follows: 1. If I don't have enough time to do everything, I don't worry about it. 2. My worries overwhelm me. 3. I don't tend to worry about things. 4. Many situations make me worry. 5. I know I shouldn't worry about things, but I just can't help it. 6. When I am under pressure, I worry a lot. 7. I am always worrying about something. 8. I find it easy to dismiss worrisome thoughts. 9. As soon as I finish one task, I start to worry about everything else I have to do. 10. I never worry about anything. 11. When there is nothing more I can do about a concern, I don't worry about it any more. 12. I've been a worrier all my life. 13. I notice that I have been worrying about things.14. Once I start worrying, I can't stop. 15. I worry all the time.16. I worry about projects until they are all done.

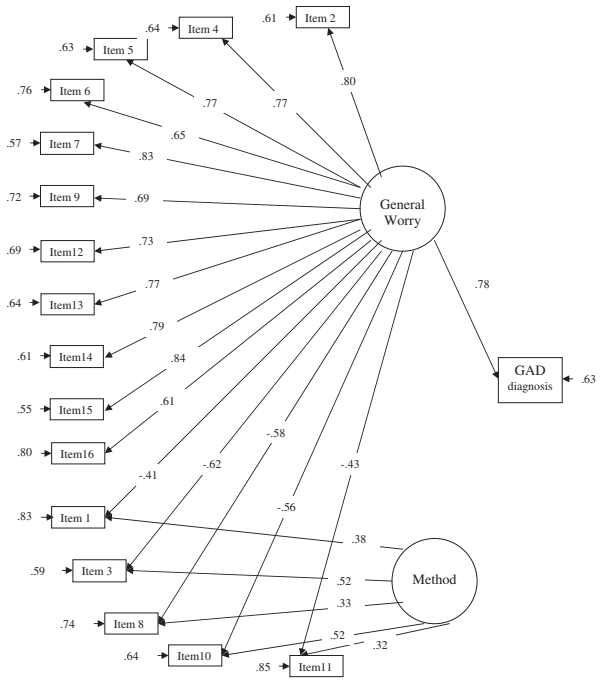
did not significantly differ in age ($p > .5$). However, chi-square analysis revealed significant differences in ethnic composition for the two samples, $\chi^2(6) = 14.75$, $p < .05$. Therefore, PSWQ item-by-item comparisons were made. Interestingly, despite differences in ethnicity, none of these PSWQ item comparisons were statistically significant. As a result, data from both samples were combined. Participants were assigned the GAD diagnosis only if they indicated meeting all *DSM-IV* diagnostic criteria on the GAD-Q-IV (i.e., experiencing excessive and uncontrollable worry more days than not for at least the past 6 months, three or more of the six accompanying generalized anxiety symptoms, and at least moderate impairment or distress from these symptoms). Of these 790 participants, 64 (8.1%) met full *DSM-IV* diagnostic criteria for GAD.

Results

Data were analyzed using the structural equation modeling software program EQS, Version 6.0 (Bentler, 2003). Tests of assumptions again revealed violations of normality without violations of linearity. Analyses used ML estimation with Satorra-Bentler Scaled test statistic and correction to standard errors (Bentler & Dijkstra, 1985; Satorra & Bentler, 1988, 1994) and CFI and RMSEA fit indices (Hu & Bentler, 1999). In addition, because this analysis included a categorical variable (GAD diagnosis), the correct standard errors were calculated with the optimal weight matrix (Lee, Poon, & Bentler, 1995). In the first model, all 16 PSWQ items loaded on the general factor, and the five reverse items also loaded on a method factor. Paths from both of these latent factors to the categorical GAD status variable (GAD vs. not GAD) were included. Chi-square, Satorra-Bentler scaled $\chi^2(113) = 477.18$, $p < .0001$, and CFI (.901) statistics indicated a poor fit, although the RMSEA (.064) indicated an adequate fit for the overall model. Examination of individual path coefficients revealed that the path from the general worry factor to GAD diagnosis was significant ($p < .05$), whereas the path from the method factor to GAD diagnosis was not. Inspection of R^2 coefficients revealed that these factors accounted for 61.2% of the variance in GAD diagnostic status.

This analysis was repeated with the path from the method factor to the GAD variable removed. Figure 2 depicts this final model with the path removed from the first model. Chi-square, Satorra-Bentler scaled $\chi^2(114) = 456.56$, $p < .0001$, and CFI (.907) statistics again indicated a poor fit, although the RMSEA (.062) indicated an ade-

FIGURE 2
Predictors of Generalized Anxiety Disorder (GAD) Diagnostic Status



NOTE: Significance testing was conducted on unstandardized coefficients.

TABLE 3
Correlation Coefficients Between Each Penn State Worry Questionnaire (PSWQ) Item and Generalized Anxiety Disorder (GAD) Diagnosis From Study 3

PSWQ Item	*GAD Correlation Coefficient*
2	.44, $p < .0001$
4	.37, $p < .0001$
5	.35, $p < .0001$
6	.24, $p < .0001$
7	.45, $p < .0001$
9	.36, $p < .0001$
12	.32, $p < .0001$
13	.33, $p < .0001$
14	.40, $p < .0001$
15	.46, $p < .0001$
16	.23, $p < .0001$
1	–.09, $p < .012$
3	–.23, $p < .0001$
8	–.29, $p < .0001$
10	–.18, $p < .0001$
11	–.18, $p < .0001$

NOTE: PSWQ items are as follows: 1. If I don't have enough time to do everything, I don't worry about it. 2. My worries overwhelm me. 3. I don't tend to worry about things. 4. Many situations make me worry. 5. I know I shouldn't worry about things, but I just can't help it. 6. When I am under pressure, I worry a lot. 7. I am always worrying about something. 8. I find it easy to dismiss worrisome thoughts. 9. As soon as I finish one task, I start to worry about everything else I have to do. 10. I never worry about anything. 11. When there is nothing more I can do about a concern, I don't worry about it any more. 12. I've been a worrier all my life. 13. I notice that I have been worrying about things.14. Once I start worrying, I can't stop. 15. I worry all the time.16. I worry about projects until they are all done.

quate fit for the overall model. Because these two models are nested models, a Satorra-Bentler scaled chi-square correction difference test (Satorra & Bentler, in press) was conducted. Results indicated that removal of the path from the method factor to the GAD diagnosis variable did not significantly degrade the model, χ^2 diff S-B = .0809, n.s. In this second model, the path from the General Worry factor to GAD diagnosis was again significant ($p < .05$), and the R^2 coefficient revealed that this factor accounted for 60.8% of the variance in the GAD variable. Thus, removal of the method factor path resulted in a loss of only 0.4%.

To examine the relationships between each individual PSWQ item and the GAD diagnosis measure, simple point-biserial correlations were computed. Correlation coefficients involving the positively worded items ranged from .23 to .46, whereas coefficients involving the negatively worded items ranged from –.09 to –.29. See Table 3 for all correlation coefficients. These correlations should be interpreted with caution; the GAD measure also consisted of positively worded items, which could explain the strength of the relationship between positively worded PSWQ items and GAD diagnosis.

Discussion

Results from Study 3 provide further support that the five reverse-direction PSWQ items do not make up a separate worry construct. Unlike the General Worry factor including all 16 items, the method factor representing these five items did not predict GAD diagnosis, and only 0.4% of the variance in GAD was unique to this method factor. Thus, it seems that the PSWQ measures the construct of pathological (excessive and uncontrollable) worry along a single continuum, with an underlying factor structure reflecting the direction in which the items are worded.

It is possible, however, that certain individuals may exhibit difficulty answering the reverse-scored items due to the double-negative wording of some items (e.g., "If I do *not* have enough time to do everything, I do *not* worry about it" [*italics added*]). For example, individuals of certain cultures may not be accustomed to answering questions in this fashion, resulting in distortions of the PSWQ total score (Diaz, 2000). In addition, including fewer than the total 16 items sometimes may be a practical necessity

for inclusion in self-report batteries. For these reasons, we evaluated the psychometric properties of the 11 positively worded items as a single scale.

STUDY 4

Method

Participants and Procedure

A new sample of 189 undergraduate students completed the PSWQ and GAD-Q-IV according to the same procedures described above. GAD diagnostic status according to GAD-Q-IV responses was determined as described in Study 3. Mean age was 19.3 years ($SD = 2.5$), and 59.9% of the participants were female. Ethnic composition was approximately 44.9% Asian, 24.2% Caucasian/White, 12.4% Middle Eastern, 8.3% Latino/Hispanic, 2.7% African American/Black, 0% Native American, and 7.8% other or mixed ethnic identity. Of these 189 participants, 23 (12.2%) met full *DSM-IV* diagnostic criteria for GAD.

Results

Logistic regression analyses were performed using SPSS for Windows software. As expected, the total PSWQ score based on all 16 items was a significant predictor of GAD diagnostic status, Wald's test (1) = 28.59, $p < .0001$; Exp (B) = 1.22, and the full PSWQ scale yielded high internal consistency ($\alpha = .94$). Logistic regression was again performed using the total of the 11 positively worded PSWQ items to predict GAD diagnostic status. Results revealed that this 11-item measure was also a significant predictor of GAD diagnostic status, Wald's test (1) = 28.06, $p < .0001$; Exp (B) = 1.28, whereas retaining high internal consistency ($\alpha = .94$). The 11-item measure correctly classified 92.6%, compared to 91.5% when the full 16-item PSWQ was used. Internal consistency coefficients for the positively worded 11-item PSWQ were then obtained from the first and second samples. Results indicated that both Study 1 ($n = 503$) and Study 2 ($n = 303$) samples yielded α coefficients of .93.

Discussion

Results from Study 4 suggest that the 11 positively worded items of the PSWQ can function as an abbreviated scale with strong internal consistency and validity. Additional research is needed to determine whether this 11-item version relates to other measures and constructs similar to the full 16-item version, although preliminary work by Fresco et al. (2002) suggests this is the case. Furthermore, a wealth of normative and clinical sample data are available for comparison of full scale PSWQ scores (Brown et al., 1992; Davey, 1993; Meyer et al., 1990; Molina & Borkovec, 1994; Stanley et al., 2001); no such information currently exists for the 11-item version. Nevertheless, these 11 items compose a promising alternative when inclusion of the reverse-scored items is problematic.

GENERAL DISCUSSION

Recent research has attempted to clarify the underlying factor structure of the PSWQ. Although traditionally conceptualized as unifactorial, evidence for a two-factor structure distinguishing positive direction from negative direction items has since emerged in the literature (Beck et al., 1995; Fresco et al., 2002; Stöber, 1995). Results from Studies 1 and 2 establish the negative method factor model as a reasonable competing explanation of the two-factor structure reported in these previous investigations. This alternative is advantageous because it reflects the underlying unidimensional construct of worry while accounting for differences in how the degree of worry is assessed (i.e., how much worry is either present or absent). However, results involving a positive method factor were not conclusive and warrant further investigation. This unidimensional conceptualization of worry is consistent with a recent taxometric analysis of its latent structure (Ruscio, Borkovec, & Ruscio, 2001) in which pathological worry was quantitatively but not qualitatively different from normal worry. Results from Study 3 further support this model of the PSWQ factor structure by demonstrating a lack of relationship between the negative method factor and GAD, a diagnosis largely defined by pathological worry.

However, a number of limitations should be considered. First, a categorical variable was used to measure GAD diagnostic status in Study 3. Although degree of GAD symptomatology can certainly be conceptualized as continuous (Newman et al., 2002), this questionnaire was originally developed to screen for the presence or absence of a GAD diagnosis. Therefore, the GAD-Q-IV was only scored in a categorical fashion for the current study. Given this limitation, it would not be statistically appropriate to treat GAD as a continuous variable and risk violation of statistical assumptions. Fortunately, EQS software allowed for appropriate estimation of a model containing a categorical variable using polyserial correlations.

In addition, the observed factor structure was only tested in an unselected sample of college students. It is possible that the method factor model may not provide a good fit to the data among other cultural, clinical, or age

groups. For example, the Spanish translation of the PSWQ yielded a single-factor structure in a Spanish sample (Sandin, Chorot, Santed, & Jimenez, 1994), whereas the two-factor solution was found in a Peruvian sample (Diaz, 2000). With respect to age, the unifactorial solution was found using a child version of the PSWQ (PSWQ; Chorpita, Tracey, Brown, Collica, & Barlow, 1997), whereas the two-factor solution was reported among older adults (Beck et al., 1995). Thus, this alternative method factor model needs to be tested across different populations before conclusions about the factor structure of the PSWQ can be extended to those groups.

Nevertheless, researchers concerned about measurement error associated with the reverse-scored items or about questionnaire length may opt for an 11-item version of the PSWQ containing only the positively worded items. The analyses described in Study 4 and by Fresco et al. (2002) suggest this version provides a useful measure of worry with adequate reliability and validity. Although removal of the five reverse-scored items may not be recommended for participants exhibiting an affirmative response bias, these reverse-scored items may be useful in determining whether such a bias is present. In addition, comparisons to various clinical and community samples cannot be made with abbreviated PSWQ scores.

Pathological worry—worry experienced as excessive and uncontrollable—appears to be a unitary phenomenon that can be reliably measured via self-report. A number of investigators have attempted to elucidate factors contributing to the development and maintenance of chronic pathological worry. For example, a lack of confidence in problem-solving abilities (Ladouceur, Blais, Freeston, & Dugas, 1998), general beliefs of personal inadequacy (Davey & Levy, 1998), and excessive fears of failure or ineffectiveness (Hazlett-Stevens & Craske, 2003) distinguish chronic worriers from nonworried individuals. Another growing body of research suggests that chronic worry serves the purpose of avoiding emotional material, a function made possible by its verbal-linguistic, conceptual nature (see Borkovec, 1994, and Borkovec, Alcaine, & Behar, in press). Consistent with this model, GAD individuals reported that worry serves as a distraction from difficult emotional topics more often than their nonanxious counterparts (Borkovec & Roemer, 1995). The PSWQ appears to measure such worry along a single dimension, and this questionnaire most likely will continue to be an important assessment tool in this area of research.

The current series of studies provides an interesting example of how method variance associated with the way in which items are phrased can appear to affect the factor structure of self-report measures. The PSWQ seems to measure a single construct (i.e., worry), but participants' responses to items systematically vary according to whether participants must indicate the degree to which worry is present versus absent. When considering other measures sharing these characteristics, it may be worthwhile to test for a method factor.

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