Factor Structure of the Relational and
Overt Aggression Questionnaire (ROAQ) in an Iranian Sample

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Objective: The purpose of this study is to provide evidence of validity of the Relational and Overt Aggression Questionnaire (ROAQ) among Iranian elementary students.

Methods: Three hundred and forty nine 4th and 5th grade students (ages 9 and 10) participated in this study. Participants completed the ROAQ. The scale consisted of 33 items designed to measure self-report aggressive behaviors for elementary school students attending fourth and fifth grade.

Results: Exploratory factor analysis resulted in three factors that included dimensions such as physical aggression, verbal aggression and relational aggression. Correlation among the three factors ranged from 0.25 to 0.43. Confirmatory factor analysis supported the multidimensional measurement model (the three-factor solution). Initial exploratory factor analyses revealed three factors that explained a substantial amount (42.32%) of the variance (20.24% by factor 1). The goodness-of-fit measures also revealed an adequate fit.

Conclusion: These results provide initial support for the construct validity of self-report version of the ROAQ in relation to the elementary students.

Declaration of interest: None.

Introduction

Aggressive and hostile behaviors, along with anger, constitute an important concern across cultures [1]. Childhood aggression has long been a focus of clinical intervention research. This focus is clearly warranted as children's aggressive behavior is remarkably stable over time and predictive from a number of negative outcomes throughout childhood and into adulthood [2,3]. While these findings are of importance in working with aggressive children and youth, many of these studies have limited relevance to females, because often measures of aggression used identified primarily with only male samples, or the researchers choose male samples for other reasons (e.g., to increase homogeneity of the sample). However, work by Crick and Grotpeter [4] has engendered

insights into relational aggression in females. Their research suggests that relational and overt aggression (physical and verbal aggression) were distinct forms of aggressive display, and males and females tend to manifest different forms of aggression. In a study in which 459 children were asked what "most boys do when they are mad at someone "and" what most girls do when they are mad at someone", relational aggression and verbal insults were the most frequently cited behaviors for girls, whereas, overt aggression and verbal insults were the most frequently noted behaviors for boys [5].

Crick, Grotpeter, and Bigbee, [6] proposed that females more frequently employ relational aggression because it damages the close dyadic bonds that are particularly important to females. In fact, girls reported significantly greater levels of distress than boys when confronted with relational provocation. Crick [7] has found that like overt aggression, relational aggression is relatively stable over time, and it predicts current and future social adjustment. Crick and Grotpeter [4] found a significant correlation between relational

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aggression in girls and their self reports of depression, loneliness, and social isolation. Unfortunately, they did not report the results of these indices in overtly aggressive males, so meaningful comparisons between gender groups were not possible. Prinstein, Boergers and Vemberg (8) also documented a significant relationship between relational aggression in girls and externalizing symptoms typical of disruptive behavioral disorders. Research indicates that relationally aggressive girl's social problems tend to increase as they become less accepted and more rejected by peers throughout their school year (9). Tomada and Schneider (10) found similar results in an investigation in Italy conducted with children whose ages ranged from 8 to 10 years old.

Crick et al. (11) reported there was a moderate relationship (r=0.60 to 0.75) between relational and overt aggression, with a number of students exhibiting both forms of aggression. The research observed the poorest outcomes for this group as compared to the non-aggressive and aggressive groups with one form of aggression. In a diverse adolescent sample, students who experienced both overt and relational victimization were most severely maladjusted and reported the highest level of depression, loneliness, and externalizing problems (8). Despite the moderate relationship between the two forms of aggression, it is important to note that relational aggression makes a unique contribution to adjustment beyond overt aggression (11).

Although Crick and Grotpeter (4) found the two types of aggression to be moderately correlated (r = 0.54), there is also evidence supporting the distinctiveness of these overlapping constructs. First, relational aggression predicts social maladjustment when levels of overt aggression are statistically controlled. Second, relational aggression is more predictive of social maladjustment in girls than in boys. Third, although girls and boys view relational aggression as harmful to others, girls are more likely than boys to use relational aggression to hurt another person, and girls report more distress when they are the victim of relational aggression (7). Fourth, relationally aggressive children exhibit a hostile attribution bias only in response to relational provocations,whereas overtly aggressive children exhibit a hostile attribution bias only in response to overt provocations (12). Crick (7) maintained that traditional measures of aggression fail to assess relational aggression, a form of aggression frequently employed by females which involves "harming others through purposeful manipulation or damage to their peer relationships".

Given the importance of aggression to children's concurrent and future adjustment (13) and the existence of reliable measurement of a form of aggression that may be more characteristic in girls than of boys, it is important to extend our knowledge of overt and relational aggression in boys and girls. In order to achieve a good self -report measure of aggression, many researchers have developed their own questionnaires. Buss and Perry (14) developed a self-report measure of trait aggressiveness; the Aggression Questionnaire (AQ), and has proved its worth in studying aggression profiles and predicting violent behavior. It is a questionnaire based on a four-factor structure; Physical Aggression (PA), Verbal Aggression (VA), Anger (A), and Hostility (H). Physical and verbal Aggression was seen to represent the instrumental components of aggression; anger, the affective component; hostility, and the cognitive component. Regarding its psychometric criterions, the results showed adequate test-retest reliability and internal consistency both for the general questionnaire and the subscales (14).

A more recent version of the AQ with an additional scale consisting of indirect aggression is available commercially (15). The focus of this study is on the original AQ. In general, studies have supported the psychometric soundness of this instrument (16-18), although some have recommended the questionnaire could be improved by removing some items. For example, Harris (19) suggested that the AQ hostility scale could be improved by removing two items. Based on confirmatory factor analyses of the AQ items, Bryant and Smith (20) proposed a refined measurement model with an improved fit consisting of three original items for each of the four AQ scales.

Most of the results obtained with the AQ are based on English-speaking samples;

however, there are few studies that evaluate the psychometric properties of the AQ in countries where other languages are spoken. In addition, AQ does not evaluate the relational aggression in children, so we added the eight items assessing relational aggression (14) to our new questionnaire, called "Relational and Overt Aggression Questionnaire" (ROAQ). In this study, we aim to: a) confirm the factor structure of the ROAQ in the Iranian community (construct validity), b) determine the internal consistency and reliability of this instrument, c) determine whether the Farsi script version of the ROAQ is a viable instrument for assessing the different components of the construct; relational, anger, hostility, physical aggression, and verbal aggression, and finally; d) determine gender differences in relational and overt aggression in elementary school students.

Materials and Methods

Participants

The sample consisted of 375 children (275 girls and 100 boys), elementary 4th and 5th grade students with their age ranging from 10 to 11 years old. The data file was randomly split, with the first group (n = 210) used for the exploratory analysis and the second group (n =175) used for the confirmatory factor analysis. Such a numerical partitioning of the sample sizes was undertaken in consideration of the minimum acceptable five responses-per-item ratio criterion in scale development, (21) as well as the recommended minimum 100 responses for confirmatory factor analysis, which forms the basis of a multiple-groups covariance structure analysis (22). A cluster random sampling method was used: at first, random sampling was used to select schools for each region of Tabriz in Iran, and then participants were randomly chosen from a list of seven public and private schools.

Procedure and Instruments

Research method in this study is in the format of descriptive-correlation. Researchers attempted to examine the validity of the relevant research tools by examining the Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA).

Aggression was measured by ROAQ which is based on the original version of Buss and Perry's Aggression Questionnaire (AQ) and Shahim's AQ. The AQ is a four-factor model consisting of 29 items. This questionnaire contains brief statements (e.g., Once in a while I can't control my urge to strike another person.) to which a rater assigns a number ranging from 1 to 5 (5-point Likert format), where 1 = uncharacteristic of me, and 5 = very characteristic of me. This questionnaire provides a total score and four subscale scores: Physical Aggression (9 items), Verbal Aggression (5 items), Anger (7 items), and Hostility (8 items).

Internal consistency reliability reported by Buss and Perry (15) are as follows: Physical Aggression=0.85, Verbal Aggression=0.72, Anger=0.83, Hostility =0.77 and the total score=0.89. The Bryant and Smith (20) refined version of the Aggression Questionnaire, consist of the following subset items from the original Buss and Perry (14) version: Physical Aggression [2, 6, and 8], Verbal Aggression [2, 4, and 5], Anger [1, 6, and 7], and Hostility [2, 3, and 4].

The standard forward-backward procedure was applied to translate the questionnaire from English into Persian (Farsi) language. The authors translated the items, and a provisional version was provided. Subsequently, it was translated back into English and checked by two English experts to confirm the similarity of the translated items to the original questionnaire. A pilot study was carried out to verify any weak items. For this purpose, children were asked individually to explain the meaning of each item, ensuring that this age range could clearly understand and correctly interpret the items. Careful cultural and age adaptation of the final version was then provided.

Aggression scale (Shahim, 2006) is a 21 item scale that was designed to assess relational and overt aggression in Iranian students. The response scale for each item ranges from 8 (seldom) to 40 (very often) producing a relational aggression score that could range from 1 to 8. In this study, we take advantage of subscale of AQ (relational aggression). Indeed, 8 items regarding relational aggression supplemented to two subscales of

physical aggression and verbal aggression of AQ. Its Cronbach Alpha Reliability coefficient for subscale of relational aggression is 0.89 (23).

The research protocol and consent form were approved by the Administration of Education of East Azerbaijan University. Consent was sought out from the school and a date was set for the tests, which would be implemented during student's class time. The participants were asked to complete the self-report Relational and Overt Aggression Questionnaire in the classroom setting. For an accurate completion of the questionnaire, the student participants were guided by trained survey takers, who were undergraduate students.

Statistical Analyses

The exploratory factor analyses were performed using SPSS version 17.0. Principal components and varimax rotation with Kaiser Normalization was used to extract the factors. In relation to the number of factors, the scree plot, and the criterion of eigenvalue higher than 1, all suggested three factors. In addition, the reliability (internal consistency) of the scale was evaluated with Cronbach's alpha.

For the confirmatory factor analysis, we used LIZREL 85, with the maximum likelihood method, which is commonly used in structural equation models (24,25). This method assumes normality, although this assumption is difficult to meet in psychology, maximum likelihood estimations are robust (25).

The following goodness-of-fit statistics were used in confirmatory factor analysis:

- Chi square: the purpose of this statistic is to contrast the null hypothesis that all residuals are null (24). The limitation of this test is that its value depends on sample size. Therefore, with large samples, the statistic tends to increase.
- Normed Chi-Square (NSC): this index is used to compare the magnitude of χ^2 with the degrees of freedom (χ^2/df); for a good fit, this proportion should be as small as possible, and values lower than 3 indicate a good or acceptable fit (24).
- Absolute Fit Indices: These indices evaluate whether the proposed model reproduces the data adequately.
  The following indices were calculated: the goodness of fit index (GFI), the adjusted

goodness of fit index (AGFI) - in which the values near to 1 indicate adequate fit; the root mean square residual (RMR) and the root mean square error of approximation (RMSEA)- in which small values indicate better fit; thus, values between 0.05 and 0.08 may indicate a reasonable error of approximation.

- Incremental fit indices: these indices measure the improvement of fit by comparing the proposed model with a model that assumes that there is no association among the observed variables, which is usually called the independence model. The following are incremental fit indices: the Normed Fit Index (NFI), the Tucker-Lewis index (TLI), the comparative fit index (CFI), and the incremental fit index (IFI)—the values of these indices should be close to 1 to indicate a good fit.

Results

Initial exploratory factor analyses revealed three factors (figure 1) that explained a substantial amount (42.32%) of the variance (20.24% by factor 1). The KMO value (0.87) was acceptable. The sphericity test was significant; hence, factor analysis of these items was appropriate. Factor 1 was signed by nine statements named to relational aggression. Factor 2 included five statements, which corresponded to the first scale of the original version of AQ (physical aggression). Factor 3 was comprised of four statements, which corresponded to the second scale of the original version of AQ (verbal aggression) (see table 1).

Confirmatory factor analysis was used to evaluate the goodness-of-fit of three alternative measurement models for the ROAQ. Table 2 presents the results of these analyses. The single factor model was used initially, however, fitted the data poorly, as shown by the fit indices (Goodness of Fit Index = 0.85, Adjusted Goodness of Fit Index = 0.82, Root Mean Square Error of Approximation (RMSEA) = 0.88, and NFI =0.86). The results show that the two-factor model fit the data very well. The indicators of the fit model were: Goodness of Fit Index = 0.92, Adjusted Goodness of Fit Index = 0.90, Root Mean Square Error of Approximation (RMSEA) =

0.05 and χ2/df = 1.72. However, the three factor model with 19 items were highly consistent with our data; Goodness of Fit Index = 0.93, Adjusted Goodness of Fit Index = 0.91, Root Mean Square Error of Approximation (RMSEA) = 0.04 and χ2/df =0.93 (Table 2). Therefore, it was concluded that three factor models is adequate and it supports ROAQ's multidimensionality. The model with standardized results is presented in Figure 2.

Reliability

In order to examine the internal consistency, ***Cronbach's alpha*** (α) ***was calculated*** for the 19 items, and for each factor, separately. The Cronbach's alpha was 0.83 for the total scale, 0.65 for physical aggression, 0.55 for verbal aggression, and 0.84 for relational aggression. Inter-factor correlations are shown in Table 3. Positive correlations were found between factors. These relationships were significant at p<.001.

Gender Differences

The mean and standard deviation of the ROAQ subscales for male and female are shown in Table 4. Independent sample t-tests revealed significant gender differences for relational and physical aggression, but not for verbal aggression, suggesting that boys show more physical and relational aggression than girls.

Table 1. Factor structure of the ROAQ

Item	Factor 1	Factor 2	Factor 3
Relational aggression			
1	0.720		
2	0.686		
3	0.672		
4	0.660		
5	0. 648		
6	0.621		
7	0.612		
8	0.595		
9	0.374		
Physical aggression			
10		0.698	
11		0.643	
12.		0.630	
13.		0.569	
14		0.538	
Verbal aggression			
15			0.666
16			0.635
17			0.557
18			0.367

Scree Plot
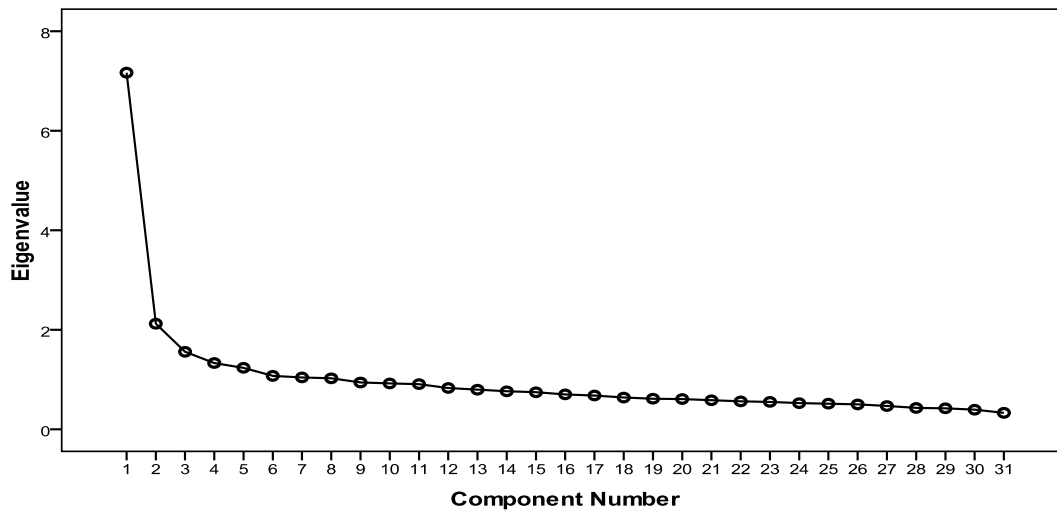
Figure 1. Scree plot of the ROAQ.

Table 2. Goodness-of-fit indices for the ROAQ

Model	X²	df	χ²/df	Absolute Fit Indices				Incremental Fit Indices		
				GFI	AGFI	RMR	RMSEA	NFI	CFI	IFI
1-Factor model	566.13	153	3.70	0.85	0.82	0.077	0.088	0.86	0.90	0.90
2-Factor model	282.26	152	1.86	0.92	0.90	0.13	0.050	0.91	0.96	0.96
3-Factor model	257.91	150	1.72	0.93	0.91	0.059	0.046	0.92	0.96	0.96
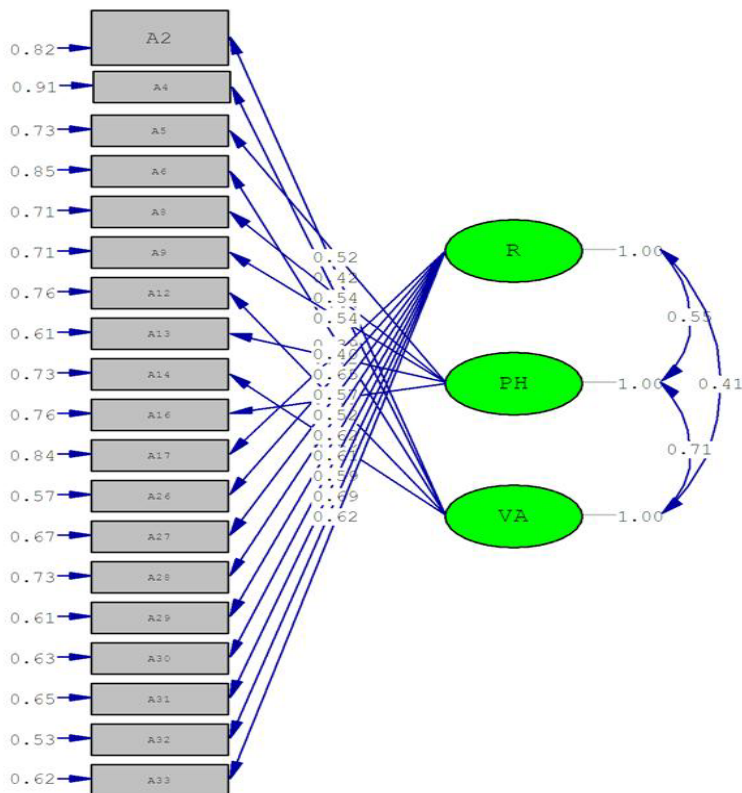
Chi-Square=257.91, df=149, P-value=0.00000, RMSEA=0.046

Figure 2. Confirmatory factor analysis of the ROAQ.

Table 3. Inter-factor correlation between factors

	Physical Aggression	Relational Aggression	Verbal Aggression
Physical aggression	1		
Relational aggression	. 433**	1	
Verbal aggression	. 399**	. 254**	1

** p<0.001

Table 4. Gender differences in subscales of ROAQ

	Boys		Girls			
	Mean	SD	Mean	SD	t	p
Relational aggression	20.87	7.96	17.94	7.57	3.51	0.001
Physical aggression	11.62	4.95	9.75	3.77	1.28	0.001
Verbal aggression	14.69	4.57	13.77	4.49	1.90	0.59

Discussion

The results of this present study generally supported the three-factor model of the Overt and Relational Aggression Questionnaire (ROAQ). Consistent with prior research (23), our results indicate a sufficient internal consistency and a satisfactory fitting to the three-factor model.

An expected correlation was found between physical aggression and verbal aggression, considering that both factors are different, but complementary aspects of instrumental behavior. It was not surprising that correlation between the two subscales of aggression (physical with relational) was modest.

Studies have often operationalized aggression as overt or physical aggression only (26,27). Physical aggression is a type of aggression in which harm occurs through direct physical damage or threat of physical damage to another person and includes behaviors such as physical attacks and threats of physical attacks (28). Relational aggression on the other hand, involves inflicting harm to a peer through purposeful manipulation or damage to relationships, such as demeaning a peer, purposefully excluding a peer from social plans or telling lies about a peer (9,29). Existing research suggests that relational aggression is related, but distinct from the overt form (28).

With respect to the gender effect, males scored higher in physical aggression than females. This result was confirmed by other findings (23,30,31) that found males to be more

physically aggressive than females. In contrast, no clear pattern emerged when analyzing gender effects on the other aggression subscale (verbal aggression). Findings of some studies pertaining to verbal aggression indicated no gender differences (15,32,16,33). However, finding that boys obtained higher ratings of both relational and overt aggression is inconsistent with results from other studies (4,22,34), which found girls obtained higher relational aggression scores than boys. Male students were more likely to represent the indirect or direct component of aggressive behavior than females. Differences between our results and those of Crick and Grotpeter (4) may be due to cultural differences, gender segregation in the classroom, different behavioral styles and friendship networks of boys and girls. Gender of peers has a powerful influence on children's social lives. Certainly, given the importance of the school context for children's development, the gender composition of a classroom will influence children's social interactions, relationships, and peer social competence (34).

The present study was intended to establish the psychometric properties of the Aggression Questionnaire and to provide evidence of the reliability and validity of an Iranian version. The results of this study should be viewed in light of several limitations on the generality of the results. The sample of the study consisted only of elementary students (ages 10-11). The analyses were conducted on the translated questionnaire items. Confirmatory factor analysis procedure was not used to replicate the factor structure of the Buss and Perry Aggression Questionnaire. Another limitation concern was the lack of further evaluation of convergence and discriminate validity. Despite these limitations, it was overall demonstrated that the Iranian version of the Aggression Questionnaire showed adequate reliability and satisfactory validity. The results of this study indirectly supported the three-factor structure of the Aggression Questionnaire as found by Buss and Perry (15) and Shahim (23). There is an obvious need for an Iranian instrument that can assess the aspects of aggression. Therefore, a Persian (Farsi) version of the ROAQ would be an appropriate tool for assessing the types of aggression needed in providing a proper evaluation to those in need.

Acknowledgement

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