SPINning Factors: A State-of-the-Art Factor Analytic Comparison of the Social Phobia Inventory in Clinical and Nonclinical Samples

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Introduction

- Social anxiety (SA) refers to levels of anxiety or apprehension experienced in social or performance situations. People with high SA fear being negatively evaluated by others, making a bad impression, or acting in a way that might be embarrassing. Among the most popular measures of SA is the Social Phobia Inventory (SPIN; Connor et al., 2000).

- A recent study explored the psychometric properties of the SPIN in a diagnostically diverse clinical sample (Antony et al., 2006); however, the study did not include an evaluation of the factor structure of the SPIN. The SPIN was designed to assess three dimensions of SA, specifically fear, avoidance, and physiological arousal (Connor et al., 2000).

- Analyses thus far have suggested both a 5-factor structure (Connor et al., 2000) and a 3-factor structure (i.e., fear, avoidance, and physiological arousal; Radomsky et al., 2006) may be appropriate. Moreover, a 3-item version of the SPIN called the mini spin has demonstrated good sensitivity and specificity for generalized SAD (Connor et al., 2001), implying several items in the original may be redundant.

- The purpose of the current study was to assess the factor structure of the SPIN using exploratory (EFA) and confirmatory (CFA) factor analyses in both an undergraduate and a clinical sample.

Method

- Undergraduate Participants, University of Regina
  - 61 men, ages 18-34 (M = 20.6; SD = 3.2)
  - 212 women, ages 18-32 (M = 20.2; SD = 3.3)

- Clinical Participants, Anxiety Treatment and Research Centre at St. Joseph's Healthcare
  - 162 men, ages 16-69 (M = 34.8; SD = 11.7)
  - 193 women, ages 15-64 (M = 32.9; SD = 11.3)

- Demographics were supplemented with:
  - Social Phobia Inventory (SPIN; Conner et al., 2000)
    - A 17-item 5-point Likert scale, 0 (not at all) to 4 (extremely) self-report measure designed to assess symptoms specific to SAD.
  - Clinical sample internal consistency, α = .91, average inter-item correlation, r = .37.
  - Undergraduate sample internal consistency, α = .94, average inter-item correlation, r = .48.
- Both samples were randomly divided in half using SPSS, allowing for EFA and CFA.

- The EFAs were performed using the recommendations based on Osborne (2008).

- CFA fit indices (Hu & 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, better fit).

Results

- There were no significant differences (all ps>.10) on any of the SPIN items between the two randomized groups, or significant interactions based on sample or sex.

- In the clinical sample, there were significant differences on several SPIN items between men and women (Table 1); there were no such differences in the undergraduate sample. Given the absence of a priori differences related to sex, those items were removed prior to EFA.

- Results of EFAs using Osborne's (2008) recommendations with a half of the clinical and undergraduate samples suggested a 2-factor 9-item solution accounting for 51% and 54% of the variance respectively; the first factor was comprised of five fear and avoidance items, the second factor was comprised of four physiological arousal items.

- Results of the CFA with the other half of the clinical sample suggested the 2-factor model did not have an acceptable fit to the data (Table 2). Results of the CFA with the other half of the undergraduate sample suggested the 2-factor model had an acceptable fit to the data; a unitary 5-item solution using only items from factor one provided the best solution.

- The 5- and 9-item versions correlated highly (r=.91; r=.97) with the full measure in both samples. Results of a receiver operator curve analyses (ROC) supported the utility of 5-and 9-item versions in distinguishing clinical and undergraduate participants (AUC=.87; AUC=.86) at a rate comparable to the full measure (AUC=.88) and the 3-item mini spin (AUC=.87).

Discussion

- Items removed prior to the EFA were significantly different across men and women, and tend to focus on fears of authority and criticism; this apparent conceptual difference between men and women warrants subsequent research.

- The EFA results suggest that items in the SPIN do not form three independent factors but, instead, form two factors that can be conceptualized as fear/avoidance and physiological arousal (Figure 1).

- The results of the CFA support a 5-item unitary and a 9-item 2-factor solution for the undergraduate sample; however, those solutions are not necessarily appropriate for the clinical sample. Despite content differences they are also comparable solutions to the proposed mini spin.

- In line with previous research (Connor et al., 2001), it appears there are several items that do not load robustly on to any factor and may be unnecessary for discriminating measurements of SA. Nevertheless, it may be that the removed items provided additional sensitivity not accounted for in the current analyses. Future research should evaluate this possibility before making definitive exclusions.

- For nonclinical samples, the second factor is not as distinct as the first. It may also represent unexplored heterogeneity between and within clinical and non-clinical presentations of SA based on symptoms of physiological arousal. Given the variety of items producing comparable ROC results, further research is needed into how we should measure SAD.

Table 1. Descriptive Statistics

	Clinical Men (n=162)			Clinical Women (n=193)			Undergraduate Men (n=64)			Undergraduate Women (n=220)		
	M (SD)	S (.19)	K (.38)	M (SD)	S (.18)	K (.35)	M (SD)	S (.30)	K (.59)	M (SD)	S (.16)	K (.33)
1. I am afraid of people in authority.*	1.87 (1.22)	.06	-.97	2.19 (1.41)	-.27	-1.20	.73 (.96)	1.66	2.98	.80 (.86)	.82	-.13
2. I am bothered by blushing in front of people.	1.64 (1.37)	.36	-1.09	1.66 (1.49)	.42	-1.23	.94 (.97)	.87	.32	.89 (.96)	1.05	.64
3. Parties and social events scare me.	2.83 (1.15)	-.61	-.71	2.69 (1.32)	-.63	-.86	.75 (1.04)	1.49	1.77	.73 (1.01)	1.43	1.53
4. I avoid talking to people I don't know.	2.63 (1.13)	-.69	-.14	2.42 (1.29)	-.44	-.87	1.22 (1.29)	.67	-.47	1.09 (1.06)	.81	-.18
5. Being criticized scares me a lot.*	2.53 (1.21)	-.52	-.72	3.09 (1.03)	-1.05	.55	1.33 (1.24)	.49	-1.06	1.50 (1.12)	.46	-.55
6. Fear of embarrassment causes me to avoid doing things or speaking to people.†	2.92 (1.19)	-.90	-.24	3.05 (1.16)	-1.06	.16	1.27 (1.22)	1.02	.18	1.35 (1.21)	.67	-.37
7. Sweating in front of people causes me distress.	2.12 (1.38)	-.14	-1.25	1.93 (1.41)	.10	-1.30	1.05 (1.10)	.85	-.30	1.20 (1.19)	.86	-.08
8. I avoid going to parties.	2.66 (1.31)	-.55	-.94	2.46 (1.46)	-.49	-1.17	.92 (1.26)	1.27	.40	.72 (1.09)	1.52	1.50
9. I avoid activities in which I am the center of attention.†	3.04 (1.13)	-1.30	1.09	2.96 (1.26)	-1.03	-.07	1.02 (1.15)	.88	-.19	1.35 (1.28)	.71	-.53
10. Talking to strangers scares me.	1.99 (1.29)	.01	-.99	2.12 (1.37)	-.17	-1.13	.73 (.91)	1.34	1.79	.92 (.95)	.93	.44
11. I avoid having to give speeches.	3.09 (1.26)	-1.21	.23	3.20 (1.31)	-1.56	1.06	1.86 (1.47)	.10	-1.35	1.97 (1.44)	.04	-1.34
12. I would do anything to avoid being criticized.*	2.29 (1.25)	-.33	-.92	2.72 (1.25)	-.73	-.47	1.08 (1.1)	.87	.02	1.30 (1.20)	.74	-.35
13. Heart palpitations bother me when I am around people.	1.38 (1.31)	.48	-1.01	1.54 (1.35)	.37	-1.09	.55 (.82)	1.57	2.02	.59 (.92)	1.54	1.53
14. I am afraid of doing things when people might be watching.*	2.41 (1.16)	-.33	-.73	2.83 (1.16)	-.84	-.10	1.03 (1.04)	.99	.62	1.22 (1.06)	.67	-.14
15. Being embarrassed or looking stupid are my worst fears.*†	2.90 (1.19)	-1.03	.18	3.23 (1.04)	-1.39	1.15	1.02 (1.21)	1.18	.42	1.31 (1.22)	.64	-.55
16. I avoid speaking to anyone in authority.*	1.88 (1.33)	.06	-1.14	2.19 (1.40)	-.21	-1.21	.45 (.66)	1.18	.21	.65 (.88)	1.31	1.30
17. Trembling or shaking in front of others is distressing to me.	2.00 (1.40)	-.04	-1.26	2.13 (1.37)	-.13	-1.22	.86 (.97)	1.14	.93	.85 (1.01)	1.22	1.06

M – Mean (Standard Deviation); S – Skewness (Standard Error); K – Kurtosis (Standard Error)
†These three items were in the Mini-Spin; *Significantly different between the sexes; Items in grey did not meet loading criteria (Osborne, 2008) and were excluded

### Table 2. Confirmatory Factor Analyses Fit Indices

Clinical

Items	Factors	χ^2	χ^2/df	CFI	SRMR	RMSEA	RMSEA 90% CI	ECVI	ECVI90% CI
17	3	701.82	6.06	.637	.107	.169	.157; .182	4.408	3.955; 4.904
17	1	672.47	5.65	.660	.098	.162	.150; .174	4.183	3.744; 4.665
9	2	142.08	5.47	.851	.073	.159	.134; .185	1.023	.832; 1.257
9	1	200.17	7.41	.778	.106	.191	.167; .216	1.342	1.107; 1.619
5	1	88.96	17.79	.862	.069	.309	.255; .367	.619	.466; .815

Undergraduate

Items	Factors	χ^2	χ^2/df	CFI	SRMR	RMSEA	RMSEA 90% CI	ECVI	ECVI90% CI
17	3	423.18	3.65	.793	.078	.137	.123; .151	3.526	3.107; 3.999
17	1	434.82	3.654	.788	.078	.137	.123; .151	3.566	3.141; 4.045
9	2	64.68	2.49	.945	.045	.103	.072; .134	.728	.587; .924
9	1	82.92	3.07	.920	.055	.121	.092; .151	.843	.675; 1.065
5	1	17.63	3.53	.970	.036	.134	.070; .204	.267	.202; .386

90% CI Refers to the 90% Confidence Intervals

The best model across both data sets was the 9-item 2-factor model; however, that model was only found to have acceptable fit indices in the undergraduate sample and those fit indices were statistically significantly improved relative to the other models.

The 9-item 2-factor model was the best fitting model for the clinical sample; moreover, the fit indices were statistically significantly improved relative to all other models tested with that data.

Figure 1: 2-Factor Model
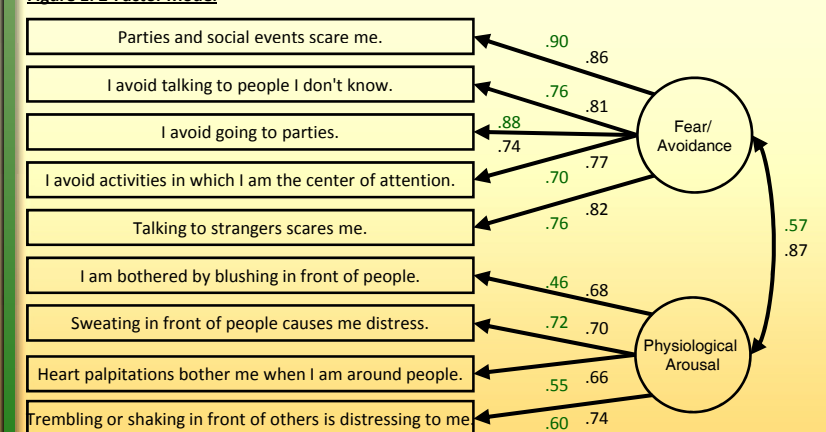
Loadings and the correlation in Green are for the Clinical sample