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# Psychometric properties of a Dutch translation of the Functionality Appreciation Scale (FAS) among adults in the Netherlands

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ABSTRACT

The Functionality Appreciation Scale (FAS; Alleva et al., 2017) measures *functionality appreciation*, the extent to which people appreciate their body for what it is able to do. We translated the FAS to Dutch and evaluated its factor structure and psychometric properties among 471 native Dutch speakers in the Netherlands (255 cisgender women, 204 cisgender men, 8 nonbinary, 1 "other," 3 "rather not say") who were between 18 and 85 years old. Participants completed the Dutch translation of the FAS, followed by questionnaires to assess additional variables of interest (body appreciation, appearance satisfaction, self-esteem, and gratitude). Exploratory factor analysis showed that Dutch FAS scores demonstrated a unidimensional factor structure. Dutch FAS scores demonstrated acceptable internal consistency and construct validity via their positive associations with the additional variables of interest. Dutch FAS scores also demonstrated gender invariance, and women reported higher functionality appreciation than men. Dutch FAS scores evidenced incremental validity for gratitude (but not self-esteem), and were inversely correlated with age and body mass index. Last, 2-week test-retest reliability of the Dutch FAS scores was supported. Overall, these findings provide support that the Dutch FAS is a psychometrically sound instrument to assess functionality appreciation among Dutch speaking adults in the Netherlands.

## 1. Introduction

*Body functionality* describes everything that the body is able to do, and encompasses six domains: physical capacities (e.g., walking), internal processes (e.g., digestion), bodily senses and sensations (e.g., sight), creative endeavours (e.g., drawing), communication with others (e.g., via body language), and self-care activities (e.g., resting; Alleva et al., 2015). Body functionality transitions to a body image construct when it considers individuals' thoughts, feelings, and perceptions about what their bodies can do. *Functionality appreciation* is one construct that represents this juncture between body image and body functionality. It is defined as "appreciating, respecting, and honouring the body for what it is capable of doing, extending beyond mere awareness of body functionality (e.g., knowing that the body can digest food vs. being grateful that the body can digest food)" (Alleva et al., 2017, p. 29). It is consistent with the broader conceptualisation of positive body image (Tylka & Wood-Barcalow, 2015a), where the emphasis lays not on *what* the body is able to do (or on whether the body can do those things '*well*') but rather on *appreciation* for what the body is able to do. Research has shown that functionality appreciation is a core aspect of the multidimensional positive body image construct (Swami et al., 2020), and that emphasising functionality appreciation is an effective technique for fostering a more positive body image (see Alleva & Tylka, 2021, and Guest et al., 2019, for reviews).

### 1.1. The Functionality Appreciation Scale (FAS)

To assess functionality appreciation, Alleva, Tylka, and Kroon Van Diest (2017) developed the Functionality Appreciation Scale (FAS). They described that the FAS was needed to address several important gaps in the body of the then-available measurement instruments. For example, the Body Appreciation Scale (BAS; Avalos et al., 2005) and the Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015b) do not include items to assess appreciation of body functionality specifically, as their items were intended to be nonspecific and encompassing (e.g., "I appreciate the different and unique characteristics of my body"). Further, several other instruments helped to advance the research on body functionality, such as the Body Surveillance Subscale of the Objectified Body Consciousness Scale (McKinley & Hyde, 1996), the Functional Investment, Satisfaction, and Values Subscales of the

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Embodied Image Scale (Abbott & Barber, 2010), the Functional Awareness and Appreciation Subscales of an author-developed scale for pregnant women (Rubin & Steinberg, 2011), and the Physical Condition Subscale of the Body Esteem Scale (Franzoi & Shields, 1984). Yet, as Alleva, Tylka, and Kroon Van Diest (2017) underscored, these measurement instruments are limited in several respects, for example because they do not capture body functionality in a holistic sense (they focus on the domains of physical capacities and internal processes), are limited to able-bodied individuals or specific populations (e.g., pregnant women), or they position functionality-focused attitudes and behaviours at the opposite end of the continuum from appearance-focused attitudes and behaviours. Moreover, most of these instruments assess satisfaction with body functionality—none of them assess appreciation for body functionality.

To overcome these limitations and develop a measure of functionality appreciation, Alleva, Tylka, and Kroon Van Diest (2017) developed and validated the FAS across three studies among adults ($N = 1042$) in the United States (U.S.). Overall, their findings showed that FAS scores demonstrated a unidimensional factor structure, acceptable internal consistency (Cronbach's alpha =.86–.89), and 3-week test-retest reliability (intraclass correlation coefficients =.74–.81). Further, FAS scores were positively associated with other facets of positive body image (e.g., body appreciation) and well-being (e.g., self-esteem, gratitude), and were inversely associated with facets of negative body image (e.g., self-objectification) and ill-being (e.g., anxiety). FAS scores also demonstrated incremental validity; for example, they predicted both body appreciation and intuitive eating after excluding their shared variance with low levels of appearance-focused attitudes and behaviours (e.g., self-objectification, appearance-ideal internalisation). Last, FAS scores were invariant across gender. Together, the findings showed that the FAS is a psychometrically sound measure that can assess a unique facet of (positive) body image. Its factor structure and psychometric properties have been upheld in other studies, for example among sexual minority adults (Soulliard & Vander Wal, 2020) and an international sample of English-speaking adults (Linardon et al., 2020).

### 1.2. A Dutch translation of the Functionality Appreciation Scale (FAS)

It is important to translate the FAS in other languages to facilitate research into functionality appreciation across cultures and geographical regions. To the best of our knowledge, there are published articles of the FAS' translation and psychometric properties in the languages Arabic (Swami, Todd et al., 2022), Bahasa Malaysia (Malay; Swami, Todd et al., 2019), Chinese (He et al., 2023), Farsi (Sahlan et al., 2022), Greek (Anastasiades et al., 2023), Italian (Cerea et al., 2021), Japanese (Namatame et al., 2022), Polish (Yurtsever et al., 2021), Portuguese (Faria et al., 2020), and Romanian (Swami, Todd et al., 2021). Broadly, these studies have upheld the unidimensional factor structure and psychometric properties of the FAS, as first demonstrated by Alleva, Tylka, and Kroon Van Diest (2017). With the present study, we aimed to complement this body of research by translating and evaluating the psychometric properties of a Dutch translation of the FAS.

There are a number of reasons why a Dutch translation of the FAS would be valuable. First, from a practical standpoint, Dutch is an official language in many countries, including the Netherlands, Belgium, Suriname, the Dutch Caribbean municipalities (St. Eustatius, Saba, Bonaire), Aruba, Curacao, and Sint Maarten (Kingdom of the Netherlands, 2023). Dutch is spoken by approximately 24 million people as a first language and by approximately 5 million people as a second language (Taalunie, 2019). Thus, a Dutch translation of the FAS could be useful to many scholars and practitioners.

Second, another practical consideration is that the current body of available Dutch instruments is limited in the same ways that were described by Alleva, Tylka, and Kroon Van Diest (2017) as having motivated their development of the FAS. For example, the Dutch translation of the Body Appreciation Scale-2 (Alleva et al., 2016) does not assess appreciation of body functionality specifically, and there are currently no Dutch questionnaires (or Dutch translations of questionnaires) that assess body functionality holistically (beyond the domains of physical capacities and internal processes) and that assess appreciation of body functionality (e.g., rather than satisfaction with body functionality). In other words, a Dutch translation of the FAS is needed in order to assess functionality appreciation among Dutch speaking individuals because there is no existing instrument to do so.

From a theoretical point of view, it is also interesting to investigate functionality appreciation within the Netherlands—where the present study was conducted and where the majority of native Dutch speakers live (Kingdom of the Netherlands, 2023)—given its potentially unique relationship to physical activity. Namely, Dutch culture emphasises engaging in physical activity, and up to 50% of Dutch adults report engaging in physical activity more than the internationally recommended standard of 150 min/week, which is higher than the majority of other (Western) European countries (World Health Organization [WHO], 2021). Government policies such as the National Sports Agreement (Nationaal Sportakkoord) aim for Dutch people "to enjoy sports and exercise during their lifetime regardless of age, physical or mental health, ethnic background, sexual orientation or social background" (WHO, 2021, p. 164), with multiple efforts to make physical activity more accessible, affordable, and attractive across sectors (e.g., within schools, workplaces). Relatedly, Dutch infrastructure is built to support cycling both as a means of transportation and as recreation. Over a quarter of all trips made by Dutch residents are made by bicycle (the highest modal share of bicycle trips worldwide; The Netherlands Institute for Transport Policy Analysis, 2020) and nationwide initiatives such as the Tour de Force Bike Agenda (Schaalsprong Fiets) promote cycling as a preferred means of transport (WHO, 2021). Although physical activity is just one domain of body functionality, this example demonstrates that Dutch people's experience of their body functionality could be affected by their cultural and geographical context. As such, one must not assume that body image findings in other (Western) countries will map onto Dutch people's experiences of their bodies. A Dutch translation of the FAS could facilitate research and practice among people in Dutch speaking countries, and is an important starting point for investigating these potential nuances in their body image.

Note that, as described above, the current study focuses on a Dutch translation of the FAS within the Netherlands, where the majority of native Dutch speakers live (Kingdom of the Netherlands, 2023). We recognise that exploring whether the psychometric properties of the Dutch translation of the FAS are upheld in other Dutch-speaking populations will be important and will likely further enrich our understandings of functionality appreciation across (Dutch-speaking) populations and cultural and geographical contexts.

### 1.3. The present study

We translated the FAS into Dutch and evaluated its factor structure and psychometric properties among adults in the Netherlands. In line with the prior research described above, we expected Dutch FAS scores to demonstrate a unidimensional factor structure, and acceptable internal consistency and test-retest reliability. Further, we expected scores on the Dutch FAS to demonstrate construct validity via their positive correlations with body appreciation and appearance satisfaction, and with self-esteem and gratitude. These variables were selected based on significant associations in prior research (e.g., Alleva, Tylka, & Kroon Van Diest, 2017; Namatame et al., 2022; Swami et al., 2022) and the availability of these measures in Dutch. We also tested whether Dutch FAS scores would be invariant across gender and, if so, whether scores would differ between women and men. Last, we investigated the incremental validity of Dutch FAS scores; we expected Dutch FAS scores to predict unique variance in self-esteem and gratitude, beyond the variance accounted for by the other measures of body image (cf. Alleva, Tylka, & Kroon Van Diest, 2017; Swami et al., 2019, 2021, 2022).

## 2. Method

### 2.1. Participants

We aimed to recruit 462 participants, based on (1) having at least 30 participants per item (7 FAS items = 210 participants) as suggested by Yong and Pearce (2013); (2) allowing analyses for women and men separately to determine gender invariance (210 × 2 = 420 participants); and (3) accounting for possibly needing to remove 10% of participants ($n$ = 42) from the analyses due to erroneous data or failure to correctly answer embedded attention-check questions.

The final sample comprised 471 native Dutch speakers, after 29 participants had been removed based on point (3) described above. Of this final sample, most participants identified as cisgender women ($n$ = 255) and cisgender men ($n$ = 204); the remainder identified as nonbinary ($n$ = 8), "other" ($n$ = 1), or selected "rather not say" ($n$ = 3). Their age ranged from 18 to 85 years ($M$ = 32.85, $SD$ = 16.53), with 294 participants between 18 and 30 years old, 101 participants between 31 and 50 years old, and 76 participants above 50 years old. Participants' body mass index (BMI) ranged from 16.26 to 45.21 ($M$ = 23.94, $SD$ = 4.16). Most participants identified as heterosexual ($n$ = 370); the remainder identified as bisexual ($n$ = 55), gay/lesbian ($n$ = 24), pansexual ($n$ = 9), asexual ($n$ = 3), "other" ($n$ = 5), or selected "rather not say" ($n$ = 5). Most participants' highest educational level was high school diploma or comparable ($n$ = 180), followed by undergraduate degree ($n$ = 131), graduate degree ($n$ = 67), "other" ($n$ = 62), PhD degree ($n$ = 26), lower than high school ($n$ = 3), or they selected "rather not say" ($n$ = 2). Participants identified their cultural background as Dutch ($n$ = 361), mixed-Dutch ($n$ = 30), Belgian ($n$ = 9), German ($n$ = 5), or "other" ($n$ = 66).

### 2.2. Procedure

Participants were recruited via advertisements on campus and via social media (e.g., accounts of the research team), word-of-mouth, and snowball sampling. Inclusion criteria were being ≥ 18 years old and having Dutch as one's mother tongue. Upon emailing the research team to express their interest in the study, participants received an electronic information letter with full details about the research. Afterward, they were emailed a link to an online survey containing an electronic informed consent sheet and the questionnaires, presented in the order listed below (see 2.3. Measures). As a thank-you for their contribution, participants could enter a raffle for a chance to win one of several €25 gift vouchers or, if applicable, they could receive research credit. They were asked to indicate their willingness to complete the FAS a second time, in two weeks (compensated with an extra entry into the raffle). This subsample comprised 184 participants ($M_{age}$ = 27.58, Range = 18–75 years; 129 women, 46 men, 7 non-binary, 1 "other," and 1 "rather not say") and their data were used to calculate the test-retest reliability of the FAS.

The study was preregistered on AsPredicted (Protocol #81477) and was approved by the Ethics Review Committee Psychology and Neuroscience at Maastricht University (Protocol #ERCPN 244_138_11_2021). Data collection occurred from March to June 2022. After preregistration, three changes were made to the study plan. First, we removed the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 2008). This decision was made considering that eating disorder symptomatology can be gendered (e.g., Lavender et al., 2017) and could thus necessitate gender-specific and/or multiple questionnaires, making it potentially difficult to combine data and analyses across the full sample. Second, after removing the EDE-Q, we wanted to include another questionnaire that could measure a different variable of interest. We added the Gratitude Questionnaire-6 (GQ-6; McCullough et al., 2002) because it would capture an index of well-being (i.e., gratitude) with a brief questionnaire that could be administered to all participants, and because it was included in prior research on the FAS (e.g., Alleva, Tylka, & Kroon Van Diest, 2017). The last change we made was substituting the Rosenberg Self-Esteem Scale (Rosenberg, 1965) for the Single Item Self-Esteem Scale (Robins et al., 2013) to reduce the length of the survey and participant burden.

### 2.3. Measures

#### 2.3.1. Functionality appreciation

The FAS Alleva, Tylka, and Kroon Van Diest (2017) comprises seven items (e.g., "I appreciate my body for what it is capable of doing"), rated from 1 = *strongly disagree* to 5 = *strongly agree*. Item scores are averaged, with higher scores reflecting higher levels of functionality appreciation.

The FAS was translated into Dutch following best-practice methods for the translation of body image instruments (Swami & Barron, 2019). First, two bilinguals independently translated the FAS from English to Dutch. Second, any discrepancies in the translations were discussed with these two bilinguals and two bilingual members of the research team to reach a consensus on a synthesised translation. Third, this synthesised translation was back-translated into English by two other bilinguals working independently. Fourth, the forward and back-translations were reviewed by two bilingual members of the research team, who agreed on a pre-final version of the Dutch translation of the FAS. Fifth, this pre-final version was pilot-tested among a sample of 40 native Dutch speakers who did not take part in the main study ($M_{age}$ = 24.05, Range = 18–50 years; 67% women, 27% men, 3% nonbinary, 3% "rather not say"). They rated each Dutch FAS item on a 5-point scale for understanding (1 = *impossible to understand* to 5 = *very easy to understand*) and grammatical clarity (1 = *very unclear* to 5 = *very clear*), and indicated whether any items were unacceptable and/or emotionally harmful. Overall, the pilot participants rated the Dutch FAS items as easy to understand ($M$ = 4.23) and grammatically clear ($M$ = 4.25), with all items scoring above 4.13 for understanding and grammatical clarity. No items were deemed unacceptable or emotionally harmful. Based on these pilot data, the Dutch FAS items were retained with only minor changes made to Items 1, 3, 4, and 6 to make the language more colloquial. These changes resulted in the final version of the Dutch FAS items (see Table 1).

#### 2.3.2. Body appreciation

To measure body appreciation, we used the Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015b; Dutch translation: Alleva et al., 2016). The BAS-2 comprises 10 items (e.g., "I respect my body"),

**Table 1**
Items of the Functionality Appreciation Scale (FAS) in English and Dutch (italics) and Factor Loadings Derived from the Exploratory Factor Analysis.

| Item | Loadings |
|---|---|
| (1) I appreciate my body for what it is capable of doing / *Ik waardeer mijn lichaam voor wat het allemaal kan.* | .79 |
| (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 / *Ik ben dankbaar voor de gezondheid van mijn lichaam, zelfs als het niet altijd zo gezond is als ik graag zou willen.* | .93 |
| (3) I appreciate that my body allows me to communicate and interact with others / *Ik waardeer dat mijn lichaam me in staat stelt met anderen te communiceren en in contact te zijn.* | .68 |
| (4) I acknowledge and appreciate when my body feels good and/or relaxed / *Ik merk op en waardeer het wanneer mijn lichaam goed en/of relaxt voelt.* | .49 |
| (5) I am grateful that my body enables me to engage in activities that I enjoy or find important / *Ik ben dankbaar dat mijn lichaam me in staat stelt om deel te nemen aan activiteiten die ik leuk of belangrijk vind.* | .83 |
| (6) I feel that my body does so much for me / *Mijn lichaam doet heel veel voor mij.* | .79 |
| (7) I respect my body for the functions it performs / *Ik respecteer mijn lichaam voor de functies die het uitvoert.* | .80 |

*Note*. The response scale was 1 = strongly disagree (*zeer mee oneens*), 2 = disagree (*oneens*), 3 = neither agree nor disagree (*noch mee eens, noch mee oneens*), 4 = agree (*mee eens*), 5 = strongly agree (*zeer mee eens*).

rated from 1 = *never* to 5 = *always*. Item scores are averaged, with higher scores reflecting higher levels of body appreciation. Scores on the items of the BAS-2 and its Dutch translation have demonstrated acceptable internal consistency, construct validity, and incremental validity (Alleva et al., 2016; Tylka & Wood-Barcalow, 2015b). In this study, Cronbach's alpha was.93.

#### 2.3.3. Appearance satisfaction

We measured appearance satisfaction using the Body Areas Satisfaction Subscale (BASS) of the Multidimensional Body-Self Relations Questionnaire (MBSRQ; Brown et al., 1990; Cash, 2000; Dutch translation: Woertman & van den Brink, 2008). The BASS comprises nine items that assess satisfaction (1 = *very dissatisfied* to 5 = *very satisfied*) with different areas or aspects of one's appearance (e.g., face, muscle tone, overall appearance). Items on the BASS are averaged, with higher scores reflecting higher levels of appearance satisfaction. Scores on the items of the English and Dutch versions of the BASS have demonstrated acceptable internal consistency and construct validity (e.g., Alleva et al., 2016; Cash, 2000; Woertman & van den Brink, 2008). In this study, Cronbach's alpha was.85.

#### 2.3.4. Self-esteem

Self-esteem was measured using the Single Item Self-Esteem Scale (SISE; Robins et al., 2013), in which participants indicate their agreement with the statement, "I have high self-esteem" from 1 = *strongly disagree* to 5 = *strongly agree*. Higher scores reflect higher levels of self-esteem. The SISE was developed as a practical alternative to the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965), which comprises 10 items. The SISE has demonstrated convergent validity via strong correlations between SISE and RSE scores, and scores on the SISE and RSE have demonstrated nearly identical correlations with a variety of criterion measures (e.g., self-evaluative biases) and with socially desirable responding (Robins et al., 2013). For the purposes of this study, we translated the SISE to Dutch among the bilingual members of the research team.

#### 2.3.5. Gratitude

To assess gratitude, we used the Gratitude Questionnaire (GQ-6; McCullough et al., 2002; Dutch translation: Jans-Beken et al., 2015). The GQ-6 contains six items (e.g., "I have so much in life to be thankful for"), rated from 1 = *strongly disagree* to 7 = *strongly agree*. Item scores are averaged, with higher scores reflecting higher levels of gratitude. Scores on the items of the English and Dutch versions of the GQ-6 have demonstrated acceptable internal consistency and construct validity (e.g., Jans-Beken et al., 2015; McCullough et al., 2002). In this study, Cronbach's alpha was.72.

#### 2.3.6. Demographic items

Participants reported their age, height and weight (to calculate their BMI), cultural background (open question), gender (*man, woman, nonbinary, other,* or *rather not say*), sexual orientation (*heterosexual, bisexual, gay/lesbian, pansexual, asexual, other,* or *rather not say*), and highest educational level (*lower than high school diploma, high school diploma or equivalent, bachelor degree, master degree, PhD, other,* or *rather not say*).

#### 2.3.7. Awareness check items

Two items were used to assess whether participants paid attention when completing the study. The first item was embedded at the end of the BAS-2, and read, "Answer with 'never' if you are reading this item." The second item was included after the GQ-6 and before the demographic items, and read, "What was asked on the previous page?" Data from participants who did not select the answer option "never" and/or who did not provide a logical answer regarding the content of the previous page were excluded from the dataset. These items were included to ensure the quality of the dataset, and are required by our institution (Maastricht University) when collecting data online.

### 2.4. Statistical analyses

To assess the *factor structure* of the Dutch FAS items, we conducted a principal axis Exploratory Factor Analysis (EFA). To ensure factors were sufficiently correlated for EFA, the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy (this value should ideally be $\geq 0.80$) and Bartlett's test of sphericity (this value should be significant) were used (Kaiser, 1974). As a single orthogonal factor was expected, the quartimax rotation method was used (Field, 2009). For this and each of the following analyses (except the analyses for gender invariance, for which we used *R*; R Core Team, 2021), we used IBM Statistics SPSS (version 25).

To assess the *internal consistency* of the Dutch FAS items, we calculated Cronbach's alpha. We also calculated the item-total correlations; correlations from .00 to .30 indicate a negligible correlation, .30 to .50 indicate a low correlation, .50 to .70 indicate a moderate correlation, .70 to .90 indicate a high correlation, and .90 to 1.00 indicate a very high correlation (Mukaka, 2012). For completeness, we also calculated McDonald's ω for the Dutch FAS items, whereby values above .70 are considered adequate (Nunnally, 1978).

To assess the *test-retest reliability* of the Dutch FAS items, we calculated the intraclass correlation coefficient (ICC); values should ideally be $\geq .50$ (Koo & Li, 2016). A paired samples *t*-test was calculated to assess the correlation between Dutch FAS scores at Time 1 and at Time 2 (i.e., 2 weeks later). A nonsignificant result would show that the Dutch FAS scores do not differ across different time points, thus demonstrating evidence for test-retest reliability.

*Gender invariance* was assessed at the configural, metric, scalar, and strict levels (Vandenberg & Lance, 2000). Namely, configural invariance would demonstrate whether the same unidimensional 7-item model of the Dutch translation of the FAS holds across genders. Metric invariance would indicate whether the factor loadings are similar across genders. Scalar invariance would demonstrate whether the item loadings and item intercepts are similar across genders. Strict invariance would show whether the items measure the latent constructs with the same degree of measurement error across gender (Chen, 2007). To assess whether gender invariance was evidenced at each of these levels, we used the following indices and criteria for determining whether there was a good fit of the models to the data (Hu & Bentler, 1999). The Comparative Fit Index (CFI) and the Tucker Lewis Index (TLI) should ideally be around .95 and above; the Root Mean Square Error of Approximation (RMSEA) should ideally be around .06 or below; and the standardized root-mean square residual (SRMR) should ideally be around .08 and below. Further, chi square tests were also used to assess invariance across groups; results should be nonsignificant, as this would indicate invariance across groups. Assuming that the Dutch FAS scores would demonstrate gender invariance, an independent samples *t*-test was planned to assess whether Dutch FAS scores differed significantly between genders.

To assess the *construct validity* of the Dutch FAS scores, bivariate correlations between Dutch FAS scores and scores on the other variables of interest (i.e., body appreciation, appearance satisfaction, self-esteem, and gratitude) were calculated. The correlations between Dutch FAS scores and age and BMI were also explored, in line with prior research on the FAS. These analyses were conducted first among the total sample, and then among women and men separately. Pearson correlation coefficients around .10 indicate a small correlation, around .30 indicate a moderate correlation, and around .50 indicate a strong correlation (Cohen, 1992).

Last, to assess the *incremental validity* of the Dutch FAS scores, hierarchical regression analyses were conducted, among the total sample and among women and men separately. The criterion variables were self-esteem and gratitude. Step 1 of the analyses included body appreciation and appearance satisfaction as predictors, and Step 2 added functionality appreciation to the model. A significant change in $R^2$ from

Step 1 to Step 2 would support the incremental validity of the Dutch translation of the FAS (i.e., functionality appreciation predicts self-esteem and/or gratitude beyond the variance accounted for by body appreciation and appearance satisfaction).

## 3. Results

### 3.1. Exploratory factor analysis

Bartlett's test of sphericity was significant, $\chi^2$ (21) = 1875.82, $p <$ .001, and the KMO measure of sampling adequacy was $\geq$ .80 (KMO =.93), indicating that scores on the Dutch FAS items were sufficiently correlated for factor analysis. The exploratory factor analysis revealed a one-dimensional factor structure of the Dutch translation of the FAS. One of the seven components had an eigenvalue above Kaiser's criterion of 1 (4.15), which explained 59.27% of the variance. The other components had an eigenvalue between .81 and .36. The item-factor loadings were all higher than.49 for component 1 (see Table 1). The inter-item correlations were acceptable (i.e., .30 to .90; Field, 2009), with values between .40 and .80.

### 3.2. Internal consistency

Cronbach's alpha for the Dutch FAS items was .91. Item-total correlations were acceptable (Range =.58 to.78). The Cronbach's alpha if an item were to be deleted, was never higher than .91, indicating that Cronbach's alpha would not increase should any FAS item be removed. McDonald's ω for the FAS items was .91 (95% CI =.89 to.93). Based on these results, Dutch FAS scores demonstrated adequate internal consistency.

### 3.3. Test-retest reliability

The ICC was.72, indicating similarity between Dutch FAS scores at Time 1 and Time 2. Further, Dutch FAS scores did not significantly differ between time points, $t(183) = 1.48$, $p = .142$. Overall, these findings support the test-retest reliability of the Dutch FAS scores over a 2-week period.

### 3.4. Gender invariance

For the following analyses, only the data from participants identifying as (cisgender) women or men were included, as the sample sizes for other gender identities were too small.

We assessed configural invariance first. The analyses showed that the CFI, TLI, RMSEA, and SRMR values were all in the acceptable range (see Table 2). Therefore, based on these indices, the Dutch FAS scores demonstrated configural invariance across genders.

Next, we tested whether the Dutch FAS scores demonstrated metric invariance. The result of the chi square test was significant, $\Delta\chi^2 = 16.51$, $df = 6$, $p = .012$, which would indicate that the factor loadings were non-invariant between groups. However, it is also important to investigate the changes in model fit indices from the configural model to the metric model (cf. Alleva, Tylka, & Kroon Van Diest, 2017): According to Chen (2007), if $\Delta$CFI $\geq -.010$ *and* $\Delta$RMSEA $\geq .015$ *or* $\Delta$SRMR $\geq .030$, then factor loadings are non-invariant across groups. Based on these criteria, the fit indices provided evidence for the metric invariance of the Dutch FAS scores, $\Delta$CFI = −.006, $\Delta$RMSEA = .018, $\Delta$ SRMR = .022 (see Table 2). Note that Item 4 ("I acknowledge and appreciate when my body feels good and/or relaxed") had been the only item with a significant $\Delta\chi^2$ value; however, the changes in the fit indices for Item 4 did not meet Chen's criteria for non-invariance.

The scalar invariance of Dutch FAS scores was assessed next. For this model, the result of the chi square test was significant, $\Delta\chi^2 = 17.46$, $df = 6$, $p = .008$, which would indicate that item loadings and intercepts were non-invariant across genders. Again, we consulted the changes in model fit indices for further insight and a more persuasive and practical evaluation of non-invariance (cf. Alleva, Tylka, & Kroon Van Diest, 2017). Based on Chen's (2007) criteria (i.e., $\Delta$CFI $\geq -.010$ *and* $\Delta$RMSEA $\geq$.015 *or* $\Delta$SRMR $\geq$.010), we concluded that the Dutch FAS scores demonstrated scalar invariance, $\Delta$CFI = −.003, $\Delta$RMSEA = .009, $\Delta$SRMR = .007 (see Table 2). Item 3 ("I appreciate that my body allows me to communicate and interact with others") was the only item with a significant $\Delta\chi^2$ value, but changes in fit indices for Item 3 did not meet Chen's criteria for non-invariance.

Last, we assessed the strict invariance of the Dutch FAS scores. The chi square test for the final model was nonsignificant, $\Delta\chi^2 = 9.02$, $df = 7$, $p = .251$. In addition, based on Chen's (2007) criteria (i.e., $\Delta$CFI $\geq -.010$ *and* $\Delta$RMSEA $\geq$.015 *or* $\Delta$SRMR $\geq$.010), the Dutch FAS scores also indicated strict invariance, $\Delta$CFI = −.001, $\Delta$RMSEA = .000, $\Delta$SRMR = .006 (see Table 2). Therefore, we concluded that the Dutch FAS scores demonstrated strict invariance.

Based on the results of the preceding analyses, gender invariance was established for the Dutch translation of the FAS. As such, we proceeded to test whether Dutch FAS scores differed between genders. Women reported significantly higher functionality appreciation ($M = 4.04$, $SD = 0.63$) compared to men ($M = 3.79$, $SD = 0.83$), $t(368.37) = -3.67$, $p <$ .001.

### 3.5. Construct validity

The Pearson correlation coefficients for the relationships between all study variables (i.e., functionality appreciation, body appreciation, appearance satisfaction, self-esteem, and gratitude) are presented in Table 3 (total sample) and in Table 4 (women and men separately). In the total sample—as well as among women and men separately—functionality appreciation was significantly correlated with body appreciation, appearance satisfaction, self-esteem, and gratitude, all *ps* $<$ .001. The magnitude of all Pearson correlation coefficients can be considered moderate to strong. These results support the construct validity of the Dutch FAS scores. Functionality appreciation was also inversely associated with age and with BMI among the total sample and

**Table 2**
Measurement Invariance Across Genders (Women and Men).

| Model | SB$\chi^2$ | *df* | Robust CFI | Robust TLI | Robust RMSEA | SRMR |
|---|---|---|---|---|---|---|
| Configural | 47.54 | 28 | .998 | .997 | .022 | .028 |
| Metric | 64.15 | 34 | .992 | .990 | .001 | .049 |
| Scalar | 65.24 | 39 | .994 | .993 | .005 | .044 |
| Strict | 58.34 | 45 | .996 | .996 | .024 | .046 |

| Model Comparison | Δ SB$\chi^2$ | Δ Robust CFI | Δ Robust TLI | Δ Robust RMSEA | ΔSRMS | Δ *df* | *p* |
|---|---|---|---|---|---|---|---|
| Configural vs. metric | 16.51 | -.006 | -.007 | .018 | .022 | 6 | .012 |
| Metric vs. scalar | 17.46 | -.003 | .993 | .009 | .007 | 6 | .008 |
| Scalar vs. strict | 9.02 | -.001 | .000 | .000 | .006 | 7 | .251 |

*Note.* SB = Satorra-Bentler; CFI = Comparative fit index; TLI = Tucker Lewis 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, BMI, and Age among the Total Sample.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| (1) Functionality appreciation | 1 | | | | | | |
| (2) Body appreciation | .63*** | 1 | | | | | |
| (3) Appearance satisfaction | .56*** | .86*** | 1 | | | | |
| (4) Gratitude | .49*** | .48*** | .45*** | 1 | | | |
| (5) Self-esteem | .42*** | .73*** | .68*** | .36*** | 1 | | |
| (6) BMI | -.29*** | -.29*** | -.39*** | -.26*** | -.16** | 1 | |
| (7) Age | -.29*** | -.08 | -.13** | -.19*** | .04 | .20*** | 1 |

*Note.* * $p < .05$, ** $p < .01$, *** $p < .001$.

**Table 4**
Bivariate Correlations Between Functionality Appreciation, Scores on Other Measures Included in the Study, BMI, and Age among Women (Top Diagonal) and Men (Bottom Diagonal) Separately.

| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
|---|---|---|---|---|---|---|---|
| (1) Functionality appreciation | 1 | .61*** | .49*** | .46*** | .44*** | -.22*** | -.13* |
| (2) Body appreciation | .69*** | 1 | .83*** | .49*** | .73*** | -.28*** | .07 |
| (3) Appearance satisfaction | .66*** | .88*** | 1 | .46*** | .69*** | -.38*** | .07 |
| (4) Gratitude | .48*** | .53*** | .49*** | 1 | .41*** | -.16* | -.05 |
| (5) Self-esteem | .52*** | .74*** | .71*** | .45*** | 1 | -.18** | .09 |
| (6) BMI | -.32*** | -.32*** | -.41*** | -.29*** | -.17** | 1 | .11 |
| (7) Age | -.36*** | -.26*** | -.35*** | -.21** | -.13 | .26*** | 1 |

*Note.* * $p < .05$, ** $p < .01$, *** $p < .001$.

among women and men separately, all *ps* < .05. The magnitudes of these correlations were moderate among the total sample and among men, and they were small among women.

### 3.6. Incremental validity

#### 3.6.1. Incremental validity among the total sample

For self-esteem, the overall model was nonsignificant, $F(3, 467) = 183.45$, $R^2 = .541$, $p = .617$. In Step 1, body appreciation, B = .71, *SE* = .08, β = .55, $t = 8.51$, $p < .001$, and appearance satisfaction, B = .34, *SE* = .08, β = .25, $t = 4.07$, $p < .001$, significantly predicted self-esteem. However, in Step 2 where functionality appreciation was added, we found that functionality appreciation did not predict self-esteem, B = −.08, *SE* = .05, β = −.06, $t = -1.54$, $p = .124$, and $R^2$ change from Step 1 ($R^2$ =.539) to Step 2 ($R^2$ =.541) was nonsignificant, $p = .124$. Regarding gratitude, the overall model was significant, $F(3, 467) = 64.85$, $R^2 = .294$, $p < .001$. In Step 1, body appreciation, B = .22, *SE* = .09, β = .19, $t = 2.34$, $p = .020$, significantly predicted gratitude, but appearance satisfaction did not, B = .14, *SE* = .09, β = .11, $t = 1.52$, $p = .130$. In Step 2, functionality appreciation was added and significantly predicted gratitude, B = .35, *SE* = .06, β = .31, $t = 6.20$, $p < .001$. $R^2$ change from Step 1($R^2$ =.236) to Step 2 ($R^2$ =.294) was significant, $p < .001$. Together, these results suggest that, for the total sample, incremental validity for the Dutch translation of the FAS was supported for gratitude but not for self-esteem.

#### 3.6.2. Incremental validity among women

Among women, the overall model for self-esteem was significant, $F(3, 251) = 104.64$, $R^2 = .556$, $p < .001$. In Step 1, body appreciation, B = .74, *SE* = .12, β = .50, $t = 6.06$, $p < .001$, and appearance satisfaction, B = .42, *SE* = .12, β = .27, $t = 3.54$, $p < .001$, significantly predicted self-esteem. In Step 2, functionality appreciation was added and did not significantly predict self-esteem, B = .01, *SE* = .01, β = .08, $t = 0.10$, $p = .918$. Reflecting this, $R^2$ change from Step 1 ($R^2$ =.556) to Step 2 ($R^2$ =.556) was nonsignificant, $p = .918$. With respect to gratitude, the overall model was significant, $F(3, 251) = 34.57$, $R^2 = .292$, $p < .001$. In Step 1, neither body appreciation, B = .20, *SE* = .11, β = .19, $t = 1.80$, $p = .073$, nor appearance satisfaction, B = .19, *SE* = .11, β = .17, $t = 1.73$, $p = .084$, significantly predicted gratitude. However, in Step 2, functionality appreciation was added and significantly predicted gratitude, B = .31, *SE* = .08, β = .27, $t = 4.02$, $p < .001$. $R^2$ change from Step 1($R^2$ =.247) to Step 2 ($R^2$ =.292) was significant, $p < .001$. Therefore, similar to the analyses among the total sample, the incremental validity of the Dutch translation of the FAS among women was supported for gratitude only.

#### 3.6.3. Incremental validity among men

Among men, the overall model for self-esteem was significant, $F(3, 200) = 87.20$, $R^2 = .567$, $p < .001$. In Step 1, body appreciation, B = .54, *SE* = .11, β = .52, $t = 5.03$, $p < .001$, and appearance satisfaction, B = .28, *SE* = .11, β = .26, $t = 2.61$, $p = .010$, significantly predicted self-esteem. In Step 2, functionality appreciation was added and it did not significantly predict self-esteem, B= −.01, *SE* = .06, β = −.01, $t = -1.29$, $p = .897$. The $R^2$ change from Step 1 ($R^2$ =.567) to Step 2 ($R^2$ =.567) was nonsignificant, $p = .897$. Concerning gratitude, the overall model was significant, $F(3, 200) = 29.74$, $R^2 = .308$, $p < .001$. In Step 1, body appreciation, B = .42, *SE* = .16, β = .35, $t = 2.66$, $p = .009$, significantly predicted gratitude, but appearance satisfaction did not, B = .06, *SE* = .16, β = .05, $t = 0.38$, $p = .704$. In Step 2, functionality appreciation was added and significantly predicted gratitude, B = .23, *SE* = .09, β = .21, $t = 2.57$, $p = .011$. $R^2$ change from Step 1 ($R^2$ =.286) to Step 2 ($R^2$ =.308) was significant, $p = .011$. In line with the analyses for the total sample and for women only, the incremental validity of the Dutch translation of the FAS among men was supported for gratitude but not for self-esteem.

## 4. Discussion

In line with the English version of the FAS and with the extant published translations (e.g., Alleva, Tylka, & Kroon Van Diest, 2017; Namatame et al., 2022; Swami et al., 2019, 2022), Dutch FAS items demonstrated a unidimensional factor structure, acceptable internal consistency, test-retest reliability, and construct validity via their positive associations with body appreciation, appearance satisfaction, self-esteem, and gratitude. Dutch FAS scores also demonstrated gender invariance, and incremental validity for gratitude, but not for self-esteem. In the main, these findings provide support that the Dutch FAS is a psychometrically sound instrument to assess functionality appreciation among Dutch speaking adults in the Netherlands. Below, we highlight several noteworthy aspects of the findings and their implications.

First, the moderate positive associations between functionality appreciation and respectively body appreciation, appearance satisfaction, self-esteem, and gratitude support the relationship between functionality appreciation and a more positive body image and well-being more broadly (Alleva & Tylka, 2021), and among Dutch adults in the Netherlands more specifically. Based on these findings, functionality appreciation is a worthwhile target within programs that aim to improve body image and other aspects of well-being among adults in the Netherlands. The availability of the FAS in Dutch can help to facilitate research and intervention/clinical work in these areas. Relatedly, Dutch FAS scores were only moderately correlated with scores on the Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015b), the other measure of positive body image included in this study. This is in line with prior research on the English version of the FAS (e.g., Alleva, Tylka, & Kroon Van Diest, 2017) and on other translations of the FAS (e.g., Swami et al., 2021). As underscored by Swami et al. (2021), this is important because it supports the fact that functionality appreciation is distinct from body appreciation, with both being core components of the multifaceted positive body image construct (Swami et al., 2020). As such, there is value to using both the FAS and BAS-2—which has also been translated and published in Dutch (Alleva et al., 2016)—as a means to comprehensively operationalize the positive body image construct among Dutch speaking adults in the Netherlands.

Second, we also explored the associations between Dutch FAS scores and age and BMI. The results showed that participants who were younger and who had lower BMIs reported higher levels of functionality appreciation. Speculatively, Dutch culture's emphasis on the domain of physical capacities—with respect to sports and cycling—could impact individuals' body image as they age. Namely, to the extent that older individuals are no longer able to engage in physical activities to the same extent or frequency (e.g., due to physical changes, less leisure time due to other responsibilities) they may have fewer opportunities to foster and experience functionality appreciation. Conversely, younger individuals may be embedded within systems that structurally include regular physical activity or where they have access to facilities for (affordable or free) physical activity, such as within the Dutch school system, universities, and colleges. They may also be more likely embedded within social groups with peers who engage in physical activity. These factors may encourage engagement in physical activity among younger Dutch people and thus, potentially, lead to higher levels of functionality appreciation. In this respect, programmes that promote accessible and joyful physical activity for people of all ages, abilities, and life stages (e.g., Nationaal Sportakkoord) should continue to be supported in the Netherlands. More broadly, programmes that encourage individuals to emphasise their body functionality holistically (i.e., incorporating the other domains of body functionality), and to participate in meaningful activities relating to these other valued domains, could be helpful.

Regarding the inverse correlation between Dutch FAS scores and BMI, global body ideals that emphasise leanness and a narrow perception of 'physical fitness' (Rodgers et al., 2023) could impact individuals of higher BMI in the Netherlands as well, such that they perceive their body to be less 'functional,' and such that their immediate and broader social environment make it challenging for them to appreciate their body functionality holistically (Alleva & Tylka, 2021). With respect to physical capacities, research shows that internalised weight stigma and weight-based discrimination can discourage engagement in physical activity (e.g., Pearl et al., 2021). Within the context of the Netherlands, adults of higher BMI are less likely to cycle and they cycle shorter distances compared to adults of lower BMI (The Netherlands Institute for Transport Policy Analysis, 2020). Though it is impossible to establish causality from these data alone, narrow body ideals and weight stigma could discourage individuals of higher BMI from engaging in physical activities such as cycling. Mirroring our standpoint described above, programmes should strive to overcome barriers to engaging in physical activity that different people may have, whether that be with respect to their age, BMI, or other characteristics. Again, it is equally important to broaden individuals' perspectives of their body functionality beyond physical capacities, which can contribute to higher functionality appreciation. In support of this, Alleva et al. (2021) showed that having Dutch participants write about the body functionality of a woman of higher body weight—namely, by describing the functions of her body across the six domains of body functionality and why those functions would be meaningful to her—contributed to lower weight stigma and increased positive body image. In two other recent studies, writing appreciatively about the diverse aspects of one's own body functionality contributed to reductions in internalised weight stigma among the participants themselves, as well (Davies et al., 2022; Dunaev et al., 2018).

Of note, the findings concerning age and BMI should be interpreted with caution, given that prior research on the FAS across language groups has shown an inconsistent pattern of results. For example, some studies have found significant correlations between FAS scores and age (e.g., Namatame et al., 2022, positive association) and BMI (e.g., Cerea et al., 2021, inverse association), whereas others have not (e.g., Swami et al., 2019, no associations with BMI). To further complicate matters, other studies have found significant correlations with age and BMI for some gender groups only, or have found different directions of correlations based on gender groups. To illustrate, Swami et al. (2021) found that Arabic FAS scores were inversely correlated with age for women but not for men. With respect to BMI, Arabic FAS scores were inversely correlated with BMI for women but were positively correlated with BMI for men. To give another example, Anastasiades et al. (2023) found that Greek FAS scores were positively correlated with age for women only. Interestingly, when correlations were established in prior studies, they tended to be small, whereas the correlations in the present dataset were moderate for the total sample and for men separately. Overall, the inconsistent patterns of results with respect to age, BMI, and FAS scores only further highlights the need for future research involving the FAS across language groups and geographical regions.

Another noteworthy aspect of the present findings concerns the results for overall Dutch FAS scores, and for Dutch FAS scores between women and men. Across the total sample, the mean Dutch FAS score was 3.93; women and men's mean FAS scores were 4.04 and 3.79, respectively. These data correspond approximately to the response 4 = *agree* on the FAS response scale, whereby 1 = *strongly disagree* and 5 = *strongly agree.* Thus, it appears that Dutch adults are appreciative of their body functionality overall. As touched upon earlier, it could be that the Netherlands' emphasis on physical capacities (e.g., WHO, 2021)—albeit only one domain of body functionality—could direct people's attention to noticing and appreciating their body functionality. In the future, it would be interesting to conduct qualitative research to explore the domains and functions that Dutch adults describe as most contributing to their functionality appreciation and why. Interestingly, while Dutch adults appear to have high functionality appreciation overall, their scores were lower compared to adults who have completed other translations of the FAS, including in Bahasa Malaysia, Chinese, Greek, Italian, Polish, and Romanian. One explanation for this could be related to the Dutch notion of '*nuchterheid*,' which translates roughly to 'level-headedness' or 'down-to-earthness.' '*Nuchterheid*' discourages strong emotional expressions (both negative and positive), showing off one's successes and positive characteristics, and 'standing out from the crowd' (e.g., Van den Berg, 2023). As such, Dutch adults may be less likely to endorse scores at the extreme ends of the FAS response scale. In contrast, Dutch adults' scores were higher than adults completing the translations in Arabic and Japanese. Similar to our explanation for Dutch FAS scores, Namatame et al. (2022) described that Japanese individuals value humbleness and modesty in interpersonal communication, and avoid standing out from the crowd as if they are better than others. So, they may be less willing to admit their positive attributes, even on anonymous questionnaires like the Japanese FAS (note that Swami et al., 2022, did not comment on potential reasons for participants' relatively

lower scores on the Arabic FAS). Note that these comparisons between Dutch FAS scores and scores on the other translations of the FAS are descriptive only, and thus are tentative. Future studies are needed to establish measurement invariance across these populations, which is necessary to conduct statistical comparisons of FAS scores and to draw firmer conclusions about the meanings of the findings. As touched upon above, it could be insightful to explore what domains and functions people experience as contributing to their functionality appreciation, how these compare across countries, and potentially how these relate to culture-specific (or shared) qualities such as '*nuchterheid*' and modesty.

With respect to potential gender differences in Dutch FAS scores, Dutch FAS scores demonstrated gender invariance, which enabled us to compare levels of functionality appreciation between the women and men in our sample. The results showed that women reported higher functionality appreciation compared to men. It is difficult to interpret these differences in the absence of additional data. However, speculatively, one reason could be related to the fact that Dutch women also reported significantly higher gratitude compared to men.[1] Higher levels of gratitude could increase Dutch women's propensity to notice and appreciate various aspects of their lives, including the things that their body is able to do. Yet, as we are unaware of whether the Dutch translation of the GQ6 (Jans-Beken et al., 2015) has demonstrated gender invariance in prior research, these comparisons must be interpreted with caution. Another potential reason for the differences in functionality appreciation between women and men in this study could be related to the body positivity movement that, in part, promotes viewing the body from a functionality vs. appearance-based perspective (Cohen et al., 2021). Women may be more familiar with the body positivity movement than men (Cohen et al., 2019), and therefore they might also be more likely to reflect on and appreciate their body functionality. Interestingly, the only other FAS translation study to have found statistically significant differences in FAS scores between adult women and men has been Swami, Todd et al.'s (2022) study on the Arabic translation of the FAS, where women also reported higher functionality appreciation than men. Thus, gender differences in FAS scores may be the exception, rather than the norm. This could be because the FAS was designed to enable individuals to draw upon their own unique conceptualisation of body functionality (cf. Alleva, Tylka, & Kroon Van Diest, 2017), based on what their own body is able to do and what domains and functions they personally value. Again, it could be insightful to explore what domains and functions individuals draw upon when completing the FAS, and how these could differ according to their characteristics such as country of origin or gender, or other characteristics such as age, physical ability, profession, etc.

It is also important to highlight that while Dutch FAS scores evidenced incremental validity with respect to gratitude—in line with other research on the FAS (Alleva, Tylka, and Kroon Van Diest (2017))—we did not find evidence for incremental validity with respect to self-esteem, which was not in line with the prior research on the FAS (e.g., Alleva, Tylka, and Kroon Van Diest (2017); Anastasiades et al., 2023; Swami et al., 2019, 2021, 2022). The simplest explanation for this could be that, among Dutch adults, functionality appreciation does not contribute unique variance to self-esteem, over and above the variance explained by body appreciation and appearance satisfaction. Another reason could be related to the questionnaires used to measure self-esteem: In this study, we used the Single Item Self-Esteem Scale (SISE; Robins et al., 2013) to reduce participant burden, whereas the Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1965) was used in almost all of the other studies except Alleva, Tylka, and Kroon Van Diest (2017) where the SISE was also used. Though the SISE has shown good psychometric properties and the SISE and the RSE have shown nearly identical correlations with additional constructs of interest and with socially desirable responding (Robins et al., 2013), future research on the Dutch translation of the FAS could include the RSE to explore whether the results for incremental validity differ. Relatedly, other studies testing the incremental validity of the FAS in relation to self-esteem have all used the BAS-2 (Tylka & Wood-Barcalow, 2015b) as an additional predictor variable in the regression models, as we did, but have used different other questionnaires as additional predictor variables (e.g., those assessing weight discrepancy, disordered eating). These nuances in methodology could contribute to differences in findings. Taking these points into account, we can conclude that Dutch FAS scores demonstrated incremental validity with regards to gratitude, but more research with respect to self-esteem is needed.

Last, in the process of publishing the present study, we discovered that another research group in the Netherlands had also conducted a study involving our Dutch translation of the FAS, which we had previously shared with them via email. In their study, Rekkers et al. (manuscript submitted for publication) tested the psychometric properties of our Dutch translation of the FAS among women with and without an eating disorder. In line with our research, Dutch FAS scores demonstrated a unidimensional factor structure and acceptable internal consistency, 2-week test-retest reliability, and convergent validity via positive correlations with body satisfaction. These findings provide additional confidence in the Dutch translation of the FAS to assess functionality appreciation among Dutch speaking adults in the Netherlands. Complementing our work, Rekkers et al. also showed that Dutch FAS scores demonstrated divergent validity via inverse correlations with eating disorder symptomatology. In addition, Dutch FAS scores were higher among women without an eating disorder compared to women with an eating disorder. These findings are in line with the broader literature on body functionality, which suggests that appreciating one's body functionality may encourage individuals to treat their body with more respect and care, for example via a more intuitive and adaptive eating style, and via lower levels of disordered eating (Alleva & Tylka, 2021). Rekkers et al.'s findings support the use of the Dutch translation of the FAS among women with an eating disorder in the Netherlands.

### 4.1. Limitations and additional future directions

The following limitations point to additional directions for future research. First, the present Dutch translation of the FAS was created and tested within the Netherlands, where the majority of native Dutch speakers live (Kingdom of the Netherlands, 2023). Yet, there are differences between Dutch language and culture across different Dutch speaking countries (e.g., Belgium, Aruba, Curacao; Taalunie, 2019), which could potentially impact how Dutch speaking individuals across these countries interpret and complete the present Dutch translation of the FAS. As such, the present Dutch translation of the FAS should be tested among people in other Dutch speaking countries as well, for example to see whether its psychometric properties are upheld and whether any adjustments to its items need to be made. Second, to minimize participant burden, we included few questionnaires in addition to the FAS. Future research could include questionnaires measuring other constructs of interest (e.g., intuitive eating; Avalos & Tylka, 2006), to further test the construct and incremental validity of the Dutch translation of the FAS. Similarly, the additional constructs we investigated enabled us to assess convergent validity only. Future research could include questionnaires assessing constructs that are expected to correlate inversely with FAS scores (e.g., self-objectification; Fredrickson & Roberts, 1997), to assess divergent validity, as well. Last, the analyses were reported for the full sample, and for cisgender women and cisgender men separately. The subsamples of individuals with other gender identities were too small to conduct separate analyses among these groups. Relatedly, the overall sample was relatively homogeneous in terms of other demographic factors such as sexual orientation and cultural background. Future research could purposely recruit larger subsamples of individuals with more diverse gender identities and with

[1] $M_{women} = 5.54$, $M_{men} = 5.18$; $t(384.23) = -4.63$, $p < .001$.

respect to other demographic characteristics as well.

### 4.2. Conclusions

The present findings are valuable because they provide support for the Dutch translation of the FAS as a psychometrically sound measure of functionality appreciation among Dutch speaking adults in the Netherlands. The findings also support the wider body of literature which has shown that functionality appreciation is an important aspect of positive body image that is associated with other aspects of healthy body image and well-being (Alleva & Tylka, 2021; Swami et al., 2020). This appears to be the case among adults in the Netherlands, too. It is our hope that the availability of a validated Dutch version of the FAS will be helpful to scholars across a variety of contexts, for example not only within research settings but also within other settings such as clinical and health care settings. We hope that the availability of the Dutch translation of the FAS can also facilitate research comparing functionality appreciation among people in the Netherlands vs. among people from other cultural groups and geographical locations.

## CRediT authorship contribution statement

**Jessica M. Alleva:** Conceptualisation, Methodology, Investigation, Writing – Original Draft, Writing – Reviewing & Editing; **Marieke Custers:** Formal Analysis, Writing – Original Draft, Writing – Reviewing & Editing; **Yi Wu:** Conceptualisation, Methodology, Writing – Reviewing & Editing; **Carolien Martijn:** Conceptualisation, Methodology, Writing – Reviewing & Editing.

## Declaration of Competing Interest

The authors have no conflict of interest to declare.

## Data Availability

The authors do not have permission to share data.

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