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**Multiple Dimensions of Interoceptive Awareness are Associated with Facets of Body Image in British Adults**

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**Abstract**

Previous research has identified a relationship between interoception and body image, where lower interoceptive awareness (IA) is associated with negative body image. However, relationships between facets of interoception and positive body image remain unexplored, and men and older adults remain underrepresented. To overcome these limitations, we assessed relationships between multiple dimensions of interoceptive awareness (IA) and multiple facets of body image in community adults. An online sample of 646 British adults (447 women) aged 18-76 years completed the Multidimensional Assessment of Interoceptive Awareness (MAIA), the Body Appreciation Scale-2, the Functionality Appreciation Scale, the Authentic Pride subscale from the Body and Appearance Self-Conscious Emotions Scale, and the Appearance Orientation and Overweight Preoccupation subscales from the Multidimensional Body-Self Relations Questionnaire. Hierarchical regressions revealed significant predictive relationships between IA and all five facets of body image after controlling for sex, body mass index, and age. In the final models, the MAIA subscales emerged as significant predictors for at least one facet of body image, with the exception of the MAIA Body Listening subscale. These findings extend previous work by demonstrating significant relationships between IA and previously unexplored facets of body image, which may hold promise for practitioner-based interventions.

 **Keywords:**Interoception; Interoceptive Awareness; Positive Body Image; Body Appreciation; Functionality Appreciation; Body Pride

**1. Introduction**

*Body image* is a multifaceted construct comprising body-related perceptions, affects, and cognitions (Cash, 2004; Cash & Smolak, 2011). A robust body of evidence supports a divergence between negative and positive body image (Ricciardelli, Caltabiano, & D’Antuono, 2018; Tylka, 2011, 2018; Tylka & Wood-Barcalow, 2015a). *Positive body image* is not defined by the mere absence of negative body image, but instead requires expressing appreciation for the body as it is, even though there may be aspects that an individual may want to alter (Pope etal., 2014; Tylka & Wood-Barcalow, 2015a). This is important because, whilst measures of negative and positive body image are often significantly and negatively correlated, there are also unique relationships between negative and positive body image, respectively, and other variables (Tylka & Wood-Barcalow, 2015a). For example, body dissatisfaction has been associated with negative outcomes, such as alcohol consumption, whereas positive body image is predictive of positive health-related outcomes, such as using sun-protection and seeking medical help when necessary (Andrew, Tiggemann, & Clark, 2016), and psychosocial well-being (Swami, Weis, Barron, & Furnham, 2018).

Whilst the body image construct has been extensively studied, much of the available research has primarily focused on the influence of the external senses (predominantly vision), thus overlooking other sensory inputs (Gaudio, Brooks, & Riva, 2014). In particular, the perception of internal bodily sensations *vis-à-vis* body image has received relatively little consideration (Badoud & Tsakiris, 2017). *Interoception* refers to the processing of stimuli originating from within the body (Craig, 2003). Viscera – such as the heart, stomach, and lungs – produce signals that indicate the present state of the organ (e.g., heartrate, hunger, dyspnoea). The nervous system senses, interprets, and integrates this information to provide an ongoing sense of the body’s internal landscape at both conscious and unconscious levels (Cameron, 2002; Craig, 2003). Interoception research typically distinguishes between *interoceptive sensitivity* (IS), which describes the objective detection of internal bodily sensations through behavioral measures, such as heartbeat perception tasks (e.g., Schandry, 1981; Whitehead, Drescher, Heiman, & Blackwell, 1977), and *interoceptive* *awareness* (IA), which refers to self-reported detections of internal bodily sensations using questionnaire-based measures (for a discussion, see Garfinkel, Seth, Barrett, Suzuki, & Critchley, 2015).

Within IA, a number of dimensions have been identified in addition to the basic awareness of internal signals. These include differing elements of regulation, appraisal, and adaptive and maladaptive modes of attention towards bodily signals (Mehling, 2016; Mehling et al.*,* 2009, 2012). For example, the valence of responses to cardiac signals (i.e., whether they were experienced as unpleasant or pleasant) has been shown to negatively predict facets of intuitive eating, independent of cardiac perception accuracy (Herbert, Blechert, Hautzinger Mattias, & Herbert, 2013). However, in a systematic review of the available self-report measures of IA, Mehling and colleagues (2009) concluded that neither of the instruments that performed well psychometrically – the Body Awareness Questionnaire (Shields, Mallory, & Simon, 1989) and the Private Body Consciousness Subscale of the Body Consciousness Questionnaire (Miller, Murphy, & Buss, 1981) – were able to distinguish between the beneficial (e.g., mindful) and maladaptive (e.g., anxiety driven) modes of attention towards internal bodily signals. It was also not possible to gain full coverage of the various dimensions of IA that were reflected in the literature using any combination of the instruments under scrutiny. Therefore, Mehling and colleagues (2012) developed the Multidimensional Assessment of Interoceptive Awareness (MAIA), which is used to assess eight distinct dimensions of IA: the ability to notice positive, negative and neutral bodily sensations (i.e., Noticing subscale); the ability to sustain attention towards such sensations (Attention Regulation subscale); the awareness of the relationship between emotional and bodily states (Emotional Awareness subscale); the use of attention to bodily sensations to regulate distress (Self-Regulation subscale); the inclination to attend to bodily sensations for insight (Body Listening subscale); the degree to which the body is experienced as a ‘safe’ and ‘trustworthy’ source of information (Trusting subscale); the tendency to attend to or ignore sensations of pain or discomfort (Not-Distracting subscale); and, finally, the extent to which a person worries about or catastrophises sensations of pain or discomfort (Not-Worrying subscale).

Explorations of how these dimensions of IA specified by Mehling and colleagues (2012) might relate to facets of body image are currently limited to one clinical study. In a psychometric assessment of the MAIA using a sample of individuals with eating disorders, Brown and colleagues (2017) found that scores for the Not-Distracting and Trusting subscales were inversely associated with all subscales of the Eating Disorder Examination Questionnaire (Fairburn & Beglin, 1994), including the Shape Concern and Weight Concern subscales. Despite the dearth of studies considering the relationships between multiple facets of IA and body image, a growing body of evidence supports a more generalised relationship between the two constructs, where lower IA and IS are thought be significantly associated with more negative body image (for a review, see Badoud & Tsakiris, 2017). For example, Emanuelsen, Drew, and Kӧteles (2014) found that lower IS (assessed using a heartbeat tracking task) was associated with significantly higher body dissatisfaction in samples of healthy Norwegian high school students (*N* = 82) and Hungarian university students (*N* = 70). Similarly, in a cardiac perception study, Ainley and Tsakiris (2013) demonstrated that British female university students (*N* = 50) with lower IS were more likely to self-objectify (i.e., adopt an outsider’s perspective and evaluate their bodies based upon appearance, rather than functional, capabilities; Fredrickson & Roberts, 1997).

Findings such as these have been interpreted in the context of the *competition of cues hypothesis* (Pennebaker, 1982; Pennebaker & Lightner 1980), which posits an attentional antagonism between internal and external stimuli, such that attention paid to internal stimuli will reduce attentional resources available for external stimuli and *vice versa,* and that attention will be directed according to the salience of the internal/external stimuli. The competition between interoceptive and exteroceptive cues can be examined using manipulations of body ownership, such as the rubber hand illusion (Botvinick & Cohen, 1998). For example, Tsakiris, Tajadura-Jiménez, and Costantini (2011) found that a stronger experience of the rubber hand illusion was associated with lower IS, suggesting that, when interoceptive signals are less salient, visual capture and other exteroceptive stimuli are prioritised. This trend has been identified in both participants within nonclinical samples (Tajadura-Jimenez & Tsakiris, 2014) and participants with anorexia (Eshkevari, Rieger, Longo, Haggard, & Treasure, 2014). These results suggest that, for people with higher IS, the precision of interoceptive information is deemed to be more reliable. Therefore, the self is more ‘robust’ because neural representations of the body are less influenced by conflicting exteroceptive inputs (Ainley, Apps, Fotopoulou, & Tsakiris, 2016; Badoud & Tsakiris, 2017).

This line of reasoning can be extended to one’s body image: it is possible that individuals with a lower awareness of interoceptive signals are more vulnerable to exteroceptive inputs (e.g., visual perception) and broader influences (e.g., sociocultural appearance ideals). Indeed, susceptibility to the rubber hand illusion has been found to account for 10% of the variance in bulimic symptomatology in women and men and 22% of the variance in susceptibility to unhealthy body change strategies in men (Mussap & Salton, 2006). In both of the pathways identified by Mussap and Salton (2006), the degree of acceptance, and perceived importance, of cultural standards of beauty was a significant mediator. However, this account broadly considers interoception and body image as unidimensional constructs, which is an important over-simplification given the body of evidence that both constructs are multidimensional (Garfinkel at al., 2015; Mehling, 2016; Tylka & Wood-Barcalow, 2015a).

More specifically, the emphasis on the mere perception of interoceptive cues in relation to body image does not distinguish between, for example, an anxiety-driven attention style and a more mindful attention style towards interoceptive cues (Mehling, 2016). Indeed, the way in which interoceptive signals are valued and responded to, but not necessarily the tendency to notice such stimuli, has been found to mediate the relationship between self-objectification and disordered eating attitudes (Daubenmier, 2005) and to partially mediate the relationship between body appreciation and intuitive eating in women (Oswald, Chapman, & Wilson, 2017). Furthermore, with regards to Mehling and colleagues’ (2012) eight dimensions of IA, while the ability to notice interoceptive sensations does not appear to predict body shape or weight concern for participants with eating disorders, styles of attention towards interoceptive stimuli are significant predictors (Brown et al., 2017). Specifically, Brown and colleagues (2017) reported that individuals who tended to distract themselves from uncomfortable body sensations, and who trusted their bodily signals the least, had the greatest shape and weight concerns. Similarly, the ability to use attention towards bodily sensations to regulate distress also approached significance as a negative predictor of weight concern. Though preliminary, the results from these studies suggest that appraisals of interoceptive cues are associated with body image and may even be more closely aligned with facets of body image than interoceptive sensitivity. However, it is not yet clear whether these findings will generalise to samples that are nonclinical or more diverse in terms of age and sex.

The extant theorising on this topic is also insufficient with regard to the consideration of potential relationships between facets of interoception and positive body image, which could represent novel intervention targets. Whilst the role of interoception in relation to negative body image has been deduced from indirect (e.g., Friederich et al., 2010; Jenkinson, Taylor, & Laws, 2018; Klabunde, Acheson, Boutelle, Matthews, & Kaye, 2013; Mohr et al., 2010, 2011; Pollatos et al., 2008; Zimmerli, Walsh, Guss, Devlin & Kisseleff, 2006) and direct explorations (Emanuelsen et al., 2015), there is a paucity of research considering the potential relationships between interoception and indices of positive body image. Within the context of the available literature, it is plausible that positive relationships will exist between many facets of interoception and positive body image. For example, the tendency to notice and sustain attention towards interoceptive signals may reinforce the positive functions that the body performs and reduce susceptibility to self-objectification (Daubenmier, 2005; see also Ainley & Tsakiris, 2013). It may also be posited that the extent to which bodily signals are trusted will be positively associated with positive body image (Brown et al., 2017; Oswald et al., 2017).

However, to our knowledge, there are currently only three published explorations of relationships between interoceptive processing and positive body image. First, Duschek, Werner, Reyes del Paso, and Schandry (2015) asked nonclinical Austrian participants with accurate (*n* = 30) and poor (*n* = 30) cardiac perception to complete the Attractive/Self-Confidence subscale from the German Body Appraisal Inventory (Brahler, Strauβ, Hessel, & Schumacher, 2000), which includes items assessing body satisfaction (e.g., “I am proud of my body”) alongside items assessing the investment and importance individuals place on their appearance (e.g., “My appearance is important to me”). Overall, participants with high IA reported significantly higher bodily satisfaction and appearance orientation in comparison to the low IA group. Meanwhile, Daubenmier (2005) found that awareness of interoceptive signals, and the way that such stimuli are valued and responded to, was significantly associated with body satisfaction in adult women (*N* = 139). Finally, Oswald and colleagues (2017) demonstrated that both IA and appraisals of interoceptive signals partially mediated the relationship between body appreciation and intuitive eating in Australian female university students (*N* = 200).

**1.1. The Present Study**

The aim of the present study was to expand the available literature considering relationships between body image and interoception by exploring the explanatory power of multidimensional IA. We selected the MAIA as the most appropriate measure for this goal because it is currently the only available measure that can assess, not only the level of awareness of interoceptive signals, but also the type and purpose of the attention toward interoceptive stimuli (Mehling, 2009, 2012). We were particularly keen to explore how the eight dimensions of the MAIA might be related to facets of positive body image, given the paucity of research investigating relationships between interoception andpositive body image more generally. To that end, we focused on a wider set of positive body image variables (i.e., body appreciation, body pride, and functionality appreciation) than has been explored previously (Daubenmier, 2005; Duschek et al., 2015; Oswald et al., 2017), using psychometrically-valid instruments designed specifically to measure these constructs.

Given the exploratory nature of the present work, we also elected to examine relationships between scores on the MAIA and two further body image variables, namely overweight preoccupation and appearance orientation. We sought to explore the relationship between overweight preoccupation and the MAIA because it has not yet been directly explored in nonclinical participants, though unique relationships between facets of the MAIA and weight concern have been identified in a clinical sample (Brown et al., 2017). Meanwhile, we sought to examine appearance orientation because findings related to IS and IA in the extant literature have been mixed. Appearance orientation, which assesses the importance and investment an individual has placed upon their appearance, can be considered as an index of self-objectification (Davis, Dionne, & Shuster, 2001; Moradi & Huang, 2008), and the extant theorising outlined above would suggest that a variable that assesses focus upon exteroceptive appearance should be associated with reduced IS and IA. However, appearance orientation has been associated with cardiac perception in both positive (Duschek et al., 2015) and negative directions (Ainley & Tsakiris, 2013). We, therefore, included appearance orientation in the present work to explore whether multidimensional IA would provide some clarity.

The MAIA Noticing subscale assesses the ability to notice interoceptive signals, rather than the valence or purpose of such attention, and can therefore be considered as the subscale most akin to measures of IA that have been utilised in the extant literature (Mehling, 2016). Therefore, we first hypothesised that the Noticing subscale would be negatively associated with overweight preoccupation and positively associated with the positive body image indices. Given the contrasting evidence in the extant literature, it was not clear whether scores on the Noticing subscale would be positively or negatively associated with appearance orientation. Secondly, we hypothesised that scores on the MAIA Trusting, Not-Worrying, and Not-Distracting subscales, which assess adaptive and maladaptive attention-styles toward internal bodily signals (Mehling, 2016), might be more closely associated with overweight preoccupation and appearance orientation (in a negative direction) and the positive body image indices (in a positive direction) than the Noticing subscale (Daubenmier, 2005; Oswald et al., 2017). Similarly, we expected that scores on the Attention Regulation, Self-Regulation, and Body Listening subscales, which have been collectively referred to as regulatory aspects of IA (Mehling, 2016), would be negatively associated with overweight preoccupation and appearance orientation, and positively associated with the positive body image indices. Finally, it was not clear whether significant relationships would emerge between the body image indices and the remaining MAIA dimension (Emotional Awareness – awareness of the connection between emotional and bodily states), but this was included in preliminary analyses for exploratory reasons, given the dearth of research in the area.

A number of further limitations affect the extant literature examining relationships between IA and indices of body image, including a reliance on small samples of (predominantly female) university students and a paucity of research considering nonclinical populations. As a final aim, we sought to address these limitations in the present study by recruiting a large sample of British women and men, with a wide age range that would be more representative of age variations in community samples. Due to the well-documented effects of sex, age, and body mass index (BMI) on indices of body image (e.g., Swami et al., 2010; Tiggemann & McCourt, 2013; for a review, see Ricciardelli et al., 2018) and interoceptive processing (Cameron, 2001; Grabauskaitė, Baranauskas, & Griškova-Bulanova, 2017; Herbert & Pollatos, 2014; Khalsa, Rudrauf, & Tranel, 2009), we sought to examine the extent to which dimensions of IA would be significantly associated outcome measures once sex, age, and BMI had been accounted for.

**2. Method**

**2.1. Participants**

The sample (*N* = 646) consisted of 199 men and 446 women, and one person who described their sex as ‘other.’ The participants were aged between 18 and 76 years (*M* = 38.92, *SD* = 11.71), and the majority of participants reported their ethnicity as White (92.4%; Asian or British Asian = 3.1%; Black or African Caribbean = 1.9%; other = 2.7%). Self-reported BMI values ranged from 15.22 to 49.57 (*M* = 27.25, *SD* = 6.08). For women, mean BMI was 26.10 and for men mean BMI was 27.72. Both values are comparable to the most recent United Kingdom averages for women and men (*M* = 27.2 and 27.4, respectively; National Health Service Digital, 2016). In terms of educational qualifications, 16.7% had completed minimum secondary schooling, 27.1% had completed A-Levels or further education equivalents, 36.7% had an undergraduate degree, 15.6% had a postgraduate degree, 1.4% were still in full-time education, and 2.5% had some other qualification. In terms of relationship status, 40.1% were married, 24.9% were partnered and cohabiting, 20.7% were single, 6.8% were partnered but not cohabiting, 6.3% considered themselves as single but dating, and 1.2% reported some other status. The majority of the sample (92.4%) reported their sexual orientation as being heterosexual.

**2.2. Measures**

 **2.2.1. Interoception**. We assessed IA using the Multidimensional Assessment of Interoceptive Awareness (MAIA; Mehling et al., 2012), a 32-item self-report measure that comprises eight subscales. The MAIA provides a multidimensional profile of IA, with each subscale assessing a different dimension of IA. The Noticing subscale assesses the subjective awareness of body sensations (4 items; sample item: “I notice changes in my breathing, such as whether it speeds up or slows down”). The Attention Regulation subscale assesses the ability to control and maintain attention towards bodily sensations (7 items; sample item: “I can pay attention to my breath without being distracted by things happening around me”). The Emotional Awareness subscale assesses the awareness of the relationship between emotional and bodily states (5 items; sample item: “I notice how my body changes when I feel happy/joyful”). The Self-Regulation subscale assesses whether a person uses attention to bodily sensations to regulate distress (4 items; sample item: “When I am caught up in thoughts, I can calm my mind by focusing on my body/breathing”). The Body Listening subscale assesses how often a person actively attends to their bodily sensations for insight (3 items; sample item: “When I am upset, I take time to explore how my body feels”). The Trusting subscale assesses the extent to which a person experiences their body as a ‘safe’ and ‘trustworthy’ source of information (3 items; sample item: “I trust my body sensations”). The Not-Distracting subscale assesses how often a person tends to ignore sensations of pain or discomfort (3 items; sample item: “I distract myself from sensations of discomfort”). Finally, the Not-Worrying subscale assesses the extent to which a person worries about or catastrophizes sensations of pain or discomfort (3 items; sample item: “I start to worry that something is wrong if I feel any discomfort”).

Responses for all MAIA items were given on a 6-point scale, ranging from *never* (0) *to always* (5). Scores for each subscale were computed as the mean of all associated items, and higher scores reflect greater IA. Scores on the MAIA have adequate levels of internal consistency and good convergent and discriminant validity (Brown et al., 2017; Mehling, 2016; Mehling et al., 2012). Here, we estimated internal consistency using ordinal coefficient α (Zumbo, Gadermann, & Zeisser, 2007), which performs more favourably than Cronbach’s alpha for the analysis of dichotomous or Likert-type data (e.g., Dunn, Baguley, & Brunsden, 2014). Values for each subscale were as follows: Noticing = .71; Attention regulation = .87; Emotional Awareness = .82; Self-Regulation = .86; Body Listening = .76; Trusting = .79; Not-Distracting = .53; Not-Worrying = .60. Although the latter two values were consistent with previous research (Mehling, 2016; Mehling et al, 2018), they are indicative of poor internal inconsistency (Gaderman, Guhn, & Zumbo, 2012) and so were excluded from further analyses1.

 **2.2.2. Body appreciation.** Body appreciation was assessed using the Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015b). The BAS-2 comprises 10 items that assess body-related positive opinions and acceptance (regardless of actual physical appearance), respect for the body by engaging in healthy behaviors, and protection of body image when exposed to appearance-based media (sample item: “I feel like I am beautiful even if I am different from media images of attractive people”). All items were rated on a 5-point scale, ranging from 1 (*never*) to 5 (*always*), and an overall score was computed as the mean of all items. Higher scores on this scale reflect greater body appreciation. Scores on the BAS-2 have a one-dimensional structure, are invariant across sex, and have adequate internal consistency and test-retest reliability over a 3-week period, as well as good patterns of convergent, incremental, and discriminant validity (for a review, see Swami, 2018; Tylka & Wood-Barcalow, 2015b). In the present study, ordinal coefficient α for this scale was .96.

 **2.2.3. Functionality appreciation.** To assess functionality appreciation, we asked participants to complete the Functionality Appreciation Scale (FAS; Alleva, Tylka, & Kroon Van Diest, 2017). The FAS is a 7-item scale that assesses the extent to which an individual appreciates and respects the body for the functions it is capable of performing (sample item: “I respect my body for the functions that it performs”). Items were rated on a 5-point scale ranging from 1 (*strongly disagree*) to 5 (*strongly agree*) and an overall score was computed as the mean of all items, with higher scores reflecting greater functionality appreciation. Scores on the FAS have a one-dimensional structure, are invariant across sex, have adequate internal consistency and test-retest reliability over a 3-week period, and good convergent, discriminant, and incremental validity (Alleva et al*.*, 2017). In the present study, ordinal coefficient α for this scale was .92.

**2.2.4. Body pride.** To measure body pride, we used the Authentic Pride subscale of the Body and Appearance Self-Conscious Emotions Scale (BASES; Castonguay, Sabiston, Crocker, & Mack, 2014). This is a 6-item measure that characterises body pride as personal appearance-related achievements and behaviours (sample item: “I am proud of my appearance efforts”). Items for this subscale were rated on a 5-point scale, ranging from 1 (*never*) to 5 (*always*). The scale is scored by calculating the mean of all 6 items and higher scores reflect greater body pride. Castonguay et al. (2014) reported that BASES scores had good factorial validity and that subscale scores had good test-retest reliability over a 2-week period, as well as good construct validity. In the present study, ordinal coefficient α for the Authentic Pride subscale was .97.

 **2.2.5. Additional body image measures.** Two subscales from the Multidimensional Body-Self Relations Questionnaire-Appearance Scales (MBSRQ-AS; Cash, 2000) were used to assess appearance orientation and overweight preoccupation, respectively.The Appearance Orientation subscale assesses the investment and importance individuals place on their appearance, with higher score reflecting greater importance and extensive grooming behaviors and a low score reflecting apathy towards personal appearance (12 items; sample item: “I check my appearance in a mirror whenever I can”). The Overweight Preoccupation subscale assesses weight-related anxiety and vigilance, as well as eating restraint (4 items; sample item: “I constantly worry about being or becoming fat”). Cash (2000) reported that scores on the MBSRQ-AS have adequate internal consistency and 1-month test-retest reliability for both men and women. Here, ordinal coefficient αs for Appearance Orientation and Overweight Preoccupation were .90 and .83, respectively.

**2.2.6. Demographics*.*** Participants were requested to provide demographic details, consisting of sex, age, ethnicity (based on categories in the United Kingdom census), educational attainment, relationship status, sexual orientation, height, and weight. We used the final two items to compute self-reported BMI as kg/m2.

**2.3. Procedure**

The study was approved by the relevant university ethics committee (approval number: EHPGR-10). Participants were recruited via the Prolific Academic website on May 18-19, 2018, and the survey was hosted on Qualtrics. Prolific Academic is a crowdsourcing Internet marketplace where individuals complete academic surveys in return for monetary compensation. Such websites have been shown to produce valid and reliable body image data (Gardner, Brown, & Boice, 2012). Samples recruited from sites such as these are also more diverse in terms of age, ethnicity, and sexual orientation in comparison to college samples (Buhrmester, Kwang, & Gosling, 2011). Our intention was to recruit a homogeneous sample in terms of cultural and national identity, so eligibility was limited to United Kingdom citizens of adult age. In addition, participation was limited to those who had good approval ratings from previous studies (an Academic Prolific score of ≥ 96), and Academic Prolific ID codes, along with Internet Protocol (IP) addresses, were examined to ensure that no participant took the survey more than once. All participants received brief introductory information about the project and provided digital informed consent. Participants completed the measures described above in a randomised order and anonymously, in addition to 24 items measuring mindfulness, which were not analysed here. Within the survey, participants were prompted to answer omitted questions, but were still free to leave these blank if they chose to do so. Participants completed the survey in 12 minutes on average and were paid £1.00 as remuneration for their time. All participants received written debriefing information at the end of the survey, which included the study aims and hypotheses.

**3. Results**

**3.1. Data Screening**

There were missing data only for participant height (0.5%), weight (8.2%), and age (8.0%). We also removed improbable BMI values (< 12 or > 50 kg/m2; 2% of the total data set) and treated these as missing data. Little’s (1988) MCAR analysis revealed that these data were missing completely at random, χ2(20) = 43.422, *p* = .784. Therefore, we replaced missing values using expectation-maximisation.Further data screening did not reveal any unduly influential univariate or multivariate outliers.

**3.2. Descriptive Statistics**

Means and standard deviations for all variables are reported in Table 1. As can be seen, significant sex differences (after Bonferroni correction, *p* = .05/13 = .0038) were identified for the MAIA Trusting subscale (men reported significantly greater experience of their bodies as safe and trustworthy in comparison to women), body appreciation (men had significantly greater body appreciation), body pride (men reported significantly greater body pride), appearance orientation (women reported significantly more investment in their appearance), overweight preoccupation (women reported significantly greater levels of overweight preoccupation), and BMI (with men having significantly higher BMIs than women).

**3.3. Correlations**

Bivariate correlations, conducted separately for women and men, between all variables are reported in Table 1. For some variables, the pattern of correlations was the same for both sexes. Body appreciation, functionality appreciation, and body pride all had predominantly small $($≥ .20) to moderate (≥ .50) (cf. Ferguson, 2009) positive correlations with each of the MAIA subscales. In contrast, for the MAIA Trusting subscale, correlations with body appreciation and functionality appreciation were moderate to strong $($≥ .80). Finally, overweight preoccupation only had a small negative correlation with the MAIA Trusting subscale.

We also observed some sex-specific effects. While appearance orientation had small positive correlations with the MAIA Emotional Awareness subscale for both sexes, there was a small positive correlation with the MAIA Noticing subscale for women only, and small positive correlations with the Attention Regulation and Self-Regulation subscales for men only. Similarly, BMI had a small negative correlation with body appreciation, and small positive correlation with overweight preoccupation for both sexes, but a small negative correlation with body pride was observed only for women. Finally, there was a small negative correlation between age and appearance orientation for men.

To examine whether there were statistically significant differences in the pattern of the correlation coefficients across sex, Fischer’s *r* to *z* transformation was computed (see Supplementary Materials). Despite the large number of comparisons, very few statistically significant differences were observed and only two statistically significant differences were identified within the relationships of interest: the correlation coefficients for Self-Regulation and Body Appreciation (*p* = .029) and between Body Listening and Overweight Preoccupation (*p* = .026). Therefore, rather than conducting regressions separately for each sex, we chose to conduct hierarchical multiple regression analyses utilising the data from both men and women, controlling for sex in the first step.

**3.4. Hierarchical Multiple Regression Analyses**

To assess which facets of interoceptive awareness predicted body image, five separate multiple hierarchical regression analyses were conducted, with the body appreciation, functionality appreciation, body-related pride, appearance orientation, and overweight preoccupation as the criterion variables. To examine which variables significantly predicted additional variance in body image once BMI, sex, and age had been taken into consideration, these demographic variables were included in a first step. MAIA subscale scores were then entered as predictor variables in a second step. Variance inflation factors (VIFs) below 10 indicate that multicollinearity is not a limiting issue (Hair, Anderson, Tatham, & Black, 1995). In the present study VIFs for all five regressions were ≤ 2.92.

Results for body appreciation and functionality appreciation are reported in Table 2, results for body-related pride are reported in Table 3, and results for appearance orientation and overweight preoccupation are reported in Table 4. As can be seen across these tables, all five criterion variables were significantly predicted by facets of IA. Specifically, for body appreciation, the regression results showed that BMI, sex, and age accounted for 12.0% of the variance, and the MAIA variables accounted for an additional 44.0% of the variance. In the final model for body appreciation, BMI and the MAIA Noticing subscale were significant negative predictors, and the MAIA Attention Regulation, Self-Regulation, and Trusting subscales were significant positive predictors. Meanwhile, for functionality appreciation, the regression results showed that BMI, sex, and age accounted for 3.7% of the variance, and the MAIA variables accounted for an additional 29.6% of the variance. In the final model, BMI emerged as a significant (negative) predictor and only two MAIA subscales (Emotional Awareness and Trusting) were significant (positive) predictors. Considering body pride, the regression results showed that BMI, sex, and age accounted for 7.0% of the variance, and the MAIA variables accounted for an additional 23.0% of the variance. In the final model, BMI and age were significant negative predictors and the MAIA Attention Regulation, Self-Regulation, and Trusting scales emerged as significant positive predictors.

 The regression results for appearance orientation showed that BMI, sex, and age accounted for 9.0% of the variance, and the MAIA variables accounted for an additional 5.0% of the variance. In the final model, sex was a statistically significant predictor, whilst age was a significant negative predictor, and the MAIA Noticing and Emotional Awareness subscales were significant positive predictors. Finally, the regression results for overweight preoccupation showed that BMI, sex, and age accounted for 20.0% of the variance, and the MAIA variables accounted for an additional 6.0% of the variance. In the final model, sex was a significant predictor. BMI and the MAIA Noticing subscale also emerged as significant (positive) predictors, whilst age and the MAIA Trusting subscale significantly (negatively) predicted overweight preoccupation.

**4. Discussion**

In this study, we sought to examine relationships between multiple dimensions of IA and a number of facets of body image. Overall, we identified significant predictive relationships between dimensions of IA and all five facets of body image. After taking into consideration the variance accounted for by sex, BMI, and age, the MAIA variables accounted for 44.0% of the variance for body appreciation, 29.6% for functionality appreciation, 23.0% for body pride, 6.0% for overweight preoccupation, and 5.0% for appearance orientation. In the final models, five MAIA subscales emerged as significant predictors for at least one facet of body image. However, the MAIA Body Listening subscale did not significantly predict any of the body image indices.

 We first hypothesised that the Noticing subscale would be positively associated with the three positive body image variables. Correlational analyses supported this hypothesis, but within the regression models Noticing emerged as a significant predictor only for body appreciation. Contrary to our expectation and previous literature (Badoud & Tsakiris, 2017), the association between Noticing and body appreciation was negative*.* Similarly, while we predicted that the Noticing subscale would be negatively associated with Overweight Preoccupation, within the regression model Noticing emerged as a significant positive predictor, despite the lack of a statistically meaningful correlation (Ferguson, 2009) with the Noticing subscale for women or men. The regression models show the relative contribution of Noticing to the prediction of the body image variables alongside all of the other IA and demographic variables under scrutiny, so it is possible that once all of the other variables have been accounted for, the direction of the relationships between Noticing and Body Appreciation, and Noticing and Overweight Preoccupation, are an accurate depiction of the relationships between the variables. Nevertheless, given the positive relationship identified between Noticing and body appreciation within the correlations, it is also possible that one of the other variables may be biasing the regression slope towards a negative effect (see Fuller, 1987). Indeed, though VIFs were all within acceptable limits, the correlations between the MAIA Noticing and the Attention Regulation and Emotional Awareness subscales were relatively high for both men and women (see Table 1).

 In addition, we found that Noticing was positively correlated appearance orientation for women and men, and this relationship was consistent within the regression model, supporting the findings of Duschek and colleagues (2015). Overall, the ability to notice interoceptive signals – when considered as an isolated variable – could be considered adaptive, in that it is positively associated with facets of positive body image, but not associated with Overweight Preoccupation. However, once other facets of IA and demographic variables have been accounted for, the tendency to notice internal bodily signals appears to be more maladaptive. Indeed, the pattern of the relationships between Noticing and the body image variables within the regression models, in particular the positive relationship with appearance orientation, suggests that this variable is perhaps more reflective of a tendency towards self-surveillance.

 We secondly hypothesised that the MAIA Trusting, Not-Worrying, and Not-Distracting subscales would be more closely associated with facets of body image than the Noticing subscale, and that the direction of these relationships would be negative for Overweight Preoccupation and Appearance Orientation, and positive for the positive body image indices. Whilst the Not-Worrying and Not-Distracting subscales could not be included within the main analyses due to poor internal consistency (a point addressed more fully below), the hypotheses regarding the Trusting subscale were supported for every body image facet under scrutiny except appearance orientation. Indeed, of all of the MAIA subscales, the Trusting subscale demonstrated the strongest, most consistent relationship with the body image variables, suggesting that the extent to which interoceptive signals are trusted, and the body is deemed as a ‘safe’ place, is perhaps the most relevant facet of IA for our understanding of positive body image. This supports previous research, which has indicated that the way in which interoceptive signals are valued and responded to, might be more closely associated with facets of body image than the extent to which interoceptive cues are perceived (Daubenmier, 2005; Oswald et al., 2017).

 We also hypothesised that the Attention Regulation, Self-Regulation, and Body Listening subscales (the ‘regulatory’ subscales; Mehling, 2016) would be positively associated with the three positive body image variables, and negatively associated with overweight preoccupation and appearance orientation. These hypotheses were partially supported: within the regression models, the Attention Regulation and Self-Regulation subscales emerged as significant (positive) predictors for both body appreciation and body pride, but not for functionality appreciation, overweight preoccupation, or appearance orientation. Body Listening, however, did not explain a statistically significant proportion of the variance for any of the body image variables included here. Nevertheless, the ability to sustain and regulate attention towards interoceptive signals appears to be an adaptive skill: such attention towards the body may make it more likely for individuals to be able to appreciate their bodies and feel proud of their bodies. Previous research has demonstrated that attention regulation and self-regulation are modifiable skills (Bornemann, Herbert, Mehling, & Singer, 2015); therefore, it is possible that these variables could represent viable therapeutic targets for promoting positive body image.

 Finally, we included the MAIA Emotional Awareness subscale in the study on an exploratory basis, because, within the available literature, no studies have yet explored how the dimension might be related to facets of body image in a non-clinical sample. The correlational results from the present study indicate that awareness of the association between emotional and bodily states tends to be weakly, but positively, associated with all of the body image facets under scrutiny for men and women. For both sexes, the strongest association was with functionality appreciation. Meanwhile, within the regression models, Emotional Awareness remained a statistically significant (positive) predictor for functionality appreciation and also emerged as a positive predictor of appearance orientation. Given the novelty of the research, it is not clear at present why Emotional Awareness emerged a significant predictor for two body image indices but not the remainder; perhaps this suggests a greater underlying emotional component for functionality appreciation and appearance orientation that could be explored in future research.

 Overall, previous research has demonstrated broad associations between the awareness and perceptual acuity of interoceptive signals and body image, where reduced IA and IS have tended to be associated with more negative body image (Badoud & Tsakiris, 2017). In the present work, we have demonstrated that distinct dimensions of IA, such as the way in which interoceptive signals are appraised and regulated, have unique relationships with facets of body image. In particular, the extent to which interoceptive signals are noticed (the dimension of IA within the present study that most closely aligns with measures used in previous body image literature; Mehling, 2016) emerged as a negative predictor of body appreciation, and a positive predictor of overweight preoccupation and appearance orientation. Meanwhile, the extent to which interoceptive signals are regarded as ‘safe’ and ‘trustworthy’ emerged as the strongest, most consistent predictor for all of the positive body image indices and overweight preoccupation. This is an important extension of previous work because the extant literature would predict that broadly increasing IA would be clinically beneficial for groups that are known to have both low IA and body image disturbances, such as patients with eating disorders (Pollatos et al*.,* 2008). However, the results from the present study demonstrate that clinical protocols would need to be more targeted, as only certain facets of IA are positively associated with positive body image.

 As a second novel contribution to the literature, we believe the present work to be the first evidence of relationships between facets of interoception and two positive body image: functionality appreciation and body pride. The present findings also extend the work of Oswald and colleagues(2017) – who demonstrated an association between IA and body appreciation in female university students – by showing that this relationship is also stable in men and a more demographically-diverse sample of adults. These findings are particularly important for clinical practice, because as Tylka (2018) indicates, attention toward alleviating symptoms of negative body image, without considering facets of positive body image may result in clinical practices that are inadequate for the promotion of health and well-being as they relate to embodiment. Indeed, the benefits of body image therapies that aim to reduce symptoms of negative body image, without attempting to enhance aspects of positive body image, may be limited (Tylka, 2018).

 Where previous research on the subject has tended to focus upon young women (see Badoud & Tsakiris, 2017), the present study benefitted from the inclusion of both men and women of a wider age range. However, despite the broad age range, there was only weak correlation between age and appearance orientation for men, with the remainder of the effect sizes for age below the recommended minimum for a practically significant effect (Ferguson, 2009). Nevertheless, several significant differences were observed for sex (see Table 1), predominantly for the body image variables. Of note, the effect size for overweight preoccupation (*d* = 0.68) was the largest across all of the variables under scrutiny, with women tending to report greater overweight preoccupation than men. There was also a moderate effect size for appearance orientation, with women tending to report greater investment in their appearance (*d* = 0.52). These observations have important ramifications within the regression models: for overweight preoccupation, MAIA variables accounted for 6% of the variance, whilst demographic factors accounted for 20% of the variance – the greatest proportion across all of the regression models – with sex making the greatest contribution (see Table 4). Similarly, we observed that a greater proportion of the variance for appearance orientation was accounted for by demographic factors (9.0%) than by all of the MAIA variables combined (5.0%), with the majority of the variance within the demographic factors again being accounted for by sex. Objectification theory (Fredrickson & Roberts, 1997) posits that Western society encourages women, more so than men, to view themselves from an outsiders’ (i.e., exteroceptive) perspective, which could account for the significant effect of sex, and the lesser contribution of IA, to the prediction of appearance orientation and overweight preoccupation. Future work could perhaps address this possibility by exploring possible mediating effects of internalisation of sociocultural appearance ideals.

 Important limitations of this study relate to the reliance upon self-report measures, some of which had poor internal consistency. While we had intended to investigate all of the eight dimensions of interoceptive awareness included in the MAIA, the Not-Worrying and Not-Distracting subscales were excluded due to low internal consistency reliability. These subscales have also had suboptimal internal consistency in previous studies (for reviews, see Mehling, 2016; Mehling et al., 2018). This is possibly because each scale only contains three items and five of these are the only negatively worded items within the full questionnaire. In response to this, Mehling and colleagues (2018) have recently developed the MAIA-2, which has improved psychometric properties and could be used in future research. As a further matter, future work should seek to examine whether the relationships between IA and facets of body image that have been identified in the present paper are consistent when utilising objective measures of IS, such as gastric sensitivity assessments (e.g., van Dyck et al., 2016), a bodily domain which may be of particular relevance to body image, given the documented association with disordered (Brown et al., 2017; Daubenmier, 2005; Myers & Crowther, 2008) and intuitive eating styles (Oswald et al., 2017). Such further work is important because research supports the conceptualisation of IA and IS as separate constructs. Many previous researchers have reported a lack of statistically significant associations between self-reported and objectively-measured detections of internal stimuli (Forkmann et al*.,* 2016; Garfinkel etal., 2015), suggesting that self-assessments of IA do not necessarily reflect the extent to which an individual can objectively detect interoceptive stimuli. To our knowledge, no studies have yet examined relationships between facets of IS and the positive body image indices utilised in the present paper.

 A further limitation of the present work relates to the screening process for eating disorder symptomology. Our intention was to assess the relationship between facets of IA and body image in a nonclinical population. We therefore included having a present or previous diagnosis of an eating disorder within the exclusion criteria. However, due to practical constraints, we did not include a screening questionnaire (such as the Eating Disorder Inventory-3; Garner, 2004), which could have been used to indicate data for exclusion. It is, therefore, possible that our sample includes participants who might be unaware that they meet the requirements for a clinical diagnosis, or who have not yet been formally diagnosed, and future research should seek to address this issue.

 In summary, the present work identified unique associations between several dimensions of IA and several facets of body image in a population of community adult men and women. The results from the present study build on previous research, which suggest that the way in which interoceptive cues are appraised may be more closely associated with body image than the accuracy of interoceptive processing (Brown et al., 2017; Daubenmier, 2005; Oswald et al., 2017). Further work is necessary to confirm whether a causal relationship exists between IA and body image; that is, due to the cross-sectional design utilised in the current study, this can only be inferred hypothetically at present. Indeed, whilst longitudinal research supports the assertion that early impairments in IA are associated with later vulnerability to the development of eating disorders (Killen et al., 1996; Leon et al., 1995; Lilenfeld et al., 2006), it is also possible that relationships between the variables are bidirectional (Cook-Cottone, 2018). Nevertheless, the results from the present study could have important clinical applications. For example, groups that are known to have both low IA and body image disturbances, such as patients with eating disorders (Eshkevari et al., 2014; Pollatos et al*.,* 2008) could benefit from nuanced interventions that increase trust in interoceptive signals, and the ability to sustain attention toward interoceptive signals as a method of regulating psychological distress. Indeed, research indicates that all three of these facets of IA are modifiable through mindfulness-based practices (Bornemann et al., 2015).

**Footnotes**

1 For the interested reader, the correlations between the body image indices and the MAIA Not-Distracting subscale ranged from -.03 to -.08. Correlations between the MAIA Not-Worrying subscale and the body image indices ranged from .03 to -.22. Due to the low reliability of the scales, these results require validation in future work. However, in the present work, it is unlikely that either scale would have emerged as significant predictors within the hierarchical regressions, given the magnitude of the correlations between the remaining MAIA scales and the body image indices (see Tables 1-4).

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Table 1*. Means, Standard Deviations, and Bivariate Correlations between the Different Measures for Women (Lower Diagonal) and Men (Upper Diagonal).*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| (1) MAIA Noticing |  | .56\*\* | .69\*\* | .56\*\* | .60\*\* | .41\*\* | .25\*\* | .35\*\* | .18\*\* | .17\* | .07 | -.05 | .05 |
| (2) MAIA Attention Regulation | .63\*\* |  | .44\*\* | .72\*\* | .61\*\* | .59\*\* | .47\*\* | .42\*\* | .42\*\* | .23\*\* | .02 | .09 | .02 |
| (3) MAIA Emotional Awareness | .71\*\* | .56\*\* |  | .51\*\* | .56\*\* | .26\*\* | .20\*\* | .32\*\* | .20\*\* | .21\*\* | .05 | -.07 | .07 |
| (4) MAIA Self-Regulation | .50\*\* | .72\*\* | .53\*\* |  | .55\*\* | .57\*\* | .43\*\* | .33\*\* | .39\*\* | .20\*\* | .02 | .04 | .03 |
| (5) MAIA Body Listening | .66\*\* | .69\*\* | .65\*\* | .60\*\* |  | .36\*\* | .28\*\* | .28\*\* | .26\*\* | .19\*\* | .17\* | .04 | .05 |
| (6) MAIA Trusting | .46\*\* | .62\*\* | .48\*\* | .61\*\* | .51\*\* |  | .69\*\* | .59\*\* | .46\*\* | .08 | -.21\*\* | -.05 | -.01 |
| (7) Body appreciation | .35\*\* | .53\*\* | .38\*\* | .57\*\* | .41\*\* | .70\*\* |  | .67\*\* | .64\*\* | .10 | -.32\*\* | -.24\*\* | -.09 |
| (8) Functionality appreciation | .39\*\* | .39\*\* | .43\*\* | .42\*\* | .37\*\* | .52\*\* | .63\*\* |  | .47\*\* | .14 | -.22\*\* | -.18\* | -.07 |
| (9) Body pride | .31\*\* | .41\*\* | .34\*\* | .42\*\* | .34\*\* | .49\*\* | .68\*\* | .45\*\* |  | .46\*\* | .03 | -.08 | -.16\* |
| (10) Appearance Orientation | .23\*\* | .09 | .23\*\* | .07 | .13\*\* | .12\* | .12\* | .22\*\* | .37\*\* |  | .37\*\* | <.01 | -.22\*\* |
| (11) Overweight Preoccupation | .08 | -.08 | .10\* | -.14\*\* | -.02 | -.20\*\* | -.36\*\* | -.17\*\* | -.14\*\* | .37\*\* |  | .35\*\* | -.01 |
| (12) BMI  | -.06 | -.11\* | -.03 | -.12\*\* | -.03 | -.19\*\* | -.32\*\* | -.18\*\* | -.27\*\* | .03 | .32\*\* |  | .15\* |
| (13) Age | .02 | .03 | -.04 | .05 | .04 | -.01 | .06 | .03 | -.10\* | -.19\*\* | -.17\*\* | .05 |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| *M* (Men) | 3.21 | 2.67 | 3.10 | 2.77 | 2.38 | 3.29 | 3.40 | 4.09 | 2.85 | 2.94 | 2.50 | 27.76 | 37.76 |
| *SD* (Men) | 0.09 | 0.09 | 1.00 | 1.02 | 1.10 | 0.99 | 0.06 | 0.06 | 0.89 | 0.71 | 0.97 | 6.46 | 11.97 |
| *M* (Women) | 3.22 | 2.50 | 3.23 | 2.57 | 2.44 | 2.88 | 3.06 | 3.96 | 2.60 | 3.31 | 3.16 | 26.10 | 39.46 |
| *SD* (Women) | 0.89 | 0.92 | 0.99 | 1.06 | 1.05 | 1.04 | 0.86 | 0.07 | 0.91 | 0.72 | 1.00 | 4.97 | 11.57 |
| *t* | 0.07 | 2.38 | 1.57 | 2.25 | 0.79 | 4.69 | 4.73 | 2.18 | 3.18 | 6.02 | 7.93 | 3.57 | 1.70 |
| *p* | .943 | .018 | .118 | .025 | .432 | †< .001 | †< .001 | .029 | †.002 | †< .001 | †< .001 | †< .001 | .089 |
| *d* | 0.02 | 0.26 | 0.13 | 0.19 | 0.06 | 0.40 | 0.54 | 0.26 | 0.28 | 0.52 | 0.68 | 0.29 | 0.14 |

*Note*. Men *n* = 199, Women *n* = 446; \**p* < .05. \*\**p* < .01. †Significant gender difference after Bonferroni correction (.05/13 = .0038). MAIA = Multidimensional Assessment of Interoceptive Awareness, BMI = Body mass index.

Table 2. *Multiple hierarchical regressions with body appreciation and functionality appreciation as criterion variables.*

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Body Appreciation | Functionality Appreciation |
| Step | Variable | B | SE | $$β$$ | *t* | *p* | Semi-partial correlation | B | SE | $$β$$ | *t* | *p* | Semi-partial correlation |
| Step 1 | BMI | -0.04 | 0.01 | -.30 | -7.93 | < .001 | -.294 | -0.02 | 0.01 | -.18 | -4.71 | < .001 | -.183 |
|  | Sex | -0.28 | 0.07 | -.15 | -3.95 | < .001 | -.146 | -0.10 | 0.06 | -.07 | -1.77 | .077 | -.069 |
|  | Age | 0.01 | 0.01 | .03 | 0.90 | .371 | .033 | 0.01 | 0.01 | .02 | 0.41 | .680 | .016 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Adj. *R2* | .12 |  |  |  |  |  | .04 |  |  |  |  |  |
|  | *F* (df) | 29.16 (3, 642) |  |  |  | < .001 |  | 9.27(3, 642) |  |  |  | < .001 |  |
| Step 2 | BMI | -0.03 | 0.01 | -.20 | -7.44 | < .001 | -.195 | -0.01 | 0.01 | -.11 | -3.28 | .001 | -.105 |
|  | Sex | -0.07 | 0.05 | -.04 | -1.46 | .145 | -.038 | -0.02 | 0.05 | -.01 | -0.31 | .759 | -.010 |
|  | Age | 0.01 | 0.01 | .02 | 0.91 | .365 | .024 | 0.01 | 0.01 | .01 | 0.41 | .682 | .013 |
|  | Noticing | -0.10 | 0.04 | -.01 | -2.35 | .019 | -.062 | 0.05 | 0.04 | .07 | 1.28 | .202 | .041 |
|  | Attention Regulation | 0.09 | 0.04 | .10 | 2.20 | .028 | .058 | 0.01 | 0.04 | .01 | 0.19 | .847 | .006 |
|  | Emotional Awareness | 0.02 | 0.04 | .03 | 0.69 | .494 | .018 | 0.12 | 0.03 | .18 | 3.62 | < .001 | .116 |
|  | Self-Regulation | 0.12 | 0.03 | .14 | 3.50 | .001 | .091 | 0.01 | 0.03 | .01 | 0.27 | .788 | .009 |
|  | Body Listening | 0.01 | 0.03 | .02 | 0.41 | .704 | .010 | -0.01 | 0.03 | -.02 | -0.36 | .723 | -.011 |
|  | Trusting | 0.45 | 0.03 | .54 | 15.12 | < .001 | .398 | 0.27 | 0.03 | .42 | 9.50 | < .001 | .305 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Adj. *R2* | .56 |  |  |  |  |  | .33 |  |  |  |  |  |
|  | *F* (df) | 90.51(9, 636) |  |  |  | < .001 |  | 36.86(9, 636) |  |  |  | < .001 |  |
|  | $∆$Adj *R2* | .44 |  |  |  |  |  | .30 |  |  |  |  |  |
|  | $∆$*F* (df) | 106.76(6, 636) |  |  |  | < .001 |  | 48.58(6, 636) |  |  |  | < .001 |  |

*Note. N = 646.* MAIA = Multidimensional Assessment of Interoceptive Awareness, BMI = Body mass index.

Table 3. *Multiple hierarchical regression with authentic pride as the criterion variable.*

|  |  |  |
| --- | --- | --- |
|  |  | Authentic Pride |
| Step | Variable | B | SE | $$β$$ | *t* | *p* |  Semi-partial correlation |
| Step 1 | BMI | -0.03 | 0.01 | -.22 | -5.60 | < .001 | -.213 |
|  | Sex | -0.18 | 0.08 | -.09 | -2.32 | .021 | -.088 |
|  | Age | -0.01 |  0.01 | -.10 | -2.32 | .010 | -.099 |
|  |  |  |  |  |  |  |  |
|  | Adj. *R2* | .07 |  |  | -2.59 |  |  |
|  | *F* (df) | 16.99(3, 642) |  |  |  |  |  |
| Step 2 | BMI | -0.02 | 0.01 | -.15 | -4.52 | < .001 | -.149 |
|  | Sex | -0.05 | 0.07 | -.02 | -0.68 | .497 | -.022 |
|  | Age | -0.01 | 0.01 | -.11 | -3.27 | .001 | -.107 |
|  | Noticing | -0.07 | 0.05 | .07 | -1.34 | .180 | -.044 |
|  | Attention Regulation | 0.13 | 0.06 | .13 | 2.27 | .024 | .075 |
|  | Emotional Awareness | 0.07 | 0.05 | .07 | 1.44 | .149 | .047 |
|  | Self-Regulation | 0.11 | 0.04 | .12 | 2.38 | .017 | .078 |
|  | Body Listening | 0.02 | 0.04 | .02 | 0.43 | .664 | .014 |
|  | Trusting | 0.26 | 0.04 | .30 | 6.70 | < .001 | .220 |
|  |  |  |  |  |  |  |  |
|  | Adj. *R2* | .30 |  |  |  |  |  |
|  | *F* (df) | 32.12(9, 636) |  |  |  | < .001 |  |
|  | $∆$Adj. *R2* | .23 |  |  |  |  |  |
|  | $∆$*F* (df) | 36.84 |  |  |  | < .001 |  |

Table 4. *Multiple hierarchical regressions with appearance orientation and overweight preoccupation as criterion variables.*

|  |  |  |  |
| --- | --- | --- | --- |
|  |  | Appearance Orientation | Overweight Preoccupation |
| Step | Variable | B | SE | $$β$$ | *t* | *p* |  Semi-partial correlation | B | SE | $$β$$ | *t* | *p* |  Semi-partial correlation |
| Step 1 | BMI | -0.01 | 0.01 | -.01 | -0.24 | .810 | -.009 | 0.06 | 0.01 | .32 | 9.13 | < .001 | .339 |
|  | Sex | 0.39 | 0.06 | .25 | 6.53 | < .001 | .245 | 0.60 | 0.08 | .27 | 7.62 | < .001 | .288. |
|  | Age | -0.01 | 0.01 | -.20 | -5.20 | < .001 | -.194 | -0.01 | 0.01 | -.14 | -3.97 | < .001 | -.155 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Adj. *R2* | .09 |  |  |  |  |  | .20 |  |  |  |  |  |
|  | *F* (df) | 21.95(3, 642) |  |  |  | < .001 |  | 56.13(3, 642) |  |  |  | < .001 |  |
| Step 2 | BMI | <0.01 | 0.01 | .01 | 0.05 | .960 | .002 | 0.05 | 0.01 | .30 | 8.50 | < .001 | .319 |
|  | Sex | 0.37 | 0.06 | .24 | 6.22 | < .001 | .228 | 0.05 | 0.08 | .22 | 6.21 | < .001 | .239 |
|  | Age | -0.01 | 0.01 | -.20 | -5.33 | < .001 | -.195 | -0.01 | 0.01 | -.14 | -4.13 | < .001 | -.162 |
|  | Noticing | 0.10 | 0.05 | .12 | 2.05 | .041 | .075 | 0.16 | 0.06 | .14 | 2.61 | .009 | .103 |
|  | Attention Regulation | 0.01 | 0.05 | .01 | 0.13 | .894 | .005 | 0.01 | 0.07 | .01 | 0.095 | .925 | .004 |
|  | Emotional Awareness | 0.11 | 0.04 | .15 | 2.62 | .009 | .096 | 0.10 | 0.05 | .10 | 1.94 | .053 | .077 |
|  | Self-Regulation | -0.02 | 0.04 | -.03 | -0.46 | .643 | -.017 | -0.08 | 0.05 | -.08 | -1.45 | .147 | -.057 |
|  | Body Listening | 0.01 | 0.04 | .01 | -0.03 | .976 | -.001 | 0.04 | 0.05 | .04 | 0.78 | .436 | .031 |
|  | Trusting | 0.01 | 0.04 | .01 | 0.05 | .964 | .002 | -0.23 | 0.05 | -.23 | -4.92 | < .001 | -.194 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | Adj. *R2* | .14 |  |  |  |  |  | .26 |  |  |  |  |  |
|  | *F* (df) | 12.22(9, 636) |  |  |  | < .001 |  | 26.11(9, 636) |  |  |  | < .001 |  |
|  | $∆$Adj. *R2* | .05 |  |  |  |  |  | .06 |  |  |  |  |  |
|  | $∆$*F* (df) | 6.76(6, 636) |  |  |  | < .001 |  | 9.00(6, 636) |  |  |  | < .001 |  |

*Note. N = 646.* MAIA = Multidimensional Assessment of Interoceptive Awareness, BMI = Body mass index.

**Supplementary Materials**

Fischer’s *z*observed values and associated *p* values for gender group comparison of the correlation coefficients.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) | (13) |
| (1) MAIA Noticing  |  |  -1.27.204 | -0.46.646 | 0.97.332 | -1.16.246 | -0.72.472 | -1.28.201 | -0.54.590 | -1.62.105 | -0.73.465 | -0.12.905 | -0.12.905 | .35.726 |
| (2) MAIA Attention Regulation |  |  | -1.87.062 | 01 | -1.62.105 | -0.55.582 | -0.93.352 | 0.42.675 | 0.14.889 | 1.68.093 | 1.17.242 | 2.34.019 | -0.12.905 |
| (3) MAIA Emotional Awareness |  |  |  | -0.32.749 | -1.66.097 | -2.99.003 | -2.3.021 | -1.49.136 | -1.76.078 | -0.25.803 | -0.59.555 | -0.47.638 | 1.28.201 |
| (4) MAIA Self-Regulation |  |  |  |  | -0.87.384 | -0.72.472 | -2.19.029 | -1.22.223 | -0.42.675 | 1.55.121 | 1.88.060 | 1.87.062 | -0.23.818 |
| (5) MAIA Body Listening |  |  |  |  |  | -2.17.030 | -1.72.085 | -1.17.242 | -1.03.303 | -1.03.303 | 2.23.026 | 0.82.412 | 0.12.905 |
| (6) MAIA Trusting |  |  |  |  |  |  | -0.23.818 | 1.18.238 | -0.45.653 | -0.47.638 | 0.12.905 | 1.66.097 | 01 |
| (7) Body appreciation |  |  |  |  |  |  |  | 0.81.418 | -0.83.407 | -0.24.810 | 0.53.596 | 1.01.313 | -1.75.080 |
| (8) Functionality appreciation |  |  |  |  |  |  |  |  | 0.3.764 | -0.96.337 | -0.61.542 | 01 | -1.17.242 |
| (9) Body pride |  |  |  |  |  |  |  |  |  | 1.27.204 | 1.99.047 | 2.29.022 | -.71.478 |
| (10) Appearance Orientation |  |  |  |  |  |  |  |  |  |  | 01 | -0.29.772 | -0.37.711 |
| (11) Overweight Preoccupation |  |  |  |  |  |  |  |  |  |  |  | 0.39.697 | 1.18.060 |
| (12) BMI  |  |  |  |  |  |  |  |  |  |  |  |  | 1.18.238 |
| (13) Age |  |  |  |  |  |  |  |  |  |  |  |  |  |

*Note. N* = 646. Men, *n* = 199. Women, *n* = 446. MAIA = Multidimensional Assessment of Interoceptive Awareness, BMI = Body mass index.