Testing the Bifactor Model of the Financially Focused Self-Concept Scale

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Abstract: Financially focused self-concept has been linked to gambling problems among people who gamble. Herein, we examined the bifactor structure of the 20-item financially focused self-concept scale (FFS), which includes one global factor and four grouping factors (self-views, feelings, interpersonal relationships, achievement). We examined the convergent and discriminant validity of the 20-item and 4-item FFS. Participants were community members who gamble ($N = 393$). They completed the 20-item FFS, Perceived Relative Deprivation Scale (PRDS), Problem Gambling Severity Index (PGSI), and reported personal income. The bifactor model provided a good fit to the data, and a better fit relative to a single-factor model. All FFS items loaded strongly on a global factor. The 20-item and 4-item FFS had similar positively moderate correlations with PRDS and PGSI, and no association with personal income. These findings support the robust psychometric properties of the FFS and are the first to support a bifactor model of financially focused self-concept.

Keywords: Self-concept, Disordered Gambling, Financial Success, Measurement, Psychometrics.

Introduction

People who have a financially focused self-concept tend to overvalue the importance of financial success when assessing their self-worth in an array of domains (Tabri, Wohl, Eddy, & Thomas, 2017). Research using the 20-item and 4-item Financially Focused Self-Concept Scale (FFS; Tabri et al., 2017) has found that being financially focused is central in the etiology and maintenance of disordered gambling (Tabri, Salmon, & Wohl, 2021, in press; Tabri & Wohl, 2021). The utility of the FFS resides, in part, on its bifactor structure (Tabri et al., 2017; Markon, 2019). Specifically, it has one global factor underlying all items that coexists with four domain factors (self-views, feelings, interpersonal relationships, and achievement; see Table 1). The domain factors explain variance in the items that is unexplained by the global factor.

However, the factor structure of the FFS has only been examined using principal component analysis (PCA; Tabri et al., 2017; Tabri et al., 2018). PCA is an exploratory data reduction method used to generate weighted linear combinations of observed variables that explain the most variance in the data. That said, PCA does not distinguish between variance due to the construct and other sources of variance (e.g., common variance, measurement error) and so is not well-suited to measuring unobserved constructs (Borsboom, 2006). To properly validate the FFS, a confirmatory factor analytic approach is required that tests both the bifactor structure and treats the underlying construct as an unobserved or latent variable. Herein, we addressed this gap in the literature using exploratory structural equation modeling (ESEM; Kline, 2016) with a sample of people who gamble.

Method

Participants, Procedure, and materials

Participants were 393 (215 cisgender men, 171 cisgender women, 4 non-binary, 2 transgender men, 1 transgender woman) American citizens residing in the US who had spent at least $100 on their gambling in the last 12 months (M_{age} = 38.03, SD_{age} = 11.41; four did not report age). They completed the 20-item FFS (Tabri et al., 2017; α = .95) from which the 4-item FFS is computed (α = .79), with items anchored from 0 (*Not at all*) to 4 (*Extremely*).

Participants also completed the 4-item Perceived Relative Deprivation Scale (PRDS; Callan et al., 2008; α = .74) to measure feelings of financial relative deprivation and the 9-item Problem Gambling Severity Index (PGSI; Ferris & Wynne, 2001) to measure disordered gambling severity (α = .93). Personal income was reported using 11 categories in $20,000 increments starting with "less than 20,000" and ending with "200,000 or more."

Data analytic plan

We used ESEM with oblique rotation to allow for intercorrelations between factors. The FFS items were modeled as ordered categorical variables using the robust diagonally weighted least squares method of estimation. We compared the fit of the bifactor model with the fit of a single-factor model and first-order four-factor model. We also tested a second-order model that included four first-order factors regressed on a second-order factor and permitted item cross-loadings on the first-order factors (see ESEM within confirmatory factor analysis in Morin et al., 2016). To adjudicate model fit, we used the mean and variance adjusted chi-square test of model fit (χ^2), comparative fit index (CFI), root mean square error of approximation (RMSEA), and the standardized root mean square residual (SRMR). An excellent fit is characterized by a statistically nonsignificant χ^2, a CFI $\geq$ .95, an RMSEA $\leq$ .05, and an SRMR $\leq$ .02 (Kline, 2016). Because χ^2 is sensitive to sample size, small model-data discrepancies may be detected as statistically significant in large samples. In this situation, Kline (2016) recommends examining the residual correlation matrix for values $\geq$ |.10| to diagnose misfit. Models were compared using chi-square difference tests ($\Delta\chi^2$). After testing the bifactor structure, correlations between the measured variables, including the 4-item FFS, were examined to determine convergent and discriminant validity.

Results

The bifactor model provided a good fit to the data (see Table 2) with no residuals $\geq$ |.10|. The four-factor model also provided a good fit to the data, but the single-factor model provided a poor fit to the data. The analysis for the second-order model with cross-loadings did not converge. Consequently, fit statistics are not available. We re-analyzed the second-order model without cross-loadings (i.e., items from the same domain were only allowed to load together). The revised second-order model did not provide a good fit to the data, $\chi^2(166) = 882.77$, $p < .0001$, CFI = .95, RMSEA = .11, and SRMR = .05. The bifactor model provided a stronger fit to the data compared to the single-factor, $\Delta\chi^2(70) = 904.78$, $p < .001$, first-order four-factor, $\Delta\chi^2(16) = 69.64$, $p < .001$, and revised second-order factor, $\Delta\chi^2(66) = 554.52$, models. Together, the bifactor model was the superior model and reflected the factor structure well with all items having strong loadings on the global factor (see Table 1). Thus, the FFS items were averaged with higher scores indicating greater financial focus.

Descriptive statistics and correlations are reported in Table 3. Of the 393 participants, 37.4% were likely to experience problem gambling, 31% were at moderate risk for gambling problems, 19.3% were at low risk for gambling problems, and 12.2% did not have gambling problems. Financial focus had moderately positive associations with the PGSI total score and PRDS, but not with the personal income. Similar correlations were observed when using the 20-item or 4-item FFS, which were highly correlated.

Table 1. Standardized factor loadings from the bifactor model analysis examining the financially focused self-concept scale.					
Item	Global	1	2	3	4
Interpersonal relationships					
The opinion others have of me is based on the among of money I have	.68**	.62**	.01	.02	.02
The amount of influence I have on other people depends on the among of money I have	.70**	.45**	.01	-.02	-.05
†People will think less of me if I do not have a lot of money	.77**	.34**	-.02	-.09	-.10
People would be more interested in me if I had more money	.76**	.18	-.12	-.19	-.21
My relationships would improve if I had more money	.81**	.19**	-.04	-.01	.06
Achievement					
The amount of success I have in my (future) job or career depends largely on the amount of money I have	.74*	-.01	.12	.23*	-.23
The amount of money I have influences my ability to do things	.55*	-.06	-.42*	.04	.02
My performance in activities (e.g., school, work, hobbies, etc.) is influenced by the among of money I have	.63*	.02	-.01	.52**	-.03
†The opportunities that are available to me depend on the amount of money I have	.67**	-.05	-.27*	.23*	.05
My school and work performance or opportunities would improve if I had more money	.73**	-.03	-.13	.28**	.02
Self-views					
My value as a person depends upon how much money I have	.77**	.13	.35**	.09	.11
†How I feel about myself is largely based on the amount of money I have	.80**	.01	.49**	-.02	.03
I would think more highly of myself if I had more money	.87**	-.07	.19	-.13	.10*
Money is a large part of who I am	.74**	-.03	.41*	.03	.01
It is difficult to feel good about myself when I do not have a lot of money	.82**	-.05	.04	-.12	.25**
Feelings					
My ability to feel happy depends on the amount of money I have	.81**	.04	.08	.03	.36**
Making money is one of the few activities that makes me feel good or like I am accomplishing something	.66**	-.23	.26	-.03	-.01
My life will be more exciting or rewarding if I had more money	.81**	-.35	-.08	-.03	-.05
†My moods are influenced by the amount of money I have	.77**	-.01	.01	-.04	.42**
I would enjoy life more if I had more money	.81**	-.24	-.15	-.05	.06

Note. Items marked with † are included in the short 4-item Financially Focused Self-Concept Scale.

*p < .05; **p < .01.

N = 393

Table 2. Model fit statistics for the structural equation modelling analyses				
	$\chi^2(df)$	CFI	RMSEA	SRMR
Bifactor model with four correlated grouping factors ESEM analysis	206.62(100)**	.99	.05	.02
First-order four-factor model ESEM analysis	278.97(116)**	.99	.06	.02
Single factor model CFA	1385.02(170)**	.92	.14	.07
Second-order model with four first-order factors and cross-loadings CFA	NC	NC	NC	NC
Revised second-order model with four first-order factors and no cross-loadings CFA	882.77(166)**	.95	.11	.05

Note. ESEM = Exploratory Structural Equation Modelling; CFA = Confirmatory Factor Analysis; CFI = Comparative Fit Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardized Root Mean Square Residual; ESEM = Exploratory Structural Equation Modelling.

*p < .05; **p < .01.

N = 393.

Table 3. *Descriptive statistics and inter-correlations between all variables*

Variable	M(SD)	1	2	3	4	5
1. 20-item FFS	2.05 (.91)	—	.54**	.48**	-.04	.94**
2. PRDS	3.66 (1.26)		—	.30**	-.32**	.54**
3. PGSI	7.04 (6.38)			—	.06	.47**
4. Personal income	3.44 (2.18)				—	-.04
5. 4-item FFS	2.04 (.96)					—

Note. FFS = Financially Focused Self-Concept Scale; PRDS = Personal Relative Deprivation Scale; Problem Gambling Severity Scale.

*p < .05; **p < .01.

N = 393

Discussion

The current research is the first to examine and find support for the bifactor structure of the 20-item FFS using a confirmatory (as opposed to an exploratory) approach. A global FFS factor emerged along with four domain factors, which is consistent with research on other focused self-concepts, including appearance (Spangler & Stice, 2001) and health (Yung & Tabri, 2022). There was also a range in the magnitude of loadings on the domain factors, and there were some cross-loadings (items from one domain loaded with items from another domain; see Table 1). These observations suggest that the Financially Focused Self-Concept construct is reflected by all 20 FFS items and thus the scale is empirically well-defined. In contrast, the domain factors (interpersonal, achievement, self-views, and feelings) were not empirically well-defined. Consequently, in practice, researchers should calculate and use in their analyses a global FFS score (average of the 20 items) as opposed to calculating an average score for each domain (interpersonal, achievement, self-views, and feelings items, respectively). Although our recommendation to compute the average of the 20 FFS items is consistent with conceptualizing the Financially Focused Self-Concept construct as a single-factor, the single-factor model did not provide a good fit to the data. The reason is that the single-factor model does not account for residual variance due to item domain.

Accordingly, a dysfunctional self-concept focused generally on financial success as paramount for success in various life domains may help proliferate and maintain disordered gambling. Indeed, akin to prior work, financial focus was positively associated with problem gambling severity and perceived financial relative deprivation (Tabri & Wohl, 2021)—demonstrating convergent validity. In contrast, financial focus was not

associated with (self-reported) personal income—demonstrating discriminant validity. This was the case when using the 20-item or 4-item FFS. Notably, the items in the 4-item FFS had strong loadings on the global factor, which supports the use of the 4-item FFS should resources be limited.

Future research should further examine the psychometric properties of the FFS in terms of measurement invariance. A recent study found that the 4-item FFS is temporally invariant over a one-month period among predominantly older people who gamble (Tabri, Philander, Wood, & Wohl, 2021). It would also behoove researchers to examine whether the Financially Focused Self-concept construct (measured by the FFS) carries the same meaning among people with and without gambling problems using measurement invariance testing. Together, the current research provides further support for the robust psychometric properties of the FFS.

Availability of data and material:

The analyzed data and statistical outputs are available via the Open Science Framework: https://osf.io/chvj7/

Ethics and informed consent：

The research was approved by Carleton University Research Ethics Board – B (Clearance number #116541)

Research Promotion

The Financially Focused Self-Concept Scale has a bifactor structure, which indicates that people can have a dysfunctional self-concept focused generally on financial success as paramount for success in various life domains. Having a financially focused self-concept may help proliferate and maintain disordered gambling.

Transprency Statement

In the interest of transparency and openness, we note that the data reported herein are part of a larger project examining attentional biases among people who gamble and who have a financially focused self-concept. The questionnaires and data described herein were completed before the attentional bias task.

Statement of Competing Interests

All authors report no financial relationships with commercial interests tied to this research. NT and MJAW have received consulting fees from the gambling industry in Canada, New Zealand, the US, Italy, and the UK. NT and MJAW have also received research contracts from Gambling Research Exchange Ontario (GREO). MJAW currently sits on the International Advisory Board of the (Singapore) National Council on Problem Gambling and the Research Review Committee of the Massachusetts Gaming Commission. HSK has received research grants from the Alberta Gambling Research Institute and GREO.

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