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Construct validity of Williams' ostracism needs threat scale☆,☆☆

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ABSTRACT

Much recent work on ostracism has used the online game Cyberball paired with an un-validated 12-item scale that purportedly measures four needs. Thus, the present paper examined convergent and discriminant validity for the needs threat scale compared to the Sheldon Needs Scale, a more established measure of ten psychological needs. Two samples, containing 192 participants, completed inclusion or exclusion manipulations via Cyberball. Convergent validity correlations were higher than divergent correlations, but within-scale correlations were higher still, suggesting the sub-scales are not perfectly distinct. This was further supported by the poor fit to a four-factor model in confirmatory factor analysis and the existence of a two-factor structure in exploratory factor analysis.

1. Introduction

Since 2001, at least 20 papers on ostracism, most in high impact journals, have used an un-validated self-report scale as the main dependent variable (Hartgerink, van Beest, Wicherts, & Williams, 2015). The independent variable in these studies is Cyberball, an online game that controls whether participants are included (or ostracized) by other pseudo-participants in a game of ball toss (Williams, Yeager, Cheung, & Choi, 2012). These studies have invariably found ostracism to be distressing (Hartgerink et al., 2015). According to Williams' (2001) needs-threat model, ostracism is distressing because it affects four fundamental needs: belonging, self-esteem, control and meaningful existence. These needs are, in brief, the need to have pleasant interactions with others (belonging), the need to believe others view us as worthy (self-esteem), the need to have influence over our social environment (control), and the need to avoid our fear of death by making an impact on the world (meaningful existence). These needs come from diverse research traditions (Baumeister & Leary, 1995; Friedland, Keinan, & Regev, 1992; Solomon, Greenberg, & Pyszczynski, 1991) and, in the case of self-esteem, may be slightly idiosyncratically defined. The four needs are assessed in many papers by a 12-item scale developed by Zadro, Williams, and Richardson (2004) with three items for each need. For ease of exposition, we will call this the *needs-threat scale*.

Establishing the validity of the needs threat scale is essential because needs are very difficult to assess (Murray, 1938/2008). In its favor, the needs-threat scale has passed the basic psychometric tests to which it has been subjected thus far. First, the sub-scales have reasonable reliability, ranging from αs ≥ 0.66 (Zadro et al., 2004) to αs ≥ 0.93 (Wesselmann, Bagg, & Williams, 2009). Second, the scale has good known group validity, reliably differentiating needs threat in included and excluded groups. Third, there is no difference in aggregate effect size between the needs-threat scale and other behavioral or scale measures of needs threat (Gerber & Wheeler, 2009), suggesting the scale is neither an outlier nor the sole measure of ostracism's distress.

On the other hand, the demonstration of other key psychometric markers is missing. For example, the factor structure of the scale remains unknown, although Williams and colleagues may be preparing a report to address this issue. Similarly, little is known about the construct validity of the scale compared to other measures. Even if a four-factor structure is found by Williams' group, construct validity is essential for establishing that the four sub-scales in the needs-threat scale are measuring needs. To address this, we compared the needs-threat scale to a measure of ten needs developed by Sheldon, Elliot, Kim, and Kasser (2001), hereafter the *Sheldon scale*. The Sheldon scale is derived from self-determination theory and measures ten needs found in satisfying events: the need to cause one's own actions (autonomy), the need to be in regular contact with other people (relatedness), the need to feel capable and effective in what one is doing (competence), the need to feel as worthy as others (self-esteem), the need to be respected and influential to others (popularity-influence), the need to be healthy and well taken care of (physical thriving), the need to develop potential and a meaningful life (self-actualization-meaning), the need to feel one is able to buy most of what one wants (money-luxury), the need

☆ Aside from the first author, author names are listed alphabetically and do not reflect unequal contributions to the paper.

☆☆ All data, syntax files and materials are available via the Open Science Framework at https://osf.io/6mfvk/.

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to be in control and unthreatened (security), and the need to feel enjoyment out of life (pleasure-stimulation).

If the needs-threat scale is to demonstrate adequate construct validity, needs represented in that scale should converge and diverge in expected ways with the Sheldon scale (see Table 1 for predictions).[1] In particular, needs-threat belonging should correlate with Sheldon's relatedness and popularity. Similarly, needs-threat self-esteem scores should correlate with Sheldon's self-esteem. Third, while the Sheldon scale has no exact parallel to Williams' definition of control, the need for autonomy is the closest match, and we also expect correlations with competence and self-actualization. Fourth, needs-threat meaningful existence is best captured in the need for self-actualization and popularity (the latter due to ostracism's effect of making the ostracized feel invisible), and, to a lesser extent, autonomy (because self-determination theory predicts individuals find meaning in autonomy).

Beyond these direct equivalences, the sociometer hypothesis (Leary, Tambor, Terdal, & Downs, 1995) suggests a correlation between self-esteem and belonging, and hence we expect a correlation between needs-threat belonging and Sheldon self-esteem, and also between needs-threat self-esteem and Sheldon relatedness. In a similar vein, self-worth has been linked to autonomy and competence, and hence we expect both of these to correlate with needs-threat self-esteem (Ryan & Deci, 2000).

With respect to discriminant validity, none of the needs-threat subscales are expected to correlate highly with Sheldon's physical thriving, money-luxury or security needs.

As a secondary issue in this study, a basic structural analysis was completed via principal components analysis, and two confirmatory factor analytic models were explored.

Two samples were collected to complete the psychometric analyses described above. The first comprised unpublished data from the first author's dissertation (2008), and examined construct validity primarily in the context of Cyberball exclusion. The second study comprised data from a capstone psychology project examining construct validity in the context of Cyberball inclusion. Given that almost identical correlational patterns were found in both samples, the samples were pooled for analysis to provide increased stability regarding the direction of, and confidence intervals around, our correlations (Schönbrodt & Perugini, 2013). Analyses of each sample separately are available via OSF.

2. Method

2.1. Participants and procedures

The first sample utilized dissertation data from the first author (Gerber, 2008), some of which were subsequently published as Experiment 2 in Gerber and Wheeler (2014). These comprised 84 undergraduates (54 female, 30 male; $M_{age} = 20.29$, $SD_{age} = 3.57$) who had completed a Cyberball administration in a laboratory, with 68 receiving some form of exclusion (in three different experimental conditions) and 16 receiving inclusion. After the primary dependent variable, the needs-threat scale, participants completed the Sheldon scale. All were completed via computer, and items were not randomized.

The second sample contained 108 participants (47 female, 60 male, 1 missing; $M_{age} = 35.22$, $SD_{age} = 9.74$) recruited online through Amazon's MTurk [Mechanical Turk], in exchange for $1. Volunteers were told that they would be participating in a study measuring online games and identity. All participants experienced the inclusion condition. After completing the Cyberball game, participants were directed to Surveymonkey to complete the needs-threat scale and the Sheldon scale based on their experience during the game.

[1] We cannot present a full MTMM analysis because the traits are not identical between scales.

Table 1
Validity predictions between Williams' needs-threat and Sheldon subscales.

Sheldon subscales	Williams' needs-threat subscales			
	Self-esteem	Belonging	Control	Meaningful existence
Autonomy	Convergent		Convergent	Convergent
Competence	Convergent		Convergent	
Relatedness	Sociometer	Convergent		
Self-actualization-meaning			Convergent	Convergent
Physical thriving	Divergent			
Pleasure-stimulation				
Money-luxury	Divergent			
Security				
Self-esteem	Convergent	Sociometer		
Popularity-influence		Convergent		Convergent

3. Results

3.1. Validity

To test convergent and discriminant validity, needs-threat subscales and Sheldon subscales were correlated (see Table 2 for a full MTMM matrix). As expected, the subscales of the needs-threat scale were reliable (αs = 0.71 to 0.79). All correlations between Sheldon and needs-threat subscales were significant. The predicted convergent correlations were larger (rs = 0.36 to 0.66) than the predicted divergent correlations (rs = 0.22 to 0.48). However, not every convergent prediction was higher than every non-predicted correlation. For example, popularity-influence's correlation with Williams' meaningful existence was equal to the non-predicted correlation between popularity and control. The needs-threat self-esteem subscale had lower correlations with the Sheldon scale. Taking an MTMM perspective, the correlations within the needs-threat subscales (rs = 0.65 to 0.78) and the Sheldon subscales (rs = 0.40 to 0.89) were higher than the predicted convergent correlations.

3.2. Confirmatory factor analysis

Two confirmatory analyses (reported on OSF) failed to support a four-factor structure. A four-factor model with three items loading onto each factor had poor fit ($\chi^2 = 176.83$, $p < 0.005$, RMSEA = 0.12, CFI = 0.92, TLI = 0.89, SRMR = 0.07). Including self-esteem cross-loadings on all items led to a covariance matrix that was not positive definite, most likely due to high correlations between the factors.

3.3. Exploratory factory analysis

To further examine the structure of the needs-threat scale, we conducted principal axis factoring with a direct oblimin rotation, limiting the solution to factors with eigenvalues greater than one. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.91, and Bartlett's test of sphericity was significant (χ^2 (66) = 1562.87, $p < 0.001$), suggesting a high likelihood of successful factor extraction. The analysis (and the scree plot) suggested a two-factor solution, the pattern of which is reported in Table 3. The first two factors explain 54.28% and 11.69% of the variance, respectively. The third and fourth factors came in with eigenvalues lower than one, explaining only 6.70% and 5.92% of the variation, respectively. The two factors extracted were somewhat oblique, exhibiting an inter-correlation of −0.50.

These results do not support a four-factor solution, nor does either factor correspond directly to any of the four needs purportedly