Measuring Health Anxiety: Moving Past the Dichotomous Response Option of the Original Whiteley Index

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Introduction

- The Whiteley Index (WI; Pilowsky, 1967) is a 14 item self-report instrument frequently used by researchers and clinicians as a measure of health anxiety.
- The WI has been found to possess good internal consistency, test-retest reliability, convergent validity, and concurrent validity (Stewart & Watt, 2001); however, the factor structure of the WI has proven unstable, primarily as a function of inconsistent item-content and factor-loadings.
- Indeed, 1, 2, and 3 factor models with between 6 and 14 items have been proposed (Asmundson, Carleton, Bovell, & Taylor, in press; Fink et al., 1999; Hiller, Rief, & Fichter, 2002; Hinz, Rief, & Brahler, 2003; Pilowsky, 1967; Speckens, Spinhoven, Sloekers, Bolk, & Van Hemert, 1996).
- Despite some criticisms of dichotomous response scales, the WI is predominantly administered – and subsequently factor-analyzed – in the original 1967 true/false response format.
- The current investigation explored the psychometric properties of a five-point Likert scale version of the WI as advocated by previous researchers (Asmundson et al., in press; Barsky et al., 1992).

Method

- Participants included 289 undergraduates
  - 64 men, ages 18-34 (M = 20.58; SD = 3.23)
  - 223 women ages 18-45 (M = 20.18; SD = 3.24)
- The participants completed the five-point Likert scale (1=not at all, to 5=a great deal) version of the WI as part of a larger ongoing investigation.
- There were no significant differences between men and women, $t(285) = -.69$, $p > .10$, on total WI scores.
- The sample was randomly divided into two sex-matched halves that did not statistically differ on WI scores (Table 1); one for the each of the two following analyses.
- Exploratory Factor Analysis (EFA) was performed on sample 1 utilizing Costello and Osborne's (2005) best practice recommendations: Extraction method – Principle Axis Factoring with Promax rotation; items with communalities<.4 were discarded; items with cross-loadings>.32 were discarded; items with total factor loadings<.5 were discarded.
- Competing factor models were compared using Confirmatory Factor Analysis (CFA) on sample 2. Model fit was evaluated using fit indices suggested by Hu and Bentler (1999): χ^2/df ratio (χ^2/df; should be < 2.0); Comparative Fit Index (CFI; should be close to .95); Root Mean Square Error of Approximation (RMSEA; should be close to .06); Expected Cross Validation Index (ECVI; lower values indicate better fit).

Results

- The iterative process of the EFA (Osborne, 2008) resulted in an 8-item 2-factor structure accounting for 51.03% of the variance (Table 1).
  - Factor 1 consisted of items 5, 10, 11, 13.
  - Factor 2 consisted of items 2, 4, 6, 14.
- Subsequent CFAs with the second sample showed the 8-item 2-factor structure to possess moderately good fit and to outperform or match most of the competing models (Table 2; Figure 1).
- Nevertheless, the Asmundson et al. (in press) 6-item 2-factor model demonstrated the best fit for the data (Figure 2).

Table 2: CFA Results

	χ^2/df	CFI	RMSEA	ECVI
2-Factor 8-Item[a]	2.74	.93	.11	.60
1-Factor 8-Item	3.40	.90	.13	.70
2-Factor 6-Item[b]	.60	.99	.00	.22
1-Factor 6-Item	3.95	.94	.14	.42
1-Factor 7-Item[c]	3.96	.91	.14	.58
1-Factor 14-Item[d]	2.80	.87	.11	1.90
3-Factor 13-Item[e]	2.42	.94	.10	1.01
1-Factor 13-Item	2.70	.89	.11	1.59
3-Factor 11-Item[f]	2.31	.94	.10	1.01
1-Factor 11-Item	3.13	.89	.12	1.27
3-Factor 10-Item[g]	2.81	.91	.11	.95
1-Factor 10-Item	2.75	.90	.11	.95

[a] Based on the current EFA results F1 = 5, 10, 11, 13; F2 = 2, 4, 6, 14
[b] (Asmundson et al., in press) F1 = 5, 8, 13; F2 = 1, 4, 14
[c] (Fisk et al., 1999) F1 = 1, 2, 4, 6, 8, 10, 13
[d] (Spreckens et al., 1996) F1 = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14
[e] (Hiller et al., 2002) F1 = 1, 4, 6, 12, 13, 15; F2 = 2, 5, 8; F3 = 7, 9, 10, 11
[f] (Hinz et al., 1994) F1 = 4, 6, 14; F2 = 1, 2, 5, 8; F3 = 7, 10, 11
[g] (Pilowsky, 1967) F1 = 6, 9, 12, 14; F2 = 2, 4, 8; F3 = 7, 11, 13

Discussion

- Previous studies of the psychometric properties and factor structure of the WI have used data with dichotomous response options; however, evidence suggests Likert or continuous responses may be more appropriate (Tabachnick & Fiddel, 2001).
- The presented data uses a five-point Likert scale response format, assessed with current best practice methods for EFA (Osborne, 2008); the results produced yet another unique variant of the proposed factor structures for the WI. This suggests that either the precedent factor structures were not robust, that the change in response format has revealed a dimensional quality to health anxiety, or both.
- The proposed 8-item 2-factor model also demonstrated acceptable fit indices when assessed using CFA; this suggests that it should be considered in future studies as being a potentially robust solution. Several of the alternative models – all extracted from versions of the WI using dichotomous response formats – also demonstrated adequate fit indices of the competing models; however, the Asmundson et al. (in press) solution was superior. This suggests that it may be a robust solution across formats that nonetheless evaluates the dimensional nature of health anxiety.
- Future research should evaluate both the Asmundson et al., (in press) solution and the current solution, ideally with clinical samples, to determine which item sets will provide the most utility with the best psychometric properties.

Figure 2: 6-Item 2-Factor Model

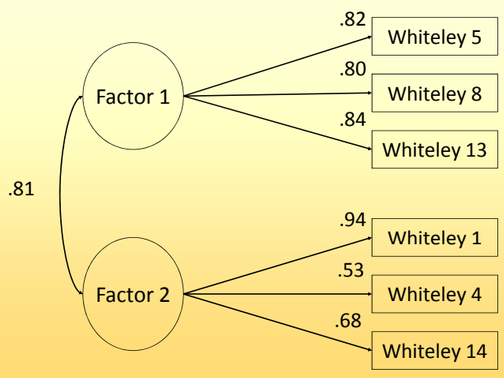
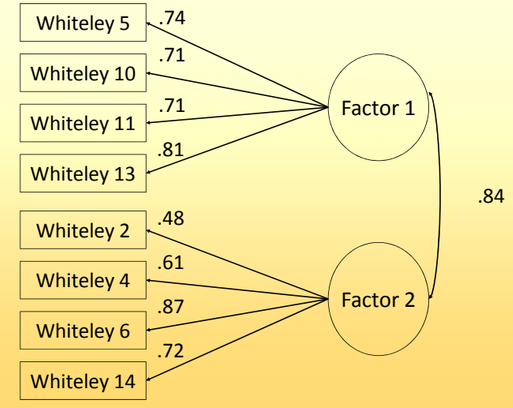


Table 1: Descriptive Statistics

	Factor Loading [a]		Sample 1 (n = 143)		Sample 2 (n = 144)				
WI Items	F1	F2	*M*	*SD*	*M*	*SD*	*t*	*p*	r^2
1	-	-	1.92	1.05	1.84	1.11	.65	.52	<.01
2	-	.53	2.08	.96	2.01	.99	.61	.54	<.01
3	-	-	2.67	1.05	2.68	1.16	-.07	.94	<.01
4	-	.54	2.52	.99	2.48	1.17	.36	.72	<.01
5	.59	-	1.48	.87	1.49	.90	-.10	.92	<.01
6	-	.90	1.89	1.04	1.91	1.05	-.18	.86	<.01
7	-	-	1.53	.90	1.60	.90	-.62	.54	<.01
8	-	-	1.68	.89	1.66	.96	.17	.87	<.01
9	-	-	2.69	1.24	2.63	1.22	.42	.68	<.01
10	.57	-	1.78	1.03	1.85	1.12	-.56	.58	<.01
11	.76	-	1.73	1.09	1.63	.92	.86	.39	<.01
12	-	-	1.63	1.03	1.76	1.14	-1.05	.30	<.01
13	.88	-	1.44	.76	1.53	.98	-.91	.36	<.01
14	-	.66	2.31	1.22	2.38	1.32	-.45	.65	<.01

[a] Factor loadings refer to the first sample.

Figure 1: 8-Item 2-Factor Model



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