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Psychometric Properties of a Farsi Translation of the  
Functionality Appreciation Scale (FAS) in Iranian Adolescents

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### **Abstract**

The 7-item Functionality Appreciation Scale (FAS; Alleva et al., 2017) measures an individual's appreciation of their body for what it can do and is capable of doing (i.e., functionality appreciation). However, few studies have assessed the psychometric properties of the FAS in non-English speaking populations and in younger age groups. Here, we examined the psychometric properties of a novel Farsi translation of the FAS in Iranian adolescent girls and boys. A sample of 828 Iranian adolescents completed the FAS alongside the Rosenberg Self-Esteem Scale and the Beck Depression Inventory-II. Participants were randomly split into a first split-half for exploratory factor analysis (EFA) or a second split-half for confirmatory factor analysis (CFA). The EFA broadly supported a 1-dimensional model of FAS scores, although one item had low item-factor loadings. The CFA indicated that both the 6- and 7-item models had adequate fit. In further analyses, we found that the 7-item unidimensional model was invariant across gender and that higher FAS scores were significantly associated with higher self-esteem and lower depressive symptoms, indicative of convergent validity. These results provide evidence that the Farsi translation of the FAS is reliable and valid for use in Iranian adolescent girls and boys.

**Keywords:** Functionality appreciation; Factor structure; Psychometrics; Iran; Adolescents; Test adaptation

## 1. Introduction

*Body functionality* refers to “everything that the body can do or is capable of doing” (Alleva & Tylka, 2021, p. 149). This includes physical capacities (e.g., walking, running), internal bodily processes and sensations (e.g., experiencing hunger), interpersonal communication (e.g., making eye contact with others), the ability to engage in creative activities (e.g., dancing), and self-care behaviours (e.g., showering) (for reviews, see Alleva & Martijn, 2019; Alleva & Tylka, 2021). However, body functionality can be affected by a range of issues, such as physical injury, aging, disability, and body-related differences (e.g., in size, gender presentation; Rice et al., 2021). As such, body image scholars sometimes distinguish between body functionality and one’s subjective appreciation for the functionality of their body (Franzoi, 1995). The latter has since come to be termed *functionality appreciation* (Alleva, Tylka, & Kroon van Diest, 2017) and more precisely refers to an individual’s “appreciation of, respect for, and honouring of their body for what it can do and is capable of doing” (Tylka, 2018, p. 15).

In this view, functionality appreciation emphasises gratitude for one’s body functionality, rather than simple awareness of said functionality (Alleva et al., 2021), and is positioned as a key facet of the construct of *positive body image* (i.e., broadly encapsulating one’s “love and respect for the body”; Tylka, 2018, p. 9). Indeed, recent work has highlighted the centrality of functionality appreciation to the construct of positive body image (Swami et al., 2020); that is, functionality appreciation is now recognised as providing a core understanding of the construct of positive body image. Moreover, in tandem with the rapid growth of research on positive body image (Andersen & Swami, 2021), scholars have increasingly focused on functionality appreciation as a target for interventionist work (e.g., Alleva et al., 2018). More specifically, interventionist studies have shown that helping individuals to develop functionality appreciation contributes to improvements in other facets

of positive body image and buffer against experiences of negative body image, (e.g., Alleva et al., 2016, 2018, 2020).

At present, the construct of functionality appreciation is typically measured using the 7-item Functionality Appreciation Scale (FAS; Alleva et al., 2017). The instrument was originally validated in community samples from the United States, where it was found through exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) to have a unidimensional factor structure, adequate test-retest reliability up to three weeks, and adequate convergent, criterion-related, and divergent validity (Alleva et al., 2017). For instance, FAS scores were found to be significantly associated with other measures of body image (e.g., body appreciation, body surveillance), psychological well-being (e.g., self-esteem, life satisfaction, depressive symptomatology), and positive self-care (e.g., self-compassion). Scores also significantly predicted psychological well-being over-and-above other body image measures (i.e., evidence of predictive validity).

One of the strengths of the FAS is its validity and reliability in a wide range of social identity groups. For instance, the unidimensional factor structure of FAS scores has been supported in a sample of sexual minority adults from the United States (Soulliard & Vander Wal, 2021) and an international sample of English-speaking adults (Linardon et al., 2020). Additionally, scores on translated versions of the FAS have also been found to reduce to a single dimension retaining all seven items in online samples of adults from Malaysia (Swami, Todd et al., 2019), Romania (Swami, Todd et al., 2021), Italy (Cerea et al., 2021), and Poland (Yurtsever et al., 2021), as well as a sample of university students from Brazil (Faria et al., 2020). These studies have also broadly supported the internal consistency, convergent and criterion-related validity, and test-retest reliability of FAS scores, with some preliminary work further supporting the invariance of the unidimensional FAS factor structure across national contexts (Todd & Swami, 2020).

In contrast to the growing literature among adults, research exploring the psychometric properties of the FAS in adolescent samples remains nascent. This is important for a number of reasons. First, adolescence is an important period of pubertal change (e.g., changes to body form and structure), biological growth (e.g., developments in cardiorespiratory fitness, motor skills), and sexual maturation, as well as changing relationships with one's body (Sawyer et al., 2018). Indeed, adolescence is notable for the rapid changes that occur in terms of one's physical self-concept (i.e., the descriptive and evaluative perceptions that individuals have about themselves; Hagger et al., 2005), as well as the (re-)negotiation of social roles and expectancies (Sawyer et al., 2018). Given the totality and speed of these changes, adolescence is sometimes viewed as a period of "intense attention" to one's body (Zsakai et al., 2017, p. 317), which in turn is likely to affect both body functionality and functionality appreciation.

In fact, functionality appreciation appears to be a key component in definitions of appearance satisfaction and positive body image in adolescence. For instance, in qualitative research with Swedish adolescents, Frisén and Holmqvist (2010) reported that adolescents' appearance satisfaction was characterised by an appreciation of the physical functions of the body, such as being able to run fast. Additionally, adolescents in the study viewed physical activity as an important means of caring for their bodies, connecting with others, and having fun. Such an appreciation for the body's functions may be especially pertinent to boys, for whom physical functionality and ability is synonymous with sporting performance (Ricciardelli et al., 2006). Second, and more generally, a better understanding of functionality appreciation in adolescence would allow scholars to consider the possible ways in which the construct fluctuates during ages when an appearance-over-function focus is beginning to emerge (Alleva et al., 2017).

To date, however, only one study has assessed the factorial validity of the FAS in an adolescent sample. In a sample of adolescents (13-16 years) from the United Kingdom, Todd et al. (2019) reported that the FAS items were appropriate for completion and understandable to the younger age group (based on positive responses in a pilot study to questions around understandability, responsivity, and changes required to improve understanding). They further reported, based on the results of CFA, that the unidimensional factor structure of FAS scores had adequate fit and evidenced criterion-related validity (e.g., through associations with other measures of body image). However, we are not aware of any previous work that has assessed the gender invariance of the FAS factor structure in adolescent samples, though gender invariance has generally been supported in adult samples (e.g., Alleva et al., 2017; Cerea et al., 2021; Swami et al., 2019, 2021). This may be important because the meaning and lived experience of functionality appreciation may differ in adolescence, with boys being more focused on physical ability and prowess compared to girls (Ricciardelli et al., 2006), which possibly complicates the expectation of gender invariance of the FAS factor structure in younger age groups. Further, we are not aware of other published research examining the psychometric properties of the FAS in non-English-speaking adolescents.

### **1.1. The Iranian Context**

In the present study, we examined the psychometric properties of a Farsi translation of the FAS in a sample of Iranian adolescents. Iran is a useful context in which to extend scholarly understanding of functionality appreciation for a number of reasons. First, in contrast to the bulk of research on the FAS that has been conducted in Western, Educated, Industrialised, Rich, and Democratic (WEIRD; Henrich et al., 2010) nations, Iran can be considered a non-WEIRD nation, albeit a “‘weird’ non-WEIRD culture” (Atari et al., 2020, p. 368). For instance, in contrast to many of its neighbouring countries in Western Asia, Iran has very high literacy rates and high access to education, with women outnumbering men in

terms of obtaining higher education degrees. Similarly, since the 1990s, Iran has experienced substantial growth in terms of industrialisation and economic development, with a modern educational, legal, and public health systems comparable to most WEIRD nations (Atari et al., 2020). Concomitantly, however, Iranian culture also remains highly “traditionalist”, with its Islamic theocracy limiting rights for women and children, which may have implications for body image experiences (Abdollahi & Mann, 2001).

Second, although there is a large corpus of research examining body image-related issues in Iran, much of the extant research has focused on elements of negative body image in adult populations (for a review, see Sahlan et al., 2021; Sahlan, Williams et al., 2021; Shoraka et al., 2019). While a focus on positive body image has begun to emerge (e.g., Atari, 2016), more can be done to understand these issues in a population that has, historically at least, been neglected in the body image literature. Second, issues of body and physical functionality have been identified as being especially important in Iranian adolescents. Two recent qualitative studies of Iranian adolescents found that themes of physical ability or readiness (i.e., being prepared and able to achieve physical or functional goals) and physical functioning (i.e., being free of disability or illness) were important components of Iranian adolescent body image (Jalali-Farahani et al., 2021a, 2021b). In particular, Iranian adolescents appear to prioritise their physical health as more important than their appearance, possibly because an unhealthy focus on appearance was viewed as being at odds with Islamic values (Jalali-Farahani et al., 2021b).

Issues of body and physical functionality may also be especially pertinent in Iranian culture because the physical self and its outcomes (e.g., the ability to labour) often contribute to moral understandings of the self and others (see Hashemi, 2018). That is, to the extent that one is able to use the body to work or engage with mainstream society, it may help to create systems of ethical worth that both affects and is affected by functionality appreciation. For

Iranian women and girls, in particular, the body may come to symbolise important performative roles in terms of being able to grow a family, with physical function tied to both psychological well-being and body image more generally (Goudarzi et al., 2021). Likewise, for boys, being physically or functionally capable may be viewed as being especially important for future life outcomes, particularly in terms of being able to support one's family through work (Jalali-Farahani et al., 2021b). In these scenarios, greater attention to and improved understanding of functionality appreciation may be particularly useful, but a first step toward such understanding would be provided by the availability of a suitable instrument, such as the FAS, for use in the Iranian context.

## **1.2. The Present Study**

In light of the commentary above, we assessed the psychometric properties of a novel Farsi translation of the FAS in a sample of Iranian adolescents. Our first objective was to determine the most suitable factor structure for FAS scores in our sample. To do so, we used an EFA-to-CFA analytic strategy, which would allow us to account for the most suitable model of FAS scores in our sample without modelling limitations and to confirm the validity of both EFA-derived and the parent (i.e., unidimensional) models of FAS scores. Given that previous work has universally supported a unidimensional factor structure of FAS scores (Alleva et al., 2017; Cerea et al., 2021; Faria et al., 2020; Linardon et al., 2020; Swami, Todd et al., 2019, 2021; Yurtsever et al., 2021), including in adolescents (Todd et al., 2019), we expected to find support for a unidimensional model of Farsi FAS scores in our sample.

Additionally, we expected to support the invariance of the 1-dimensional model of the FAS structure across gender, which would be consistent with previous work (Alleva et al., 2017; Cerea et al., 2021; Swami et al., 2019, 2021). Establishing the invariance of the FAS factor structure would also allow us to examine gender differences in FAS scores (Chen, 2007). Given that previous studies have shown that Iranian boys have greater body



satisfaction than girls (e.g., Behdarvandi et al., 2017), we expected that boys would also demonstrate greater functionality appreciation than girls in our study. Finally, to preliminarily assess the convergent validity of FAS scores, we explored associations with scores on measures of psychological well-being (i.e., self-esteem and depressive symptoms). These measures were selected as they have been validated for use in Iranian adolescents and because significant associations with functionality appreciation would support convergent validity.

## 2. Method

### 2.1. Participants

Participants ( $N = 828$ ) were adolescent boys ( $n = 303$ ) and girls ( $n = 524$ ) who were recruited from four cities located in different regions in Iran (Tehran,  $n = 150$ , Tabriz,  $n = 226$ , Kurdistan,  $n = 236$ , Rasht  $n = 216$ ). Participants ranged in age from 12-19 years ( $M = 15.98$ ,  $SD = 1.48$ ).

### 2.2. Materials

**2.2.1. Demographics.** Participants were asked to self-report their age, gender, height, and weight (used to derive BMI;  $\text{kg}/\text{m}^2$ ). Based on World Health Organization (WHO) guidelines for children and adolescents aged 5-19 years, we converted BMI to BMIz (WHO, 2021). Participants' BMIz ranged from -2.26 to 3.67 ( $M = 0.02$ ,  $SD = 0.96$ ).

**2.2.2. Functionality appreciation.** Participants completed a novel Farsi translation of the 7-item FAS (Alleva et al., 2017). All items were rated on a 5-point scale ranging from 1 (*Strongly disagree*; Farsi: *کاملاً مخالفم*) to 5 (*Strongly agree*; Farsi: *کاملاً موافقم*). The translation procedure is described below and the FAS items in English are reported in Table 1 and in Farsi in Appendix 1.

**2.2.3. Self-esteem.** To measure self-esteem, we used the Rosenberg Self-Esteem Scale (RSES; Rosenberg, 1965; Farsi translation: Shapurian et al., 1987), a widely used

instrument that assesses global self-esteem. All items were rated on a 4-point scale ranging from 1 (*strongly disagree*) to 4 (*strongly agree*) and an overall score was computed as the mean of all items. Higher scores on this scale reflect greater self-esteem. Scores on the Farsi version of the RSES has been shown to have a unidimensional factor structure in Iranian adolescents (e.g., Alvani & Alvani, 2011). In the present study, McDonald's omega for scores on this scale was .86 (95% CI = .84, .87).

**2.2.4. Depressive symptoms.** Depressive symptoms were measured using the Beck Depression Inventory-II (BDI-II; Beck et al., 1996; Farsi translation: Ghassemzadeh et al., 2005). This is a 21-item instrument that measures depression symptoms and their severity, and that is suitable for use in adolescent populations. All items were rated on a 4-point scale ranging from 0 (*did not apply to me at all*) to 3 (*applied to me very much, or most of the time*). In Iranian adolescents, BDI-II scores have been found to reduce to four dimensions (Toosi et al., 2017), namely items broadly tapping cognitive symptoms (8 items), affective symptoms (7 items), somatic symptoms (4 items), and two items in a separate factor. Because this final factor is likely to be unstable (Tabachnick & Fidell, 2019), we computed scores for the first three factors, with McDonald's omega  $\geq .76$  in all cases.

### 2.3. Test Adaptation

Once permission to translate the FAS was obtained from its developer in January 2018, we used the parallel back-translation method (Brislin, 1970) to produce a Farsi version of the FAS. The first author and an independent translator, both of whom were fluent in Farsi, translated the FAS from English into Farsi, with linguistic differences resolved at this stage by a third independent translator. Next, a synthesised Farsi version was back-translated into English by two further independent translators. Finally, the synthesised forward translation and the two back-translations were submitted to a committee consisting of a methodologist, a psychometrician, and a linguist for assessment. No concerns were raised at this stage, so the

Farsi version of the FAS was piloted with a sample of adolescent ( $N = 41$ ), who were asked to assess the comprehensibility of each item. To do so, this sample was presented with the seven FAS items in Farsi and asked to circle any word, phrase, or sentence fragment that they found difficult to understand. Very few concerns were raised by participants, so the items were considered to be comprehensible and no further revisions were made. The final items of the Farsi FAS are provided in Appendix 1.

#### **2.4. Procedures**

The project was approved by the institutional review board of Iran University of Medical Sciences. The project began with the translation of the FAS, as described in Section 2.4 above. Once this was completed, regional administrators were sent the survey materials, which they reviewed and approved, along with information about the project. Once this approval was obtained, regional administrators sent information about the project to schools in their regions. School administrators and counsellors then met with parents/caregivers during scheduled bi-monthly meetings, at which time the latter were informed about the project and invited to provide written informed consent for their children to take part in the study. Adolescents whose parents/caregivers had consented to their participation were then invited to complete a paper-and-pencil survey during school hours and individually with a member of the research team. Prior to completing the survey, participants were provided with information about the project (i.e., that the survey included items about their body image and psychological well-being) and were asked to provide written informed consent. All surveys were anonymous and participants and their parents/caregivers received debriefing information following completion of the survey. Completion of the survey was voluntary and participants did not receive any remuneration.

## 2.5. Analytic Strategy

**2.5.1. Data treatment.** One participant did not provide demographic information and was excluded from analyses. Also, nine participants were missing height and/or weight data, so these were replaced using the mean replacement method. There were no other missing responses in the dataset. As recommended by Swami and Barron (2019) for instruments that are hypothesised to be unidimensional, our analytic strategy used a combination of exploratory factor analysis (EFA) and confirmatory factor analysis (CFA). To allow for this, the dataset was randomly split, giving us one split-half for EFA (girls  $n = 262$ , boys  $n = 152$ ) and a second split-half for CFA (girls  $n = 262$ , boys  $n = 151$ ).

**2.5.2. Exploratory factor analysis.** We subjected data from the first split-half subsample to EFAs using the *psych* package (Revelle, 2019) in *R* (*R* Development Core Team, 2014). In keeping with the analytic strategy of Alleva et al. (2017), EFAs were conducted separately for girls and boys. Subsample sizes for girls and boys met all sample size requirements for EFA in terms of item-communalities (item-communalities ranged from .53 to .64 [ $M = .59$ ] in girls and from .55 to .73 [ $M = .63$ ] in boys; Worthington & Whittaker, 2006), as well as assumptions for EFA based on item distributions, average item correlations, and item-total correlations (Clark & Watson, 1995). Data factorability was assessed using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (which should ideally be  $\geq .80$ ) and Bartlett's test of sphericity (which should be significant; Hair et al., 2009). Principal-axis factoring was used as it yields results similar to commonly used maximum likelihood estimation without assuming multivariate normality (Goretzko et al., 2020). We used a quartimax rotation due to the expectation of a single, orthogonal factor (Pedhazur & Schmelkin, 1991).

Following the recommendation of Swami et al. (2021), factor structure extraction and adequacy was determined using a combination of parallel analysis and consideration of fit

indices. In terms of the latter, we relied on the normed model chi-square ( $\chi^2/\text{df}$ ; values  $< 3.0$  considered indicative of good fit), the Steiger-Lind root mean square error of approximation (RMSEA) and its 90% CI (values close to .06 considered to be indicative of good fit and up to .08 indicative of adequate fit), the standardised root mean square residual (SRMR; values  $< .09$  indicative of good fit), the Tucker-Lewis index (TLI; values close to or  $> .95$  indicative of good fit), and the comparative fit index (CFI; values close to or  $> .95$  indicative of adequate fit) (Hu & Bentler, 1999; Steiger, 2007). Corrections to fit indices were not required as EFA is robust to violations of univariate and multivariate normality (Curran et al., 1996). Items were retained if they had item-factor loadings  $\geq .33$  and low inter-item correlations (i.e., low item redundancy) as indicated by the anti-image correlation matrix (Comrey & Lee, 1992; Tabachnick & Fidell, 2019). Finally, to assess the degree of factor similarity across girls and boys, we used Tucker's (1951) congruence coefficient of agreement, with values between .85 and .94 indicative of fair similarity and values  $\geq .95$  indicative of factor structure equality (Lorenzo-Seva & ten Berge, 2006).

**2.5.3. Confirmatory factor analysis.** CFA was conducted with the second split-half subsample using the *lavaan* (Rosseel, 2012), *semTools* (Jorgensen et al., 2018), and *MVN* packages (Korkmaz et al., 2014) with *R* (R Development Core Team, 2014). Based on Monte Carlo simulations, Cerea et al. (2021) previously reported that a minimum sample size of 180 was required for this analysis, which was surpassed here. Our objective was to test the unidimensional model of FAS scores with all 7 items (Alleva et al., 2017) and any model that emerged from our EFAs. Assessment of the data for normality indicated that they were neither univariate (Shapiro-Wilks  $p < .001$ ) nor multivariate normal (Mardia's skewness = 408.47,  $p < .001$ , Mardia's kurtosis = 16.65,  $p < .001$ ), so parameter estimates were obtained using the robust maximum likelihood method and fit indices (see above) were interpreted with the Satorra-Bentler correction applied (Satorra & Bentler, 2001).

**2.5.4. Gender invariance.** To examine gender invariance of the FAS factor structure, we conducted multi-group CFA (Chen, 2007) using the second split-half subsample. Measurement invariance was assessed at the configural, metric, and scalar levels (Vandenburg & Lance, 2000). Configural invariance implies that the latent FAS variable(s) and the pattern of loadings of the latent variable(s) on indicators are similar across gender (i.e., the unconstrained latent model should fit the data well in both groups). Metric invariance implies that the magnitude of the loadings is similar across gender; this is tested by comparing two nested models consisting of a baseline model and an invariance model. Lastly, scalar invariance implies that both the item loadings and item intercepts are similar across gender and is examined using the same nested-model comparison strategy as with metric invariance (Chen, 2007). Following the recommendations of Cheung and Rensvold (2002) and Chen (2007), we accepted  $\Delta CFI \leq .010$  and  $\Delta RMSEA \leq .015$  or  $\Delta SRMR \leq .010$  (.030 for factorial invariance) as evidence of invariance. Gender differences on manifest FAS scores would be tested using an independent-samples *t*-test only if scalar or partial scalar invariance were established.

**2.5.5. Further analyses.** Internal consistency in both split-half subsamples was estimated using McDonald's  $\omega$  and bootstrapped 95% CI (Dunn et al., 2014), with values greater than .70 reflecting adequate internal reliability (Dunn et al., 2014). Evidence of convergent validity was assessed using the Fornell-Larcker criterion (Fornell & Larcker, 1981), with average variance extracted (AVE) values of  $\geq .50$  considered adequate (Malhotra & Dash, 2011) and meaning that a latent variable is able to explain more than half of the variance of its indicators on average (i.e., items converge into a uniform construct). To assess convergent validity, we examined bivariate (Spearman's) correlations between FAS scores and scores on the additional measures included in the survey. Based on Cohen (1992),

correlational values  $\leq .10$  were considered weak,  $\sim .30$  were considered moderate, and  $\sim .50$  were considered strong correlations.

### 3. Results

#### 3.1. Preliminary Analyses

There were no significant differences between the two split-half subsamples in terms of mean age,  $t(825) = 1.56$ ,  $p = .060$ ,  $d = .11$ , and the distribution of boys and girls,  $\chi^2(1) = 0.01$ ,  $p = .964$ . Participants in the first split-half subsample had significantly higher BMIs ( $M = 21.46$ ,  $SD = 3.53$ ) than participants in the second split-half subsample ( $M = 20.91$ ,  $SD = 3.28$ ),  $t(825) = 2.32$ ,  $p = .010$ ,  $d = .12$ , but the effect size of the difference was small.

#### 3.2. Exploratory Factor Analysis

**3.2.1. Factor analysis with girls.** For girls, Bartlett's test of sphericity,  $\chi^2(21) = 573.03$ ,  $p < .001$ , and the KMO (.82) indicated that the FAS items had adequate common variance for factor analysis. Results indicated two factors with  $\lambda > 1$ , but parallel analysis indicated that only one factor from the actual data had  $\lambda$  greater than the criterion  $\lambda$  generated from the random data ( $\lambda_1 = 3.34 > 1.23$ ,  $\lambda_2 = 1.00 < 1.14$ ). As such, we retained one factor, which explained 40% of the common variance. The fit indices for this model were:  $\chi^2(14) = 53.65$ ,  $p < .001$ ,  $\chi^2_{\text{normed}} = 3.83$ , CFI = .928, TLI = .892, RMSEA = .104 (90% CI = .076, .134), SRMR = .06. All 7 items loaded onto the extracted factor (item-factor loadings  $\geq .37$ ; see Table 1).

**3.2.2. Factor analysis with boys.** For boys, Bartlett's test of sphericity,  $\chi^2(21) = 291.99$ ,  $p < .001$ , and the KMO (.79) showed that FAS items had passable common variance for factor analysis. Parallel analysis indicated that only one factor from the actual data had  $\lambda$  greater than the criterion  $\lambda$  generated from the random data ( $\lambda_1 = 3.12 > 1.29$ ,  $\lambda_2 = 0.98 < 1.16$ ), which explained 37% of the common variance. The fit indices for this model were:  $\chi^2(14) = 41.13$ ,  $p < .001$ ,  $\chi^2_{\text{normed}} = 2.94$ , CFI = .900, TLI = .849, RMSEA = .113 (90% CI =

.074, .154), SRMR = .07. Item #1 (“I appreciate my body for what it is capable of doing”) did not load onto the extracted factor (loading = .21; see Table 1), but the remaining 6 items loaded strongly onto the extracted factor (item-factor loadings  $\geq .51$ ; see Table 1).

**3.2.3. Factor structure congruence and internal consistency.** The factor loadings reported in Table 1 for girls and boys separately suggest strong similarity across factor structures, with the exception of Item #1, which did not strongly load onto the extracted factor for the boys. Nevertheless, Tucker’s congruence coefficient (.98) indicated that there was factor structure equivalence across the models for girls and boys. McDonald’s  $\omega$  was adequate for the 7-item model in girls (.81, 95% CI = .75, .86), the 6-item factor in boys (.80, 95% CI = .71, .89), and for the 7-item model in the total sample (.81, 95% CI = .76, .86). Given that the EFA analyses indicated two slightly different models (i.e., the full 7-item model for girls, and a 6-item model for boys), we elected to examine both models using CFA.

### 3.3. Confirmatory Factor Analysis

In the second split-half sample, CFA indicated that fit of the 7-item model of FAS scores was acceptable:  $SB\chi^2(14) = 41.48, p < .001$ ,  $SB\chi^2_{\text{normed}} = 2.96$ , robust RMSEA = .084 (90% CI = .055, .114), SRMR = .036, robust CFI = .970, robust TLI = .954. The convergent validity for this model was adequate, as AVE = .53, and internal consistency of scores was adequate in girls (.87, 95% CI = .84, .90), boys (.91, 95% CI = .87, .93), and the total sample (.89, 95% CI = .86, .90). The standardised estimates of factor loadings were all adequate (see Figure 1). Fit indices for the 6-item model were also acceptable:  $SB\chi^2(9) = 29.22, p = .001$ ,  $SB\chi^2_{\text{normed}} = 3.25$ , robust RMSEA = .090 (90% CI = .055, .127), SRMR = .035, robust CFI = .971, robust TLI = .952. The convergent validity for this model was adequate, as AVE = .53, and internal consistency of scores was adequate in girls (.86, 95% CI = .82, .89), boys (.90, 95% CI = .87, .93), and the total sample (.88, 95% CI = .85, .90). Overall, both models adequately fitted the data, and had good convergent validity and internal consistency



reliability estimates. We elected to examine the full 7-item model in all further analyses because, from a theoretical perspective, it is preferable to retain the full 7-item model to retain full conceptual meaning. Additionally, RMSEA for the 6-item model was also slightly outside acceptable parameters.

**3.3.1. Gender invariance.** All indices suggested that configural, metric, and scalar invariance for the unidimensional model of FAS scores was supported across gender for the 7-item model (see Table 2). Given these results, we computed an independent-samples *t*-test to examine gender differences in FAS scores. The results indicated that boys ( $M = 4.56$ ,  $SD = 0.56$ ) had significantly higher FAS scores than girls ( $M = 4.40$ ,  $SD = 0.68$ ) in the second split-half subsample,  $t(412) = 2.48$ ,  $p = .007$ ,  $d = 0.25$ , but the effect size of the difference was small. Although this analysis was likely robust against violations of normality, we also computed a non-parametric equivalent test, which likewise showed that boys had significantly higher FAS scores than girls,  $U = 17404$ ,  $p = .030$ .

### **3.4. Convergent Validity**

To assess the validity of FAS scores, we examined bivariate correlations with the other measures included in the present study separately for girls and boys using the total sample (see Table 3). In both boys and girls, greater functionality appreciation was significantly associated with lower cognitive, affective, and somatic depressive symptoms, as well as higher self-esteem. For exploratory purposes, we also assessed associations between functionality appreciation, BMI, and age. There were no significant associations between functionality appreciation and BMI in both girls and boys. In terms of age, greater functionality appreciation was significantly, but weakly, associated older age in girls, but the relationship was not significant in boys.

#### 4. Discussion

The objective of the present study was to assess the psychometric properties of the FAS in a sample of Iranian adolescents. In broad outline, our results provide support – albeit preliminary – that the Farsi translation of the FAS is valid and reliable for use in Iranian adolescents. In terms of the instrument’s factorial validity, we were able to support – through EFA and CFA – the unidimensional factor structure of FAS scores. This is consistent with previous work supporting a unidimensional model in adults from diverse national settings (Alleva et al., 2017; Cerea et al., 2021; Faria et al., 2020; Linardon et al., 2020; Swami, Todd et al., 2019, 2021; Yurtsever et al., 2021), as well as adolescents from the United Kingdom (Todd et al., 2019). This unidimensional model of FAS scores in Iranian adolescents was also found to have adequate internal consistency in both split-half subsamples.

Interestingly, however, the results of our EFAs indicated that the item-factor loadings for Item #1 (“I appreciate my body for what it is capable of doing”) were low. Indeed, the item failed to load on to the primary factor in boys, leaving us to retain a 6-item measure instead. In our CFA, we found that both the 6- and 7-item unidimensional models had adequate fit and, based on suggestion that retaining all items would provide fuller conceptual meaning, we elected to retain the 7-item model for further analyses. However, the former set of results raises important questions about the Item #1: although it is difficult to know why this item had low item-factor loadings, we suggest it is unlikely to be a translational issue. Instead, it may be reflective of cultural understandings of bodily or physical capabilities, which may be under-developed in adolescent populations (Jalali-Farahani et al., 2021a). Alternatively, its especially low loading in boys may reflect the fact that Iranian boys experience greater pressure than girls to achieve and demonstrate physical prowess (Jalali-Farahani et al., 2021a), which may mean they have different (or greater) standards for appreciating their body’s capabilities. Nevertheless, from a practical point-of-view, our

recommendation is that scholars wishing to use the FAS in Iranian adolescent sample compute scores using the full 7-item version, but be aware of concerns over the low item-factor loading on Item #1.

Beyond issues of factorial validity, our results also supported the invariance of the 1-dimensional model of FAS scores across gender, which is consistent with the reported invariance of the FAS factor structure in adults (Alleva et al., 2017; Cerea et al., 2021; Swami et al., 2019, 2021). A comparison of mean scores across gender indicated that boys had significantly higher scores than girls, which is consistent with a previous report of significantly higher scores in boys from the United Kingdom (Todd et al., 2019). Broadly speaking, these results are consistent with the finding that Iranian boys are more satisfied with their bodies than Iranian girls (e.g., Behdarvandi et al., 2017), which may be reflective of the greater sociocultural pressure that girls experience in relation to their bodies and appearance (Sahlan et al., 2020). However, it should also be noted that the effect size of the difference was small and it is possible that cultural factors – such as restricted opportunities to express physicality, norms of behaviour and communication, and gendered expectations – minimise gendered differences in functionality appreciation in this national context (see Khademi et al., 2015).

One interesting thing to note was the relatively high mean FAS scores ( $M_s \geq 4.40$ ), suggestive that our sample had very high levels of functionality appreciation. Although we caution against making direct comparisons with descriptive statistics reported in other studies (because of the lack of measurement invariance across these studies, differences in operational equivalence, and so on), it is informative that the mean FAS values in the present study were higher than those reported in adolescents from the United Kingdom ( $M_s = 4.02$ ; Todd et al., 2019) and those typically reported in adults ( $M_s \sim 4.10$ ; Alleva et al., 2017). This highlights two fruitful avenues for future research. First, if measurement invariance across

national groups can be established, it may be interesting to examine cross-national differences in FAS scores, especially as some work suggests that Malaysian adults have significantly higher functionality appreciation than their counterparts in the United Kingdom (Todd & Swami, 2020). Second, it may be interesting to examine lifespan changes, as it may be that functionality appreciation decreases with age – in contrast to the increase in body appreciation seen with increasing age (e.g., Tiggemann & McCourt, 2013).

Finally, our examination of convergent validity indicated that greater functionality appreciation was significantly associated with lower depressive symptoms (i.e., cognitive, affective, and somatic) and greater self-esteem. This is consistent with previous findings in adults (Alleva et al., 2017) and is indicative of the positive relationship between functionality appreciation and psychological well-being. This may be particularly important in terms of developing interventions to promote greater functionality appreciation in Iranian adolescents, which may be expected to bring downstream effects in terms of psychological well-being. Nevertheless, it should also be noted that the correlational nature of our study precludes any conclusions about the causal direction of these relationships, and it is possible that greater self-esteem and lower depression enable adolescents to feel positively about their body functionality.

In our correlational analyses, we found that functionality appreciation was significant associated with older age in girls, but not boys. It is possible that this reflects gendered differences in pubertal maturation or biological development (Sawyer et al., 2018), though we also caution that the significant association in girls was weak. We also found that functionality appreciation scores were not significantly associated with participants' BMI-z. This is broadly consistent with findings in adults, where functionality appreciation is either weakly or non-significantly associated with BMI (e.g., Alleva et al., 2017; Cerea et al., 2021). However, it is also particularly noteworthy given that BMI-z is more strongly

associated with indices of body dissatisfaction among Iranian adolescents (Hatami et al., 2015; Sahlan, Saunders et al., 2021), which suggests that weight status may be more strongly associated with indices of negative rather than positive body image. In terms of our analyses of validity, however, it should be noted that our examination of convergent validity was limited and preliminary, and future work could extend our findings by examining association with other indicators of convergent (e.g., measures of positive self-care), concurrent (e.g., other measures of positive body image), and discriminant validity (e.g., a measure of impression management), although we also note that these steps may be hampered by the lack of validated instruments for use in Iranian adolescents. In a similar vein, we did not examine test-retest reliability, which should be rectified in future studies.

There are other ways in which the present study could be improved upon. For instance, it may be useful to conduct qualitative research with Iranian adolescents to more fully understand their experiences of body functionality and functionality appreciation. Such an emic approach might be particularly useful in helping scholars better understand reasons for the low item-factor loading of Item #1, as well as to get a sense of the extent to which additional items may provide better coverage of the functionality appreciation construct in the Iranian context. In addition, given our sampling method, we cannot be confident that our results will be generalisable to all Farsi-speaking adolescents. In future work, this could be rectified by recruiting representative samples of adolescents, as well as paying greater attention to factors that were neglected in the present study, such as invariance as a function of urban-rural residence and socioeconomic status. Indeed, previous work with adults in Iran has suggested that the latter may be especially important in terms of understanding moral and symbolic understandings of the body (Hashemi, 2018).

These limitations notwithstanding, the present study provides evidence that the FAS is a useful tool for the assessment of functionality appreciation in the Iranian context. While

we acknowledge that more work needs to be done to ascertain the validity and test-retest reliability of the Farsi FAS in adolescents, we are hopeful that the present work will contribute to a greater understanding of the construct of positive body image in the Iranian context.

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Table 1

*Items of the Functionality Appreciation Scale in English and Factor Loadings Derived from the Exploratory Factor Analyses with Girls and Boys in the First Split-Half Subsample.*

Item	Girls	Boys
(1) I appreciate my body for what it is capable of doing.	.37	.21
(2) I am grateful for the health of my body, even if it isn't always as healthy as I would like it to be.	.38	.54
(3) I appreciate that my body allows me to communicate and interact with others.	.70	.73
(4) I acknowledge and appreciate when my body feels good and/or relaxed.	.67	.65
(5) I am grateful that my body enables me to engage in activities that I enjoy or find important.	.79	.81
(6) I feel that my body does so much for me.	.60	.60
(7) I respect my body for the functions it performs.	.77	.51

Table 2

*Measurement Invariance Across Gender.*

Model	SB $\chi^2$	df	Robust CFI	Robust RMSEA	SRMR	Model Comparison	$\Delta$ SB $\chi^2$	$\Delta$ Robust CFI	$\Delta$ Robust RMSEA	$\Delta$ SRMR	$\Delta$ df	p
Configural	72.37	28	.977	.080	.028							
Metric	80.69	34	.978	.071	.034	Configural vs metric	8.32	.001	.009	.006	6	.708
Scalar	101.20	40	.973	.073	.038	Metric vs scalar	20.51	.005	.002	.004	6	.001

*Note.* SB = Satorra-Bentler; CFI = Comparative fit index; RMSEA = Steiger-Lind root mean square error of approximation; SRMR = Standardised root mean square residual.

Table 3

*Bivariate Correlations Between Functionality Appreciation, Scores on Other Measures Included in the Study, Body Mass Index, and Age in Girls (Top Diagonal) and Boys (Bottom Diagonal).*

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
(1) Functionality appreciation		-.27**	-.25**	-.18**	.33**	.01	.09*
(2) Cognitive depressive symptoms	-.33**		.82**	.66**	-.55**	.03	.03
(3) Affective depressive symptoms	-.33**	.80**		.68**	-.57**	.10*	.01
(4) Somatic depressive symptoms	-.34**	.70**	.62**		-.44**	.03	.10*
(5) Self-esteem	.34*	-.50**	-.49**	-.36*		-.11*	-.04
(6) Body mass index-z	-.06	.03	.03**	.04	-.15*		.01
(7) Age	.07	.19*	.13*	.10	-.11	.11	

*Note.* \* $p < .05$ , \*\* $p < .001$ .

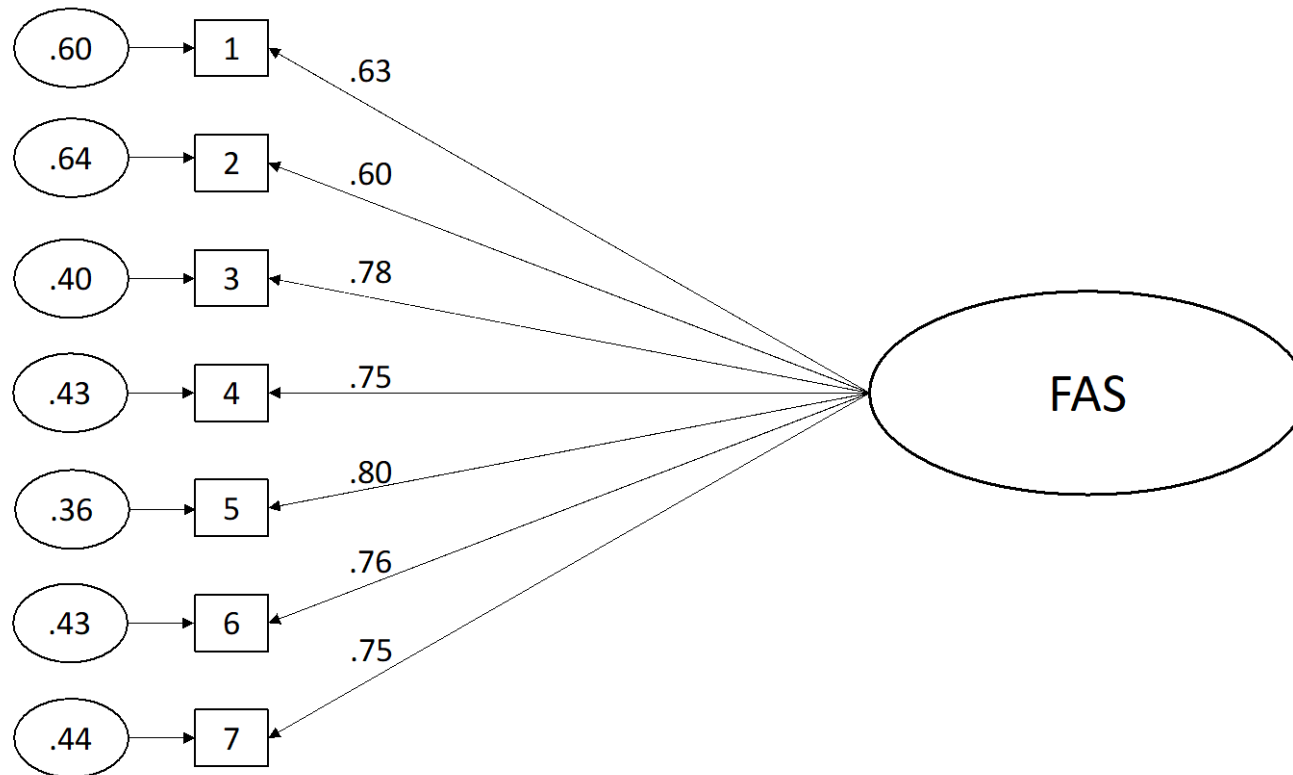


Figure 1

Path diagram and estimates for the 1-dimensional model of Functionality Appreciation Scale (FAS) scores. The large oval is the latent construct, with the rectangles representing measured variables, and the small circles with numbers representing the residual variables (variances). The path factor loadings are standardised with significance levels were determined by critical ratios (all  $p < .001$ ).

## Appendix 1

### *Items of the Functionality Appreciation Scale in Farsi.*

Item
1. از بدنم نسبت به آنچه که قادر به انجامش است، قدردانی می‌کنم.
2. به خاطر سلامتی بدنم شاکرم؛ علی رغم اینکه بدنم طبق میلم همیشه سالم نباشد.
3. قدردان بدنم هستم که به من اجازه‌ی تعاملات و ارتباط با دیگران را می‌دهد.
4. وقتی بدنم احساس خوب یا آسودگی می‌کند، قدردانی و سپاس گذاری می‌کنم.
5. شاکر بدنم هستم به خاطر اینکه من را در فعالیت‌هایی درگیر می‌کند که از آن فعالیت ها لذت می‌برم و آن فعالیت‌ها را مهم می‌دانم.
6. احساس می‌کنم بدنم خیلی کارآمد است.
7. به بدنم به خاطر آنچه که انجام می‌دهد احترام می‌گذارم.