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The Situational Triggers of Aggressive Responses scale in five countries: Factor structure and country clustering solutions

Kostas Mylonas [a,*], Claire Lawrence [b], Anna Zajenkowska [c], Mary Bower Russa [d]

[a] National and Kapodistrian University of Athens, Greece
[b] University of Nottingham, UK
[c] The Maria Grzegorzewska University, Poland
[d] Grand Valley State University, USA

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ABSTRACT

Much research has focused on the detection of factors that might lead to aggression based on evolutionary arguments, trait approaches, psychosocial models and cognition/information processing. There may be trait differences in the way that individuals respond to environmental triggers thus, aggression may occur as the expression of a trait during specific situations. Such specific situations have been described (Lawrence, 2006) as "situational triggers" and are assessed through the STAR (Situational Triggers of Aggressive Responses) scale which is comprised of two main situational prompts, *Provocations* and *Frustrations*. In Study 1 ($N = 328$ Greek university students), confirmatory factor analysis modeling confirmed the STAR scale structure with minor fluctuations. In Study 2, using data from the UK, Poland, Korea and USA, as well as an additional sample of Greek participants ($N = 1219$), we tested the STAR for factor equivalence levels, aiming at an overall factor structure. The scale structure was confirmed across countries with levels of factor equivalence being satisfactory, although some within-factor collinearity was observed. A clusters-of-countries approach was thus implemented for further testing within each cluster. Overall, the stability and validity levels of the STAR structure and its cross-cultural application were verified with possible considerations of country-sets being the units of future analysis.

1. Introduction

Estimating when a person is likely to behave aggressively is a key step in intervening to prevent aggression (Barling, Dupré, & Kelloway, 2009). Research on this topic has focused on several different levels of analysis. First, evolutionary arguments have sought to explain aggressive behavior as a function of Darwin's sexual selection (e.g., Archer, 2009), which may be subject to geographical and culture influences. Second, trait approaches have examined which individuals are more likely to act aggressively, with traits such as trait aggression (Buss & Perry, 1992), narcissism (Bushman et al., 2009), impulsivity (Cross, Copping, & Campbell, 2011) and hostile attribution (Crick & Dodge, 1996) all increasing the likelihood that a person will behave aggressively (Bettencourt, Talley, Benjamin, & Valentine, 2006; Lawrence & Hodgkins, 2009; Ortiz & Raine, 2004; Wilkowski, Robinson, & Troop-Gordon, 2010). Finally, psychosocial models have pointed to environmental influences on aggression. These environmental influences can be broad, such as the relative differences in approval for aggressive behavior across cultures or by sex (Thanzami & Archer, 2005), or they can be more specific, such as the presence of provocations (Anderson & Bushman, 2002), frustrations (Berkowitz, 2008), and additional demands on self-control (Stucke & Baumeister, 2006). Thus, much of the research has focused on the detection of factors that might lead to aggression, with both personality factors such as aggressive/angry traits, and situational factors such as frustration, stress, or state anger (McCurdy, 2005; Sprague, Verona, Kalkhoff, & Kilmer, 2011), playing a role. While this research suggests that both dispositional and situational triggers may increase the likelihood of aggressive responding, more subtle individual differences in cognition or information processing (e.g., schemata; Milner et al., 2011) also play a key role in influencing the propensity for aggressive behavior. For example, individual differences in the tendency to attribute hostile intent are associated with variations in aggressive responding (see Crick & Dodge, 1994 for a review). These data are consistent with more recent research, which demonstrates significant individual differences in reactivity to hostile cues (e.g., Lawrence & Hodgkins, 2009; Robinson & Wilkowski, 2010).

In fact, it has been proposed that there may be trait differences in the way that individuals respond to these environmental triggers (Lawrence, 2006). Thus, the tendency for aggression in response to specific situations has a trait-like quality, with individuals varying in their inclination to act aggressively in response to situational

* Corresponding author at: Department of Psychology, National and Kapodistrian University of Athens, Ilisia, 15784 Athens, Greece.
E-mail addresses: kmylonas@psych.uoa.gr (K. Mylonas), Claire.Lawrence@nottingham.ac.uk (C. Lawrence), zajenkowska@gmail.com (A. Zajenkowska), bowerm@gvsu.edu (M. Bower Russa).

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triggers. Specific situations that often trigger aggression have been described as "situational triggers" (Lawrence, 2006) and have served as the basis for an instrument designed to "predict individual differences in the kinds of events and antecedents that make people feel aggressive" (p. 242). Based on these theoretical grounds, the Situational Triggers of Aggressive Responses (STAR) scale was created in order to assess aggression under two main situational prompts, *Provocations* and *Frustrations*. Through a series of studies, Lawrence (2006) devised and tested a set of items, scored by youth and adults (16 years or older) reflecting individuals' self-reported propensity to respond aggressively to various triggers, as related to *Sensitivity to Frustrations* (SF) and *Sensitivity to Provocations* (SP) (further details on the STAR scale are given in Section 2.2). The extent to which the STAR scale's structure is reproducible across different countries and cultures has been examined to a limited extent only. To date, apart from the initial UK studies, the STAR has also been used in Germany (Bondü & Richter, 2016) and at least two other countries, Poland and Greece, with research supporting convergent validity for the STAR in samples in these two countries along with a new UK sample (Zajenkowska, Mylonas, Lawrence, Konopka, & Rajchert, 2014); some support for cross-cultural equivalence of the factor structure was also found but in preliminary fashion. The extent to which the STAR scale's structure is reproducible across different countries and cultures has been examined to a limited extent, therefore. However, culture influences the way people display their angry feelings, possibly also depending on whether they are among people they know or are related to (Markus & Kitayama, 1991). Thus, cross-cultural exploration of questions related to readiness for aggression using STAR requires more thorough exploration of the stability of the factor structure across countries that are diverse in terms of geographic proximity and continent. This way, we may better understand the cross-cultural similarities and differences in aggression mechanisms, taking other situation-specific correlates into consideration as well.

With these in mind, the main purpose of the current two studies is to test the factor structure of the STAR scale. For a scale to be readily available for use in different cultures, it must support various levels of equivalence starting with factor structure equivalence (Van de Vijver & Leung, 1997). The first study is a confirmatory factor analysis approach applied to a Greek sample of 328 university students. This first study served as a pilot one and a guide for the second study where data ($N = 1219$) from the UK, Poland, South Korea and the USA, as well as an additional sample of Greek participants were examined. The aims of the second study were to test the STAR scale within these five countries for factor equivalence levels, and if possible, derive an overall factor structure for these countries.

2. Study 1

2.1. Purpose and sample characteristics

The purpose of this study was to confirm the existence of the two STAR dimensions (*Sensitivity to Provocations* and *Sensitivity to Frustrations*) in a Greek sample of university students. The sample consisted of 328 students, 203 of which studied psychology, 106 of which studied sciences, and 15 of which studied medicine. Approximately 70% of these students ($N = 229$) were females and the mean age for the total sample was 21.34 years ($SD = 3.34$). These data were collected during the 2013–2014 academic year.

2.2. Materials and procedure

The STAR scale consists of 22 items, 10 of which comprise the *Sensitivity to Frustrations* (SF) factor and 12 of which comprise the *Sensitivity to Provocations* (SP) factor; all items are scored on a 5-point Likert-type scale and high-scores reflect individuals' self-reported propensity to respond aggressively to the two triggers. Scale construction and preliminary psychometric data for this instrument were based on UK samples. Both scales demonstrate good reliability (*Cronbach's* $\alpha = .82$ and .80 for SF and SP, respectively) and convergent validity (Lawrence, 2006; Lawrence & Hodgkins, 2009; Lawrence & Hutchinson, 2013a; Lawrence & Hutchinson, 2013b).

The STAR scale was first translated into Greek and was then back-translated into English by two experts. A few language modifications were necessary and cultural specificities were considered (so as to avoid sex-discriminating language and to convey the real cultural meaning of items as much as possible). The instrument was administered (having attained informed consent) to several small groups of university students who were awaiting a lecture.

2.3. Results

We first conducted confirmatory factor analysis (Jöreskog & Sörbom, 1996; Schreiber, Nora, Stage, Barlow, & King, 2006) on the 22 STAR items with respect to the original theory structure (Lawrence, 2006). The following criteria and indices were considered: Normal theory weighted least squares chi-square (χ^2) and χ^2/df, Comparative Fit Index (*CFI*), Goodness of Fit index (*GFI*), Root Mean Square Error of Approximation (*RMSEA*), and for the comparison across models, Tucker-Lewis Index (*TLI*) and $\Delta\chi^2$ along with its significance levels. In an initial two-factor solution, goodness of fit indices did not reach acceptable levels.

A closer look revealed some distribution irregularities that were possibly affecting correlation (*Pearson's r*) magnitudes. Recognizing that a non-parametric approach might improve the potential and precision of the correlation indices, a *Fisher's-z* transformation (Mylonas, 2009; Mylonas, Veligekas, Gari, & Kontaxopoulou, 2012; Steiger, 1980; Zajenkowska et al., 2014) was used to compare the *Pearson's r* indices with *Spearman's Rho* and *Kendall's Tau-b* indices. *Kendall's Tau-b* was used in all subsequent analyses because *Kendall's Tau-b* coefficients did not statistically differ from *Pearson's r* indices; for the overall sample only 10 out of the 231 pairs of coefficients were different at the .05 significance level (approx. 4%). Thus, the analysis on *Kendall Tau-b* is fully justified in this research as these coefficients only add/unmask information and do not alter the overall intercorrelation matrix. *Kendall's* approach is preferable to the *Spearman's Rho* to address statistical ties in the data (Howell, 1987). Nunnally and Bernstein (1994), in their discussion of measures of linear relation, suggest that "None has achieved the prominence of *r* because none fits as neatly into the mathematics of a general psychometric theory […] The closest to an exception is *Kendall's tau…*" (pp. 124–125). Apart from this assertion that *Kendall's Tau* coefficient can fit best in a general psychometric theory and this makes it a very good *Pearson's r* substitute, Nunnally and Bernstein explain that psychometricians should be cautious with the use of *Pearson's r* when equal intervals are not given, despite any continuity that may seem to exist in the data (i.e., Likert-type measurement scales).

A series of CFA models were applied to the data (Table 1). The independence model was easily rejected with a χ^2/df index reaching as high as 6.00. A unifactorial model was much better, but *RMSEA* remained at high levels and *CFI* was very low. The two-factor model showed improved goodness of fit, but *RMSEA* still remained rather high, and *GFI* and *CFI* did not improve much; however, there was some model improvement with respect to the unifactorial solution ($TLI = .20$).

A modified two-factor model reached acceptable levels with *RMSEA* being even lower than .05, *GFI* exceeding .90, *CFI* approaching .90, and χ^2/df dropping below 2 (despite the notorious and unavoidable χ^2 significance). Model improvement with respect to the unifactorial model was .51, a satisfactory *TLI* outcome. This final model in Table 1 is a modified two-factor model for which seven error covariances -strictly within factors- were estimated, allowing for some collinearity levels within factors (factors remaining independent). While this model was acceptable, it is noteworthy that it was the *Sensitivity to Provocations* factor which suffered the most from collinearity problems.

Table 1
Confirmatory factor analysis - Study 1 (Greek sample, $N = 328$).

Model	χ^2	df	p	χ^2/df	RMSEA	GFI	CFI	$\Delta\chi^2$	Δdf	TLI
[a] Independence model	1388.45	231	< .0000001	6.01	–	–	–	–	–	–
[b] Unifactorial model	537.72	209	< .0000001	2.57	.069	.87	.78	[a–b] 850.73**	22	[a–b] .69
[c] Two-factor model	471.16	208	< .0000001	2.27	.061	.88	.81	[b–c] 65.56**	1	[b–c] .20
[d] Two-factor model #	357.01	201	< .00001	1.78	.049	.91	.88	[b–d] 180.71**	8	[b–d] .51

Note: # Specific error covariances estimated for item pairs: 1, 3; 1, 16; 3, 16; 6, 20; 16, 19; 7, 8; 17, 18.
** Statistically significant at the .001 level.

In summary and with respect to the theoretical factor structure of the STAR scale, the outcomes of this first study were very promising. All details regarding the final CFA solution can be found in the Appendix. Despite the minor collinearity issues possibly reflecting cultural fluctuations, we determined it appropriate to further examine the fit of this modified two-factor model for a subsequent set of five countries (UK, US, Poland, Greece, and South Korea) in Study 2.

3. Study 2

3.1. Purpose and sample characteristics

The sample for this second study was collected from five countries, namely the U.K. ($N = 196$), Poland ($N = 300$), Greece ($N = 299$, a different sample from the one in Study 1), USA ($N = 215$), and South Korea ($N = 209$). Informed consent was attained in all countries and Institutional review board approval was also available. In all, 1219 university students responded to the 22-item STAR. Among these students, 57.7% were females and 42.3% were males; the students' median age was 20 years (95% range: 18–26 years). Translation and back-translation methods, similar to those used in Study 1, were employed. Additional personal data were also collected: daily smoking and alcohol consumption (times per week), the existence and duration of a sexual relationship, and coffee consumption per day. These measures acted as a safeguard, if problems of homogeneity within each sample appeared, so as to be able, if necessary, to remove unwanted variance due to extraneous factors by employing *post-hoc* statistical methods (Mylonas & Furnham, 2014). The data-collection procedure was similar to that of Study 1.

3.2. Statistical analysis and results

3.2.1. Factor equivalence testing and confirmatory factor analysis across countries

The confirmatory factor analysis models described in the previous study were also employed in this second five-country study, but were also preceded by other methods, namely Covariance Structure Analysis (Muthén, 1994, Muthén, 2000, as applied in Mylonas, Pavlopoulos, & Georgas, 2008, and in Mylonas et al., 2013) and MDS-T and Hit-matrix methods (as applied in Gari, Mylonas, & Portešová, 2013; Mylonas, 2009; Mylonas et al., 2011), as we first attempted to assess the levels of factor structure equivalence across the five countries through covariance structure analysis (Van de Vijver & Leung, 1997). This analysis is based on the estimated between and pooled-within correlation matrices as proposed by Muthén (1994, 2000), and as extended to factor analysis by van de Vijver and Poortinga (2002). Its outcomes suggested good levels of factor structure equivalence as the estimated average intraclass correlation was < .06, an indication that no multilevel modeling was necessary. However, as these coefficients do not necessarily ensure equivalence (factor loadings can still suffer from some bias), a series of five CFA models (one for each country) were employed as well, confirming the two-factor structure for the UK, Poland and Greece. Some irregularities were present for the USA and especially for the South Korean data (*RMSEA* > .06, *GFI* < .85, *CFI* < .85). However, at this point, we were justified in pursuing a common factor structure confirmation based on the covariance structure analysis general outcomes, so we first pursued confirmation of the two-factor structure as previously described for the overall sample. All outcomes are summarized in Table 2.

As shown in Table 2, the independence and unifactorial models (*a* and *b*) were rejected, although the unifactorial model showed vast improvement, albeit not reaching acceptance levels. The best fit was observed for the modified two-factor model (*d*), for which only *CFI* was marginally acceptable (.88). Model improvement was evident both with respect to the unifactorial model (*TLI* = .47), and the two-factor model without the estimation of any error covariances (model *c*). A closer inspection of the (*d*) modified model (including the error covariances within factors), revealed that all goodness of fit indices were slightly better, as also evident from the Tucker-Lewis Index (a non-zero value of .15). Overall, the data supported the existence of the two factors (with minor within-factor collinearity problems), even for seemingly diverse countries.

Still, the less than perfect *CFI* of .88 (model *d*) indicated the presence of some factor inequivalence, and as noted earlier, the few irregularities present when each country was analyzed raised opportunities for further modeling; a variant of multilevel modeling was employed utilizing the Hit-matrix and MDS-T methods, as these are described below in section 3.2.2. Through these and other methods of exploratory and confirmatory nature we attempted to identify specificities that might not have been previously apparent. The main axis in the exploratory stage of this analysis was based on the clusters of countries idea coined by Georgas and Berry (1995), which aims to compare country sets rather than individual countries, with these sets being defined through ecocultural or psychological indices (Georgas & Berry, 1995; Georgas & Mylonas, 2006; Mylonas et al., 2011).

3.2.2. A 'clusters of countries' methodology and confirmatory factor analysis across clusters of countries

We computed a two-factor solution (on *Kendall Tau-b* coefficients, using principal component analysis and orthogonal rotation) for each country separately, and we retained all rotated loadings for further use. We computed all *Tucker's phi* indices on these loadings, and a five by five matrix (countries) was formed. Each comparison (each country pair) comprised four *Tucker's Phi* indices (in a two by two sub-matrix), so in all, 100 indices were available (20 indices for the within country comparisons were identities, as expected). From these 100, 40 indices were further employed (omitting the 40 redundant indices above the diagonal of the matrix and the within-country identities). We counted the "hits" as the number of *phi* indices ≥ .90 for country-pair comparison, for example, for the Greek and the USA solutions, their first and second factors were identical, thus the number of hits was "2"; however for USA and South Korean solutions no factors were identical, thus the number of hits was 0. The maximum possible hits was 20 and the minimum was 0. In our hit matrix we counted eight such hits. We inserted the number of hits per country-pair into a plain five by five matrix. This Hit-matrix contained information on which pairs of countries presented two, one, or no identical factors (the diagonal was set to "2"), and this was then the basis for the similarity/dissimilarity Euclidean distance matrix to be analyzed through multidimensional scaling, trigonometrically transforming the coordinates to arrive at a circular continuum. Using this approach, the levels of factor equivalence across countries were used to portray larger homogeneous sets of countries, which