Article:
Hu, Z. orcid.org/0000-0003-0605-8687, Wood, C. orcid.org/0000-0001-6451-7859 and Buckland, N. (2025) Measuring self-objectification in cisgender heterosexual women and men: A psychometric validation of the self-objectification beliefs and behaviors scale. Body Image, 52. 101844. ISSN 1740-1445

https://doi.org/10.1016/j.bodyim.2024.101844

Measuring Self-Objectification in Cisgender Heterosexual Women and Men: A Psychometric Validation of the Self-Objectification Beliefs and Behaviors Scale

Abstract

Research demonstrates that self-objectification negatively impacts both cisgender heterosexual women and men. However, measures of self-objectification have primarily been designed for and validated in women, raising doubts about their applicability to men and demonstrated gender differences in self-objectification.

This research investigated the psychometric properties of the Self-Objectification Beliefs and Behaviors Scale (SOBBS; Lindner & Tantleff-Dunn, 2017) in cisgender heterosexual women, and for the first time, in cisgender heterosexual men. Study 1 (women = 180, men = 163) and 2 (women = 137, men = 138, age-representative samples) used an online longitudinal design. Confirmatory Factor Analysis (CFA) in Study 1 supported the original 2-factor structure of the SOBBS across genders. Multigroup CFA in Study 2 confirmed measurement invariance across genders. Women showed lower latent SOBBS Factor 1 than men, with no gender difference on latent Factor 2. Across studies, the SOBBS demonstrated good concurrent validity, convergent validity, internal consistency and test-retest reliability for both genders, in addition to differentiation by sexual objectification experience. The psychometric properties of the Self-Objectification Questionnaire (Noll & Fredrickson, 1998) and the Objectified Body Consciousness Body Surveillance Scale (McKinley & Hyde, 1996) were also explored. Both scale scores were differentiated by gender after controlling for sexual objectification experience, suggesting that scores on these scales may be subject to gender-based measurement bias. Overall, the current research contributes to the evidence-base for effective measurement of self-objectification in men, indicating that the SOBBS is psychometrically sound for use not only in cisgender heterosexual women, but also in cisgender heterosexual men.

Keywords: Objectification, Body image, Psychometrics, Test validity, Measurement invariance

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1. Introduction

Fredrickson and Roberts (1997, p. 175) define sexual objectification as "the experience of a woman being treated as a body existing for the use and pleasure of others". According to objectification theory (Fredrickson & Roberts, 1997), sexual objectification reduces women and their bodies to objects, primarily valued for their physical appearance. Objectification theory argues that experiencing sexual objectification also socializes women to adopt others' perspectives on their own bodies. This internalization of an observer's perspective on one's own physical self is referred to as self-objectification. When women self-objectify, they think less about how their bodies function, and more about how their bodies look to others, treating themselves as objects for other people's consumption. Self-objectification can result in habitual body monitoring and is associated with a range of negative psychological consequences including greater risk of disordered eating (Schaefer & Thompson, 2018; Tiggemann & Williams, 2012), depression (Carr & Szymanski, 2011; Harrison & Fredrickson, 2003), sexual dysfunction (Steer & Tiggemann, 2008), and other psychological well-being and health-related outcomes including high appearance-contingent self-worth (Adams et al., 2017).

Sexual objectification and self-objectification have mostly been studied in women. For example, research has explored the sexual objectification of women in their daily lives (Ching et al., 2019; Szymanski & Henning, 2017), mass media (Conley & Ramsey, 2011; Aubrey, 2010), and social media (Guizzo et al., 2021; Vendemia & Fox, 2024), as well as the impact of sexual objectification on women's self-objectification (Aubrey, 2006b; Vandenbosch et al., 2015). However, men are also sexually objectified in traditional and social media (Aubrey, 2006a; Deighton-Smith & Bell, 2018; Seekis et al., 2021) and by others (Davidson et al., 2013; Jiao et al., 2022; Terán et al.,2020). In traditional media forms such as magazines and television (Aubrey, 2006a; Rohlinger, 2002), masculinity has historically been expressed through a man's physical attractiveness and muscular appearance. Men' bodies and sexualities are also increasingly subject to commentary and objectification in social networking sites, where they are often targeted by inappropriate, sexually explicit messages and images (Barak, 2005; Gordon-Messer et al., 2013) and receive appearance-related feedback (Seekis et al., 2021). Similar to women, experiences of sexual objectification can lead men to self-objectify (Aubrey, 2006a), and greater self-objectification in men is similarly associated with a greater risk of disordered eating (Wiseman & Moradi, 2010), depression (Chen & Russo, 2010), sexual dysfunction (Sanchez & Kiefer,

2007), and increased appearance-contingent self-worth (Moya-Garófano & Moya, 2019). If causes and consequences of self-objectification in women and men are similar, objectification theory would offer a valuable theoretical framework for understanding how men might engage in self-objectification and what the potential consequences could be.

However, despite similarities, experiences and consequences of sexual objectification also differ across genders, and gendered patterns of sexual objectification may lead self-objectification to manifest differently in men and women. For example, women experience greater body-focused evaluation and unwanted sexual advances than men (Holland et al., 2017; Jiao et al., 2022; McLaughlin et al., 2012; Terán et al.,2020), and women's physical appearance is more highly valued by male partners than men's appearance is valued by female partners (Fales et al., 2016). Men are also more often in the position of objectifying others rather than being objectified, given their greater social power (Aubrey & Frisby, 2011). The frequent evaluation of women's bodies and the perceived importance of their physical appearance can lead women to engage in appearance-management behaviors, such as wearing makeup (Smith et al., 2017), dieting (Grabe & Hyde, 2006) and seeking cosmetic surgery (Vaughan-Turnbull & Lewis, 2015). In media portrayals, women are held to a more rigid and singular appearance ideal than men, with a specific emphasis on thinness (Buote et al., 2011). Specifically, women face greater media pressure to achieve the sociocultural ideal (Fredrickson et al., 2022), leading to increased internalization of thinness ideals and frequent monitoring of the degree to which their bodies adhere to this ideal (Rodgers et al., 2015). In contrast, popular media often portrays muscular, lean, and toned male bodies as ideal, linking muscularity to traditional masculine norms (Cunningham et al., 2020). This can increase men's internalization of ideals of muscularity (Daniel & Bridge, 2010). Consequently, men are more likely to focus on whether their bodies appear muscular, leading to self-objectification centered around the muscularity of their chest and upper arms (Daniel et al., 2014). Self-objectification therefore has unique consequences for men, including a greater drive for muscularity (Davids et al., 2019), steroid use (Parent & Moradi, 2011) and muscle dysmorphia (Grieve & Helmick, 2008).

In addition, while we noted earlier that several consequences of self-objectification for women have also been demonstrated for men, the research is not equivocal. For example, Martins et al. (2007) found that heterosexual men engaged in self-objectification without accompanying body shame. Similarly, Daniel and Bridges (2010) did not find a relationship between self-objectification and body shame in men. Tiggemann and Kuring (2004) reported that, unlike in women, self-objectification in men was not related to body shame, appearance anxiety, or disordered eating.

There is also debate over whether there are differences in the degree to which women and men engage in self-objectification. Most studies report lower self-objectification in men compared to women (Grabe & Jackson, 2009; Smolak & Murnen, 2011; Vendemia et al., 2024), findings which are consistent with both theory and empirical evidence. That is, given that sexual objectification is a key precursor to self-objectification (Fredrickson & Roberts, 1997; Moradi & Huang, 2008), and women experience greater sexual objectification than men (Holland et al., 2017; Jiao et al., 2022; McLaughlin et al., 2012; Terán et al.,2020), women should also have comparatively high levels of self-objectification. However, observed gender differences in self-objectification may also be impacted by the validity of self-objectification measures use in male and female samples. That is, measurement bias in self-objectification scales which were primarily designed for women, may hinder accurate measurement of self-objectification in men, thus limiting our ability to make adequate comparisons between genders (Daniel & Bridges, 2010). In the next section, we explore whether contemporary measures of self-objectification are likely to adequately measure self-objectification in men as well as women, drawing on relevant psychometric evidence.

1.1. Self-objectification Measures and Their Validity Across Genders

Contemporary measures of self-objectification include the Self-Objectification Questionnaire (Noll & Fredrickson, 1998), the Objectified Body Consciousness Body Surveillance scale (McKinley & Hyde, 1996), and the more recently developed Self-Objectification Beliefs and Behaviors Scale (Lindner & Tantleff-Dunn, 2017). An additional scale, the Male Assessment of Self Objectification (MASO: Daniel et al., 2014) scale has been developed to capture self-objectification in men, but as this scale focuses on male-specific forms of self-objectification (participants rate how important aspects such as upper arm diameter and penis length and girth are to the way they view their body and its ability), it is of limited use in comparing self-objectification in men and women and is not discussed further.

The Self-Objectification Questionnaire (SOQ: Noll & Fredrickson, 1998) assesses the extent to which individuals view their physical self in observable, appearance-based terms versus non-observable, competence-based terms. Individuals with greater levels of self-objectification rank the importance of appearance-based physical attributes (i.e., physical attractiveness, weight, sex appeal, measurements, and firm/sculpted muscle) over competence-based body attributes (i.e., muscular strength, physical coordination, health, physical fitness, and physical energy levels). The SOQ has been used to measure self-objectification in women of different nationalities (Calogero et al., 2009; Grippo & Hill, 2008), sexual orientations (Hill & Fischer, 2008), and ethnic backgrounds (Buchanan et al., 2008; Grabe & Jackson, 2009), and is positively associated with outcomes

implicated in objectification theory, including appearance anxiety (Adams et al., 2017) and body shame (Lindner & Tantleff-Dunn, 2017).

While the SOQ (Noll & Fredrickson, 1998) has also been used to measure self-objectification in men (Daniel & Bridges, 2010; Grieve & Helmick, 2008), the validity of the questionnaire for use in this sample has not been established. The SOQ is partially based on Franzoi and Shields's (1984) Body Esteem Scale for women and is designed to capture women's thinness concerns (Noll & Fredrickson, 1998). As a result, the attribute of 'strength' in the SOQ is conceptualized as a competence-based scale item, such that ranking strength as having a greater impact on physical self-concept would be interpreted as indicating lower self-objectification (Calogero, 2011). However, as Calogero (2011) argues, young men may perceive 'strength' as an appearance-based scale item with an increased focus on the muscular appearance ideal (Pope et al., 2000), casting doubt over the utility of this scale in measuring men's self-objectification. Moreover, the rank-order format presents both practical and statistical challenges. Researchers have reported problems with data loss due to participants not completing the scale correctly (Daubenmier, 2005; Lindner et al., 2012), and the rank-order format precludes calculation of internal consistency (Lindner et al., 2012; Lindner & Tantleff-Dunn, 2017).

In contrast to the focus of the SOQ (Noll & Fredrickson, 1998) on the relative importance of body appearance vs. function, the Objectified Body Consciousness Body Surveillance Scale (OBC-Surv: McKinley & Hyde, 1996) taps into the behavioral manifestation of self-objectification- the habitual monitoring of one's external appearance (McKinley & Hyde, 1996). The OBC-Surv measures the frequency of individuals monitoring their bodies and thinking of the body in terms of how it looks rather than how it feels (e.g., "During the day, I think about how I look many times"; 7-point Likert-type scale ranging from strongly disagree to strongly agree). The OBC-Surv and its youth version display satisfactory construct validity and reliability in women across the lifespan (Dakanalis et al., 2017; Lindberg et al., 2006; Sicilia et al., 2020), and have been shown in some studies to predict body shame and appearance anxiety more effectively than the SOQ (Slater & Tiggemann, 2002; Szymanski & Henning, 2007).

Unlike the SOQ, the OBC-Surv has been psychometrically validated and used with men and boys (Dakanalis et al., 2017; Martins et al., 2007; Sicilia et al., 2020). However, it may not be appropriate for comparing self-objectification *across* genders. Specifically, the failure to confirm the measurement invariance of the OBC-Surv between women and men (Chen & Russo, 2010; Dakanalis et al., 2017; Hazzard et al., 2022) suggests that women and men interpret items on the OBC-Surv differently. For example, since appearance-related social comparisons are thought to result from social pressures to achieve appearance-related ideals

(Rodgers et al., 2015), and women perceive greater pressure on this front from media and family (Buote et al., 2011; Fredrickson et al., 2022), some items such as "I rarely compare how I look with how other people look" may be more relevant to women's lived experiences than men's.

Finally, the Self-Objectification Beliefs and Behaviors Scale (SOBBS: Lindner & Tantleff-Dunn, 2017) is a relatively new measure assessing women's self-objectification across two factors. Factor 1 taps into the internalization of an observer's perspective on the body (e.g., "I choose specific clothing or accessories based on how they make my body appear to others"; 5-point Likert-type scale ranging from strongly disagree to strongly agree) and Factor 2 taps into valuing physical appearance above competence, and a focus on the body as adequately representing the self (e.g., "Looking attractive to others is more important to me than being happy with who I am inside"; 5-point Likert-type scale ranging from strongly disagree to strongly agree). Lindner and Tantleff-Dunn (2017) found that the SOBBS demonstrates satisfactory validity and showed greater predictive validity for women's body image than the SOQ and OBC-Surv. In addition, its two-factor structure has been validated among different populations, including Chinese women (Lang & Ye, 2021) and transgender and nonbinary people (Cascalheira et al., 2023).

While scholars have recently used the SOBBS (Lindner & Tantleff-Dunn, 2017) to measure and compare self-objectification between women and men (Terán et al.,2020; Jiao et al., 2022), this scale has not yet been validated in men. Unlike the SOQ and OBC-Surv, however, items on the SOBBS appear to be gender-neutral, avoiding female-specific ideals relating to thinness. Specifically, the SOBBS items measure manifestations of self-objectification that are likely to be shared by both women and men, such as focusing on how their bodies are presented to others and valuing appearance-related attributes (Daniel et al., 2014; Fredrickson et al., 2022). However, without conducting a Confirmatory Factor Analysis (CFA), it remains unclear whether the two-factor structure of the SOBBS demonstrated in women in the original validation (Lindner & Tantleff-Dunn, 2017) is replicated in male samples. Testing measurement invariance is also essential for confirming that men and women interpret SOBBS items similarly. If invariance across genders is demonstrated for the SOBBS, this scale would be a valuable tool for comparing self-objectification in men and women, contributing to a better understanding of gender differences in self-objectification.

1.2. The Current Research

To better understand gender differences in self-objectification, it is essential to use a valid measure that allows for adequate comparisons between men and women. Both the SOQ and OBC-Surv have clear limitations in measuring self-objectification in men or comparing self-objectification across genders. Given the SOBBS's

potential for measuring and comparing self-objectification in both women and men, this research aimed to validate its psychometric properties across genders and investigate gender differences in self-objectification. Given differences in self-objectification based on sexual orientation and transgender/cisgender identity (Tebbe et al., 2021), and time/financial constraints, this research focused solely on cisgender heterosexual women and men. In addition, due to practical challenges (e.g., time constraints) in assessing strict predictive validity, we used incremental validity as an alternative (Swami & Barron, 2019). The psychometric properties of the SOQ and OBC-Surv in women and men were also explored. While validation of these scales was not part of our pre-registration, we had the data needed to validate these measures alongside the SOBBS, and thus decided to do so for completeness. Hypotheses were not pre-registered for the SOQ and OBC-Surv. Our hypotheses for the SOBBS are outlined below.

1.3 Overview of Hypotheses

1.3.1. Factor Structure and Measurement Invariance

We hypothesized that the two-factor structure of the SOBBS would be replicated in both women and men (Study 1), and that the SOBBS would demonstrate invariance at the configural, metric, and scalar levels between women and men (Study 2).

1.3.2. Concurrent Validity

The SOQ, OBC-Surv, and SOBBS are all designed to assess the construct of self-objectification in women. While the SOQ and OBC-Surv may not fully capture self-objectification in men due to measurement bias related to participant gender, the SOBBS is expected to address this more adequately. We therefore anticipated moderate correlations between the SOBBS, SOQ, and OBC-Surv in male samples, as all three measures are theoretically grounded in the internalization of an observer's perspective on one's body. We hypothesized that the SOBBS Total and its Factors would demonstrate satisfactory concurrent validity with the SOQ and OBC-Surv in both women and men (Studies 1 and 2, with Study 2 using age-representative samples), operationalized as correlations exceeding $r = .4$, as recommended by Peers (1996)

1.3.3. Convergent Validity

Appearance orientation refers to the extent to which someone invests in their appearance (Cash, 2018) and appearance-contingent self-worth refers to the extent to which individuals attach self-worth to their appearance (Crocker et al., 2003). Both appearance orientation and appearance-contingent self-worth are conceptually aligned with valuing physical appearance and empirically associated with self-objectification (Adams et al., 2017; McKinley & Hyde, 1996; Moya-Garófano & Moya, 2019). The internalization of

sociocultural standards of appearance refers to the extent to which individuals consider societal norms of size and appearance to be appropriate standards for their own size and appearance (Thompson & Stice, 2001). This construct is considered a facet of self-objectification in relevant theory (Vandenbosch & Eggermont, 2015) and is associated with higher levels of self-objectification (Kozee et al., 2007). Sexually objectifying experiences are considered the primary predictor of self-objectification (Kozee et al., 2007; Vandenbosch & Eggermont, 2013). We hypothesized that the SOBBS Total and Factors would demonstrate satisfactory convergent validity with appearance orientation with (Study 1), appearance-contingent self-worth (Study 1), internalization of sociocultural standards of appearance (Study 1), and sexual objectification experience (Study 2) in women and men, operationalized as correlations exceeding $r = .3$, as recommended by Cohen (1992).

Research suggests that drive for muscularity is a major body image concern in men (Daniel et al., 2014) and is strongly predicted by the internalization of media ideals (Daniel & Bridges, 2010). We hypothesized the SOBBS Total and Factors would demonstrate satisfactory convergent validity with drive for muscularity in men (Study 2).

1.3.4. Discriminant Validity

Objectification theory and empirical findings (Daniel et al., 2014, Fredrickson et al., 1998) indicate that self-objectification occurs across the spectrum of body weight and height and is thus not associated with Body Mass Index (BMI). Similarly, self-objectification should not be associated with self-dehumanization - the denial of the self's fundamental human needs, such as emotion and feeling (Loughnan et al., 2010). While both self-dehumanization and self-objectification are theoretically related to the denial of individuals' self-efficacy, self-dehumanization de-emphasizes personhood and humanity, and self-objectification instead emphasizes the body (Loughnan et al., 2010). Additionally, grandiose narcissism shares commonalities with self-objectification, including placing a greater focus on oneself and concern regarding feedback from others (Raskin & Terry, 1988). However, the two constructs are distinct in how this focus manifests and the underlying drivers. While in the case of self-objectification, increased body monitoring results from the internalization of other people's perspectives on the body, people with high levels of grandiose narcissism curate their physical appearance in order to be the center of attention (Vazire et al., 2008). In the original validation of the SOBBS, Lindner & Tantleff-Dunn (2017) found no relationship between self-objectification and subclinical grandiose narcissism in young women - a pattern also found in other studies (e.g. Dryden & Anderson, 2019). Accordingly, we predict the same pattern in men. As such, we hypothesized that the SOBBS Total and Factors would demonstrate

discriminant convergent validity with BMI (Studies 1 and 2), self-dehumanization (Studies 1 and 2), grandiose narcissism (Study 2) in women and men, operationalized as no significant correlation.

Previous research indicates that drive for muscularity is uniquely associated with men's body image, not women's (Smolak & Murnen, 2008). Accordingly, we hypothesized that the SOBBS Total and Factors would demonstrate discriminant convergent validity with drive for muscularity in women (Study 2).

1.3.5. Differentiation by Known Groups

Differentiation by known groups was evaluated using gender and sexual objectification experience. While findings regarding gender differences in self-objectification are mixed, most research shows greater levels of self-objectification or body surveillance in women than men (Grabe & Jackson, 2009; Smolak & Murnen, 2011, Vendemia et al., 2024). Accordingly, we hypothesized that women would have greater scores on the SOBBS Total and Factors than men (Study 1), operationalized as *p*-values less than .05. Study 2 also examined differentiation by gender, and the hypothesis of Study 2 would be consistent with the finding of Study 1.

Given the predictions of objectification theory (Fredrickson & Roberts, 1997) and empirical evidence suggesting that experiences of sexual objectification are precursors to self-objectification (Kozee et al., 2007; Vandenbosch & Eggermont, 2013), we further hypothesized that sexual objectification experience would best differentiate individuals' SOBBS Total and Factors scores, and gender would not significantly improve the variance accounted for the SOBBS scores after controlling for sexual objectification experience (Study 2).

1.3.6. Predictive Validity and Incremental Validity

Prichard and Tiggemann (2008) argue that individuals with greater levels of self-objectification may view exercise as a strategy to achieve an internalized body ideal. Both women's and men's self-objectification is positively related to appearance-related reasons for exercise (Strelan et al., 2003; Strelan & Hargreaves, 2005). Accordingly, we hypothesized that the SOBBS Total would demonstrate predictive validity in relation to appearance-related reasons for exercise in both women and men (Study 1), operationalized by the significance of the regression coefficients for SOBBS Total scores in predicting appearance-related exercise motivations. As the SOBBS is theoretically designed to capture more facets of self-objectification than the SOQ and OBC-Surv (Lindner & Tantleff-Dunn, 2017), we further hypothesized that the SOBBS Total would demonstrate incremental validity in predicting appearance-related reasons for exercise above and beyond the SOQ and OBC-Surv in both women and men (Study 1), operationalized by the unique contribution of SOBBS Total scores in

explaining additional variance in appearance-related exercise motivations, above and beyond the variance accounted for by the SOQ and OBC-Surv.

1.3.7. Internal Consistency and Test-retest Reliability

In line with previous research, we hypothesized the SOBBS Total and Factors would demonstrate acceptable internal consistency in women and men (Study 1), operationalized as Cronbach's alpha (α) exceeding .7, as recommended by Cronbach (1951).

Similarly, we hypothesized the SOBBS Total and Factors would demonstrate acceptable test-retest reliability over a 2-week test-retest interval in women and men (Study 1), operationalized as an Intraclass Correlation Coefficient (*ICC*) exceeding .6, as recommended by Cicchetti (1994).

1.4. Transparency and Openness

Study 1 (https://osf.io/aybn4/), including an amendment to conduct confirmatory factor analysis (https://osf.io/v8yn7/) and Study 2 (https://osf.io/jxytu/), including an amendment to conduct measurement invariance analysis (https://osf.io/rz3xy/), were pre-registered. The confirmatory factor analysis and measurement invariance analysis were pre-registered as amendments after data collection but before these analyses were conducted. All study materials and data can be found at the Open Science Framework. The pre-registrations for Studies 1 and 2 centered solely around validation of the SOBBS. However, as the data collected allowed for validation of all three measures of self-objectification, the psychometric properties of the SOQ and OBC-Surv were also explored. Ethical approval was obtained from the Psychology Ethics Subcommittee at a University in the North of England prior to data collection [Study 1 reference number: 033917; Study 2 reference number: 038289]. All research was conducted with adherence to the University's Code on Good Research Practice, and participants gave their informed consent prior to taking part in the study.

2. Study 1

In Study 1, we aimed to confirm the SOBBS' two-factor structure in women and men (H1) and to evaluate its concurrent validity through correlations with the SOQ and OBC-Surv (H2); convergent validity with appearance orientation (H3), appearance-contingent self-worth (H4), and internalization of sociocultural standards (H5); discriminant validity with BMI (H6) and self-dehumanization (H7); differentiation by known groups through gender (H8); predictive validity (H9) and incremental validity (H10) with appearance-related reasons for exercise; internal consistency (H11); and two-week test-retest reliability (H12).

2.1. Method

2.1.1. Design and Participants

Participants were invited to participate in a 20-minute survey on the relationships between body-related thoughts, feelings, and behaviors, followed by a 15-minute follow-up survey two weeks later. Questionnaires were administered via the online survey platform, Qualtrics (Provo, UT) at two time points, two weeks apart. To constrain effects of cultural norms on self-objectification (Crawford et al, 2009), only people who had lived in the UK most of their life were eligible to participate in the online surveys.

Data from 180 cisgender heterosexual women (M_{age} = 26.47 years, SD = 11.23 years; M_{BMI} = 23.13, SD = 6.19), and 163 cisgender heterosexual men (M_{age} = 34.50 years, SD = 14.54 years; M_{BMI} = 25.88, SD = 6.23) were included at Time 1. Most women (89.4%) and men (85.9%) identified as White (see Supplementary Material 1 for a full breakdown of the participant sample by gender and ethnicity). Participants were recruited from the online research recruitment platform Prolific (www.prolific.co; n = 180), University study participation schemes for psychology students (n = 86), and research volunteering lists for staff and students at a University in the North of England (n = 77).

Data from 133 cisgender heterosexual women (M_{age} = 27.72, SD = 11.87) and 137 cisgender heterosexual men (M_{age} = 34.5, SD= 14.54) were included at Time 2 (78.7% completion rate). Most women (91%) and men (89.1%) identified as White.

Participants who completed both surveys received £4.13 (~$4.97) via Prolific, partial course credit or were entered into a prize draw to win a £20 (~$24.07) e-shopping voucher, depending on the recruitment method. Participants who completed the Time 1 survey only received £2.88 (~$3.47) via Prolific or partial course credit.

As outlined in the pre-registration, the power analysis was conducted based on the lowest observed effect size between the SOBBS and variables broadly relevant to self-objectification (i.e., interpersonal sexual objectification, r = .21; Lindner & Tantleff-Dunn, 2017), due to the limited literature on this relatively new measure. G*Power (version 3.1; Heinrich Heine University Dusseldorf, Germany) analysis showed a minimum requirement of 138 participants per group to detect r = .21, with 80% power and α = .05, in a one-tailed bivariate correlation test. We oversampled by 10% to account for data loss due to attrition and screening.

With sample sizes of 180 men and 163 women at Time 1, Study 1 met the minimum recommended sample size of 140 participants for conducting a two-factor, 14-item CFA on the SOBBS (Kline, 2016).

2.1.2. Measures

Unless stated otherwise, final scores for each measure were calculated as a mean of all items, such that higher mean scores indicate greater levels of the measured construct.

2.1.2.1. Self-objectification. The Self-Objectification Questionnaire (SOQ: Noll & Fredrickson, 1998) measures the extent to which individuals typically view their physical bodies based on 5 physical appearance-based attributes (i.e., "physical attractiveness", "weight", "sex appeal", "measurements", and "firm/sculpted muscle") versus 5 physical competence-based attributes (i.e., "muscular strength", "physical coordination", "health", "physical fitness", and "physical energy level"). Participants were asked to rank attributes in order of importance to their physical self-concept. Final scores (ranging from -25 to 25) are calculated by subtracting the sum of scores for competence attributes from the sum of scores for appearance attributes.

The Objectified Body Consciousness Body Surveillance Scale (OBC-Surv: McKinley & Hyde, 1996) is a 9-item measure of body surveillance. Participants rated their level of agreement with each item (e.g., "I rarely think about how I look") using a 7-point Likert-type scale ranging from "strongly disagree" (1) to "strongly agree" (7).

The Self-Objectification Beliefs and Behaviors Scale (SOBBS: Lindner & Tantleff-Dunn, 2017) is a 14-item measure of self-objectification composed of two factors. Factor 1 measures the internalization of an observer's perspective on the body (e.g., "I try to imagine what my body looks like to others"), and Factor 2 measures treating the body as if it is capable of representing the self (e.g., "Looking attractive to others is more important to me than being happy with who I am inside"). Participants rated their level of agreement with each item using a 5-point Likert-type scale ranging from "strongly disagree" (1) to "strongly agree" (5).

2.1.2.2. Convergent Validity

2.1.2.2.1. Appearance Orientation. The Appearance Orientation Subscale of the Multidimensional Body-Self Relations Questionnaire (MBSRQ-AO: Cash, 2018) has 12 items. Participants indicated the extent to which each statement (e.g., "Before going out in public, I always notice how I look") described them personally on a 5-point Likert-type scale ranging from "definitely disagree" (1) to "definitely agree" (5). Cronbach's α in the current samples of women (α = .88*)* and men (α = .90*)* were excellent.

2.1.2.2.2. Appearance-contingent Self-worth. The Appearance Subscale of Contingencies of Self-Worth Scale (CSWS-AS: Crocker et al., 2003) has 5 items. Participants rated their levels of agreement with each statement (e.g., "My self-esteem does not depend on whether or not I feel attractive") on a 7-point Likert-type scale ranging from "strongly disagree" (1) to "strongly agree" (7). Cronbach's α in the current samples of women (α = .80*)* and men (α = .84*)* were good.

2.1.2.2.3. The Internalization of Sociocultural Standards of Appearance. The Internalization- General Subscale of The Sociocultural Attitudes Towards Appearance Scale-3 (SATAQ3-IG: Thompson et al., 2004)

has 9 items. Participants rated their levels of agreement with each statement (e.g., "I would like my body to look like the people who are on TV") on a 5-point Likert-type scale ranging from "totally disagree" (1) to "totally agree" (5). Cronbach's α in the current samples of women (α = .95*)* and men (α = .95*)* were excellent.

2.1.2.3. Discriminant Validity

2.1.2.3.1. BMI. BMI was computed using self-reported height and weight, in order to evaluate discriminant validity. BMI was calculated using the following formula: BMI = weight (kg) / [height (m)]^2.

2.1.2.3.2. Self-dehumanization. The 9-items Mind Attribution Task (MAT; Loughnan et al., 2013) measures individuals' dehumanization of others. We adapted the MAT to measure dehumanization of the self instead of others. Participants rated the frequency with which they engaged in the listed mental activities (e.g., "Wishing") per day on the 7-point Likert-type scale ranging from "hardly ever" (1) to "almost always" (7). The final score was calculated as a mean of the reversed score of all items. Cronbach's α in the current samples of women (α = .74*)* and men (α = .71*)* were acceptable.

2.1.2.4. Reason for Exercise. The appearance-related subscales (i.e., "Weight Control", "Attractiveness" and "Tone") of the 24-item Reason for Exercise Inventory (REI; Silberstein et al., 1988) were used to evaluate predictive and incremental validity. The full scale was administered to participants, but only the above three subscales analyzed. Participants rated the perceived importance of the listed reasons for exercise (e.g., "Exercising for Weight Control") on a 7-point Likert-type scale ranging from "not at all important" (1) to "extremely important" (7). Mean scores of each appearance-related subscale were calculated. Those who do not exercise did not need to complete the REI. Cronbach's α in the current samples of women ($\alpha_{\text{Weight Control}}$ = .51; $\alpha_{\text{Attractiveness}}$ = .83; α_{Tone} = .70) and men ($\alpha_{\text{Weight Control}}$ = .64; $\alpha_{\text{Attractiveness}}$ = .86; α_{Tone} = .69) range from poor to good.

2.1.2.5. Attention Check. To check the quality of the online survey responses, two attention checks (e.g., select the "often" or "number 2" option) were embedded at Time 1, and one at Time 2. Participants who failed at least one of the attention checks were excluded from all analyses.

2.1.3. Procedure

Data were collected from 16th October 2020 to 24th January 2021 (i.e., under COVID-19 pandemic). The data collection period partially overlapped with the COVID-19 quarantine (i.e., 31st October to 2nd December 2020 and 6th January to 19th July 2021) in the UK but deliberately avoided the Christmas season.

At Time 1, participants were asked to report their demographic information, including gender, gender identity, sexual orientation, whether they have lived in the UK most of their life, age, ethnicity, body weight,

and height. Participants then completed the key measures presented in random order. Participants were invited to complete the Time 2 survey two weeks after the Time 1 survey was completed. At Time 2, participants completed the SOBBS, SOQ and OBC-Surv, which were presented in random order. Participants were debriefed in both surveys. A self-generated ID entered in both surveys was used to match participants' data across time points.

2.2. Results

2.2.1. Data Screening and Statistical Analysis

A total of 454 participants completed the Time 1 survey. Participants were excluded from all analyses if they were missing more than 20% of survey items (n = 101, 22.3%), missing more than 5 items on a single scale (n = 2, 0.4%), or failed attention checks (n = 2, 0.4%). Only the first submission of the data was retained if participants completed the survey more than once (n = 6, 0.3%). Of the final 343 participants, 5 participants (1.5%) with missing data that did not meet the above criteria were retained but excluded from any analyses containing the variable with missing data. Self-reported age data from 2 participants (0.6%) was manually removed due to implausible ages.

Data from measured variables were normally distributed with the exception of BMI scores, which showed relatively positive levels of kurtosis ($Kurtosis_{\text{women}} = 5.16$; $Kurtosis_{\text{men}} = 6.27$). The BMI scores were all within expected ranges.

A total of 301 participants completed the Time 2 survey. Participants were excluded from all analyses if they were missing more than 20% of survey items (n = 20, 6.64%), missing more than 5 items on a single scale (n = 1, 0.33%), or failed attention checks (n = 1, 0.33%). Only the first submission of the data was retained if participants completed the survey more than once (n = 6, 2%). Time 2 data from 3 participants (1.1%) could not be matched with Time 1 data and was excluded, yielding a final sample of 270 participants for conducting test-retest reliability analysis.

R Version 4.4.1 (Lavaan 0.6-18) was used to conduct the CFA. Acceptable model fit was evaluated using the following fit indices: Comparative Fit Index (CFI) value exceeding .95, Standardized Root Mean Square Residual (SRMR) value below .08, and Root Mean Square Error of Approximation (RMSEA) value below .06 (Hu & Bentler, 1999)

2.2.2. Factor Structure

Two CFAs were conducted to confirm the factor structure of the SOBBS in women and men, using R Version 4.4.1 (Lavaan 0.6-18). The two-factor correlational model identified by Lindner and Tantleff-Dunn

(2017) was applied, with each SOBBS item assigned to load on the specific SOBBS Factor. The two-factor structure showed acceptable fit in women ($\chi^2(76, n = 180) = 109.81$, $p = .007$, CFI = .973, SRMR = .059, RMSEA = .050 (90% CI: .027, .069); see Table 1) and moderate fit in men ($\chi^2(76, n = 163) = 144.66$, $p < .001$, CFI = .941, SRMR = .057, RMSEA = .076 (90% CI: .057, .094)). In line with Hypothesis 1, the 2-factor structure of the SOBBS with 14 items in women and men was supported.

2.2.3. Concurrent Validity

Research indicates that age affects the magnitude of correlations between self-objectification and body image constructs (Lindner & Tantleff-Dunn, 2017). Partial correlations (controlling for age) were therefore performed to assess the relationships between self-objectification measures and validity constructs in women and men, instead of the pre-registered bivariate correlations. In women and men, the SOBBS Total and its Factors showed moderate-to-strong positive correlations with the SOQ and OBC-Surv scores (see Table 2). However, the correlations between SOBBS Factor 1 and the SOQ remained below .4 in both genders. In line with Hypothesis 2, the concurrent validity of the SOBBS Total and Factors with the OBC-Surv was supported in women and men, but not with the SOQ.

2.2.4. Convergent Validity

The SOBBS and OBC-Surv scores in women and men showed moderate-to-strong positive correlations with appearance-contingent self-worth, appearance orientation, and internalization of sociocultural standards of appearance (see Table 2). SOQ scores in women and men were moderately and positively correlated with appearance-contingent self-worth and internalization of sociocultural standards of appearance. SOQ scores were moderately and positively correlated with appearance orientation in women while weakly correlated in men. In line with Hypotheses 3, 4, and 5, the convergent validity of the SOBBS in women and men was supported. The SOQ and OBC-Surv also demonstrated convergent validity, except for the SOQ with appearance orientation in men.

2.2.5. Discriminant validity

2.2.5.1. BMI. SOBBS Factor 2, SOQ and OBC-Surv scores were not significantly correlated with BMI in women and men (see Table 2). SOBBS Factor 1 and SOBBS Total scores were weakly and positively correlated with BMI in women and men. In line with Hypothesis 6, discriminant validity from BMI was supported for the SOBBS Factor 2 in both women and men. However, discriminant validity from BMI was not supported for SOBBS Total and Factor 1 in either gender. The SOQ and OBC-Surv demonstrated discriminant validity in women and men.

2.2.5.2. Self-dehumanization. In women, the SOBBS Factor 2, SOQ and OBC-Surv scores were not significantly correlated with self-dehumanization (see Table 2). However, SOBBS Factor 1 and Total scores were weakly and negatively correlated with self-dehumanization. In men, the SOBBS Total and Factors, SOQ, and OBC-Surv scores were not significantly correlated with self-dehumanization. In line with Hypothesis 7, the discriminant validity of the SOBBS from self-dehumanization was supported in both gender groups, except for SOBBS Total and Factor 1 in women. The SOQ and OBC-Surv demonstrated discriminant validity in women and men.

2.2.6. Differentiation by Known Groups

Independent t-tests were performed to assess differences in the SOBBS, SOQ and OBC-Surv scores at Time 1 as a function of gender. Compared with men, women scored significantly higher on the SOBBS Total, t (341) = 5.36, $p < .001$, $d = .56$; SOBBS Factor 1, t (325) = 8.11, $p < .001$, $d = .83$; SOQ, t (341) = 4.62, $p < .001$, $d = .52$; and OBC-Surv, t (341) = 10.06, $p < .001$, $d = 1.04$. No significant difference between women and men was found in SOBBS Factor 2 scores, t (341) = .70, $p = .486$, $d = .08$.

Given the mean age of men at Time 1 was significantly older than women, t (304) = 5.66, $p < .001$, $d = .55$, a forced entry multiple regressions (instead of the pre-registered t-test) were conducted to examine whether the difference in self-objectification measure scores between women and men was predicted by gender, when controlling for age. The average variance inflation factor (*VIF* =1.097) suggested no collinearity between age and gender, thus meeting the assumption of regression. SOBBS Total and Factor 1, SOQ, and OBC-Surv were significantly predicted by gender, controlling for age, while SOBBS Factor 2 was not (see Table 3). In line with Hypothesis 8, differentiation by gender was supported for the SOBBS Total and Factor 1, but not for Factor 2. Differentiation by gender was supported in the SOQ and OBC-Surv.

2.2.7. Predictive validity and Incremental validity

The SOBBS, SOQ and OBC-Surv scores in both women and men were weakly to moderately and positively correlated with exercise for weight control, attractiveness, and tone (see Table 2). Separate forced entry multiple regressions were conducted to examine the predictive validity of each self-objectification measure in women and men, with appearance-related reasons for exercise (i.e., exercise for weight control, attractiveness, and tone) as the outcome variables, and self-objectification measures (i.e., SOBBS Total, SOQ, and OBC-Surv) as the predictor variables, controlling for age. In both women and men, all self-objectification measures significantly and positively predicted exercise for weight control, attractiveness, and tone (see Table 4). In line with Hypothesis 9, the predictive validity of the SOBBS Total for appearance-related reasons for

exercise was supported in women and men. The SOQ and OBC-Surv also demonstrated predictive validity for both genders.

Hierarchical multiple regressions were further conducted to examine the incremental validity of the SOBBS Total scores in predicting appearance-related reasons for exercise above and beyond the SOQ and OBC-Surv in women and men, with appearance-related exercises as the outcome variables and self-objectification measures as predictor variables, controlling for age. Age and SOQ scores were entered into the Model in Step 1, followed by OBC-Surv scores in Step 2, and SOBBS-Total scores in Step 3. For women, the SOQ predicted all three reasons for exercise in Step 1 (see Table 5), and adding the OBC-Surv in Step 2 explained additional variance in predicting all three reasons for exercise above and beyond the SOQ. Adding the SOBBS Total in Step 3 explained additional variance in predicting exercise for attractiveness above and beyond the SOQ and OBC-Surv. For men, the SOQ predicted all three reasons for exercise in Step 1 (see Table 5), and adding the OBC-Surv in Step 2 explained additional variance in predicting exercise for attractiveness and tone above and beyond the SOQ. Adding the SOBBS Total in Step 3 explained additional variance in predicting exercise for attractiveness above and beyond the SOQ and OBC-Surv. In line with Hypothesis 10, the incremental validity of the SOBBS Total in predicting exercise for attractiveness above and beyond the SOQ and OBC-Surv in women and men was supported. At odds with Hypothesis 10, the incremental validity for weight control and tone was not supported.

2.2.8. Internal Consistency and Test-retest Reliability

Cronbach's α of the SOBBS in women ($\alpha_{\text{Factor 1}} = .89$; $\alpha_{\text{Factor 2}} = .87$; $\alpha_{\text{Total}} = .90$) and men ($\alpha_{\text{Factor1}} = .91$; $\alpha_{\text{Factor 2}} = .87$; $\alpha_{\text{Total}} = .92$) was excellent, and similar to past research (Lindner & Tantleff-Dunn, 2017; $\alpha_{\text{Factor 1}} = .89$; $\alpha_{\text{Factor 2}} = .88$; $\alpha_{\text{Total}} = .91$). Cronbach's α of the OBC-Surv in women ($\alpha = .87$) and men ($\alpha = .89$) was excellent and similar to past research (McKinley & Hyde, 1996; $\alpha = .89$). Cronbach's α of the SOQ cannot be estimated. In line with Hypothesis 11, the internal consistency of the SOBBS in women and men was supported. The OBC-Surv demonstrated internal consistency in women and men, while the SOQ did not.

The correlations between the SOBBS, SOQ, and OBC-Surv and in women and men across the Time 1 and 2 surveys, were moderate to good, with all ICC values exceeding .64 (see Table 6). In line with Hypothesis 12, the 2-week interval test-retest reliability of the SOBBS in women and men was supported. The OBC-Surv and SOQ also demonstrated test-retest reliability.

2.3. Discussion

The aim of Study 1 was to evaluate the psychometric properties of the SOBBS in cisgender heterosexual women and men. The CFA results supported the two-factor structure of the SOBBS with 14 items in the current samples of women and men, indicating that the SOBBS measures the same underlying constructs in both gender groups. Specifically, Factor 1 measures the internalization of an observer's perspective on the body, and Factor 2 measures the treatment of the body as a representation of the self. The SOBBS Total and Factors demonstrated significant, moderate to strong positive associations with the OBC-Surv, appearance-contingent self-worth, appearance orientation, and internalization of sociocultural standards of appearance in women and men. The SOBBS Total significantly predicted appearance-related reasons for exercise and showed incremental validity in predicting exercise for attractiveness above and beyond the SOQ and OBC-Surv in women and men. The SOBBS Total and Factors also demonstrated satisfactory internal consistency and test-retest reliability in women and men. However, there were instances where the concurrent validity with the SOQ, discriminant validity with BMI and self-dehumanization, as well as differentiation by gender, were suboptimal in specific SOBBS Factors or participant samples. The psychometric properties of the SOQ and OBC-Surv were also explored. Both measures exhibited satisfactory psychometric properties overall, including discriminant validity, differentiation by gender, predictive validity, and test-retest reliability in both women and men. Convergent validity was generally strong, although the SOQ showed limitations with appearance orientation in men. Internal consistency was excellent for the OBC-Surv but could not be calculated for the SOQ. Explanations and next steps are outlined below.

The SOBBS demonstrated satisfactory concurrent validity with the SOQ and OBC-Surv in both women and men, except for SOBBS Factor 1 with the SOQ in both genders. As SOBBS Factor 1 focuses on viewing the body from an observer's perspective- an aspect also considered part of the underlying logic of the SOQ (Lindner & Tantleff-Dunn, 2017), further replication is needed to fully interpret the relationship between the SOBBS and SOQ.

The SOBBS, SOQ and OBC-Surv largely showed good convergent validity in women and men. However, the SOQ did not have adequate convergent validity with appearance orientation in men. It is unclear why this is the case. The variables used to test convergent validity all largely appear gender neutral. As such, the appearance orientation scale (i.e., MBSRQ-AO: Cash, 2018) does not seem differentially applicable to women versus men. The findings also do not seem to be due to differential conceptual alignment between the convergent constructs and measures of self-objectification (e.g., appearance-contingent self-worth was related to the SOQ in men, which similar to the appearance orientation scale, reflects concerns about one's physical

appearance). The MBSRO-AO includes items focusing on engagement in appearance-enhancing behaviors (e.g., "I am careful to buy clothes that will make me look my best."), similar to the OBC-Surv and SOBBS. On the other hand, the SOQ solely measures cognitions valuing physical appearance over physical competence. This may account for the failure to demonstrate convergent validity of the SOQ with appearance orientation, though it is less clear why this may be restricted to men. To evaluate this explanation, the relationship between self-objectification and measures of appearance-enhancing behaviors in men (e.g., muscular body change behaviors: Kling et al., 2016) should be further examined.

The SOBBS Total and Factor 1 scores failed the discriminant validity with BMI, and having a higher BMI was associated with higher SOBBS Total and Factor 1 scores. This finding is inconsistent with the tenets of objectification theory, which argue that self-objectification affects individuals regardless of body weight (Fredrickson & Roberts, 1997). The SOQ and OBC-Surv showed good discriminant validity with BMI in women and men, and this divergence from the SOQ and OBC-Surv results further complicates interpretation. Therefore, the relationship between BMI and self-objectification needs to be replicated before fully interpreting the findings.

The SOBBS, SOQ and OBC-Surv largely showed good discriminant validity with self-dehumanization in women and men. However, higher scores on SOBBS Factor 1 and Total in women were associated with lower self-dehumanization. One possible explanation is that the MAT is not a well-validated measure of dehumanization (Loughnan et al., 2013). Alternatively, there may be a stronger link between self-objectification and self-dehumanization than predicted, or a confound with the way in which the MAT measures self-dehumanization. In hindsight, given that SOBBS Factor 1 captures body-focused mental activities including imagining, thinking, and anticipating how one's body looks to others, the correlation with the frequency of mental activities measured by the MAT, such as wishing, planning, feeling and desiring, is not unexpected. To evaluate above explanations, more research is needed to examine the association between self-objectification and self-dehumanization using alternative measures of self-dehumanization.

Differentiation by known groups was demonstrated via significantly higher scores in women versus men on the SOBBS Total and Factor 1, SOQ and OBC-Surv. However, this was not the case for SOBBS Factor 2, which was not differentiated by gender. The reason for this needs further exploration. It is possible that either there are no true gender differences in SOBBS Factor 2 scores, or the SOBBS Factor 2 does not fully capture these gender differences. While the CFA confirmed a two-factor structure across women and men, CFA alone cannot not justify the direct comparison of SOBBS scores between genders. It is crucial to examine

measurement invariance and compare mean difference in latent factors across genders (Byrne, 2011) to ensure that any observed gender differences (or lack thereof) in the SOBBS reflect true differences in the latent factor, rather than reflecting measurement bias (Ployhart & Oswald, 2004). Current thinking also attributes gender differences in self-objectification to equivalent gender differences in sexual objectification experience. Specifically, sexual objectification experience is theoretically proposed and empirically supported as the primary precursor of self-objectification in women and men (Kozee et al., 2007; Vandenbosch & Eggermont, 2013). As women experience greater sexual objectification (Holland et al., 2017; Jiao et al., 2022; McLaughlin et al., 2012; Terán et al.,2020), they should therefore engage in more self-objectification than men (Grabe & Jackson, 2009; Smolak & Murnen, 2011, Vendemia et al., 2024). Accordingly, examining differentiation by sexual objectification experience rather than gender may provide a sterner and more direct test to help resolve this discrepancy. In addition, an examination of the relationship between self-objectification and sexual objectification experience would provide an additional test of convergent validity.

Finally, the SOBBS Total, SOQ and OBC-Surv demonstrated predictive validity for exercise for weight control, attractiveness, and tone in both women and men. The SOBBS Total also showed incremental validity for predicting exercise for attractiveness above and beyond the SOQ and OBC-Surv, though not for weight control or tone. Statistically, this may be because the SOQ and OBC-Surv already capture much of the reasons for exercise driven by specific body ideals rather than general attractiveness (see Table 5 for variance explained by the SOQ and OBC-Surv).

3. Study 2

Given the arguments above, it is clear that while the convergent validity, predictive validity, internal consistency, test-retest reliability of the SOBBS in women and men are satisfactory, the concurrent validity, discriminant validity and differentiation by known groups are less supported. Study 2 therefore aims to replicate and further explore the findings of Study 1 using alternative measures. In Study 1, we proposed that poor convergent validity of SOQ scores in men with appearance-orientation may be due to the MBSRO-AO measuring appearance-enhancing *behavior* (vs. cognitions). Study 2 therefore examined convergent validity in men through the Drive for Muscularity Scale (DMS; McCreary & Sasse, 2000), which measures muscle-oriented attitudes and behaviors. Good convergent validity of the SOQ with the DMS would also rule out our previous explanation for poor convergent validity with appearance-orientation. Discriminant validity was examined using the measures included in Study 1 (BMI; MAT: Loughnan et al., 2013). However, given the lack of consistent support for discriminant validity using these measures, Study 2 also extended the evaluation of

discriminant validity using an alternative measure of self-dehumanization; Ruttan and Lucas's (2018) Self-dehumanization Scale, adapted from Bastian & Haslam (2010). The Self-dehumanization Scale focuses on individuals' perceived lack of human nature and human uniqueness, and as such, does not have the same mechanistic overlap with self-objectification measured by the SOBBS as the MAT does. To account for the possibility that there is a stronger relationship between self-objectification and self-dehumanization than predicted, we also included two additional outcome measures not related to self-dehumanization - subclinical grandiose narcissism measured by The Narcissistic Personality Inventory-16 (NPI-16: Ames et al., 2006) and the Drive for Muscularity measured by DMS discussed above (Women only).

Study 2 also examined the relationship between the SOBBS scores and sexual objectification experience, to further explore convergent validity and differentiation by known groups. The Interpersonal Sexual Objectification Scale (ISOS: Kozee et al., 2007) and items adapted from Holland et al.'s (2017) Sexually Objectifying Events Checklist were included in Study 2, to capture experiences of sexual objectification, both directly experienced or witnessed. In Study 1, all self-objectification measures were differentiated by gender with the exception of SOBBS Factor 2. Study 2 aims to examine whether these findings replicate. Contrary to the hypothesis in Study 1 but consistent with its findings, Study 2 hypothesised that only the SOBBS Total and Factor 1 scores would differ by gender, while SOBBS Factor 2 would show no gender difference. As discussed in Study 1, differences in sexual objectification experience, rather than gender, may provide a more robust test of differentiation by known groups. Study 2, therefore, examined the differentiation of the SOBBS scores by sexual objectification experience. Finally, Study 2 aims to examine the measurement invariance of the SOBBS between women and men to determine whether the SOBBS allows for valid comparisons between women and men. We recruited age-representative samples of cisgender heterosexual women and men to avoid the need to control for age in the analyses.

Overall, Study 2 assessed the measurement invariance of the SOBBS between age-representative samples of women and men and compared latent factor means across genders (H1) and further validated the SOBBS' concurrent validity through the SOQ and OBC-Surv (H2); convergent validity with drive for muscularity (men only; H3) and sexual objectification experience (H4); discriminant validity with BMI (H5), self-dehumanization (H6), narcissism (H7), and drive for muscularity (women only; H8); differentiation by known groups through gender (H9) and sexual objectification experience (H10).

3.1. Method

3.1.1. Design and Participants

Participants were invited to participate in a 20-minute survey on the relationships between body-related thoughts, feelings, and behaviors. A cross-sectional survey was conducted online via Qualtrics. Data from 137 cisgender heterosexual women (M_{age} = 45.36 years, SD_{age} = 15.61 years; M_{BMI} = 27.94, SD_{BMI} = 6.44) and 138 cisgender heterosexual men (M_{age} = 45.62 years, SD_{age} = 15.95 years; M_{BMI} = 25.93, SD_{BMI} = 5.24) were included. Most women (92%) and men (88.4%) identified as White (see Supplementary Material 1 for a full breakdown of the participant sample by gender and ethnicity). Age-representative women and men samples were recruited via Prolific, and the same inclusion and exclusion as Study 1 applied. Participants who completed the survey received £2.50 (~ $2.88) via Prolific. Power calculations were identical to Study 1, indicating that 138 participants were needed for each group.

3.1.2. Measures

In line with Study 1, women and men completed the SOBBS, SOQ and OBC-Surv as measures of self-objectification, the adapted MAT (discriminant validity), reported height and weight in order to calculate BMI (discriminant validity), and two attention checks. They also completed the following measures. Unless stated otherwise, final scores for each measure were calculated as a mean of all items, such that higher mean scores indicate greater levels of the measured construct.

3.1.2.1. Drive for Muscularity. The 15-item Drive for Muscularity Scale (DMS: McCreary & Sasse, 2000) was used to evaluate convergent validity in men and discriminant validity in women. Participants rated each item (e.g., "I wish that I were more muscular") using a 6-point scale ranging from "never" (1) to "always" (6). Cronbach's α in the current samples of women (α = .87) and men (α = .93) were excellent.

3.1.2.2. Self-dehumanization. The 11-item Self-dehumanization Scale (SDS: Ruttan & Lucas, 2018), adapted from the Dehumanization Scale used by Bastian and Haslam (2010) was used to evaluate discriminant validity. This scale taps into human nature (e.g., "I feel like I'm emotional like I am responsive and warm") and human uniqueness (e.g., I feel like I am refined and cultured). Participants rated their agreement that each statement described how they have felt over the past year using a 7-point Likert scale ranging from "Strongly disagree" (1) to "Strongly agree" (7). Cronbach's α in the current samples of women (α = .79) and men (α = .78) were generally good.

3.1.2.3. Subclinical Grandiose Narcissism. The Narcissistic Personality Inventory-16 (NPI-16: Ames et al., 2006) has 16 forced-choice pairs of contradictory items (e.g., "I really like to be the center of attention" vs. "It makes me uncomfortable to be the center of attention"). This scale was used to evaluate discriminant validity. Participants selected the item that most closely describes their feelings and beliefs about themselves.

The inventory is scored by computing the proportion of responses consistent with narcissism, ranging from 0 to 1, such that higher scores indicate greater levels of narcissism. Cronbach's α in the current samples of women (α = .67) and men (α = .73) were low to acceptable.

3.1.2.4. Sexual Objectification Experience. The 15-item Interpersonal Sexual Objectification Scale (ISOS: Kozee et al., 2007) measures sexual objectification directed at oneself, and was used to evaluate convergent validity and differentiation by known groups. Participants reported the frequency of each experience (e.g., "How often have you been whistled at while walking down a street?") within the past year using 5-point Likert scales ranging from "never" (1) to "almost always" (5). For men, one item was modified to better capture sexual objectification experiences as per Davidson et al. (2013; the term "breast" was changed to "chest" in the item "How often have you noticed someone staring at your breasts when you are talking to them?"). Cronbach's α in the current samples of women (α = .96) and men (α = .92) were excellent.

Study 2 was conducted during the COVID-19 pandemic, just after a period of quarantine in the UK. Accordingly, measures of sexual objectification that did not rely on face-to-face contact were also included. Holland et al. (2017) used a Sexually Objectifying Events Checklist (adapted from the ISOS: Kozee et al., 2017) in their ecological momentary assessment to track witnessed sexual objectification (e.g., "catcalling, whistling, or car honking", and "sexual remark made about body") of others. We adapted the response options of the checklist by including the 5-point Likert rating scale from the ISOS, and had participants complete the measure separately for sexual objectification experiences witnessed in-person and experiences witnessed in the media within the past year. Cronbach's α for sexual objectification witnessed in-person (In-Person SO) in the current samples of women (α = .93) and men (α = .88), and Cronbach's α for sexual objectification witnessed in the media (Media SO) in the current samples of women (α = .93) and men (α = .88) were excellent.

3.1.3. Procedure

Data was collected in April 2021 (when the COVID-19 quarantine was eased in the UK). Participants were asked to report the same demographic information as Study 1. Participants then completed the key measures, which were presented in random order for each participant.

3.2. Results

3.2.1. Data Screening and Statistical Analysis

A total of 285 participants completed the online survey. As per Study 1, participants were excluded from all analyses if they were missing more than 20% of survey items (n = 10, 3.51%). No participants missed more than 5 items on a single scale, failed attention checks, or completed the questionnaire repeatedly. Of the

final 275 participants, one participant (0.35%) with missing data that did not meet the above criteria was retained but excluded from any analyses containing the variable with missing data. Data from measured variables were normally distributed.

IBM SPSS AMOS 27 was used to conduct the measurement invariance analyses. The data from each SOBBS item for women, men, and the total sample showed normality for univariate distributions, meeting assumptions for confirmatory factor analysis. However, Mardia's (1970) estimates for multivariate kurtosis (21.71, 36.69, and 29.51) for women, men and total sample respectively indicated multivariate non-normality, so maximum likelihood estimation was applied (Muthen & Kaplan, 1992).

Model fit was evaluated using the comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root-mean-square residual (SRMR). A good model fit was indicated by CFI exceeding .95, RMSEA below .06, and SRMR below .08. Acceptable fit was indicated as CFI exceeding .90, RMSEA below .10, and SRMR below .10 (Hu & Bentler, 1999).

Configural, metric, and scalar measurement invariance were assessed using multi-group CFA. For measurement invariance, nested models were tested by comparing metric to configural and scalar to metric invariance models. These comparisons were evaluated using changes (Δ) in CFI, RMSEA, SRMR, and chi-square difference tests (χ^2). ΔCFI below .010, ΔRMSEA below .015, and ΔSRMR below .030 indicate metric invariance, while ΔCFI below .010, ΔRMSEA below .015, and ΔSRMR below .010 indicate scalar invariance (Chen, 2007).

3.2.2. Measurement Invariance

Three confirmatory factor analyses were performed to confirm the factor structure of the SOBBS in women, men and the total sample. The 2- factor structure and item loadings identified by Lindner and Tantleff-Dunn (2017) were applied. This model yielded an acceptable fit in women, men and the total sample (see Table 7).

The configural invariance model was tested to establish a baseline between women and men, with item factor loadings and intercepts freely estimated, showing an acceptable fit (see Table 7). The metric invariance model, which constrained item factor loadings to be equal across genders, also showed an acceptable fit, with no significant difference from the configural model, $\Delta (13) = 11.67$, $p = .56$. ΔCFI, ΔRMSEA, and ΔSRMR supported metric invariance of the SOBBS between women and men. The scalar invariance model, which constrained all item factor loadings and item intercepts to be equivalent in women and men, showed an acceptable fit to the data. The scalar invariance model did not significantly differ from the metric invariance

model, Δ (12) = 16.16, p = .18, and Δ CFI, Δ RMSEA and Δ SRMR supported the scalar invariance of the SOBBS between women and men. Overall, in line with Hypothesis 1, the measurement invariance of the SOBBS between women and men was supported at the configural, metric and scalar level.

The latent mean differences between women and men were compared. The full scalar invariance model was used as the baseline model. The latent mean of the SOBBS Factor 1 and SOBBS Factor 2 were constrained to 0 in women, and free to estimate in men. Compared with women, men had significantly lower levels of latent SOBBS Factor 1 (difference of latent mean = - .51, z = - 4.71, p < .001, Cohen's d = .61), but there were no gender differences in latent SOBBS Factor 2 (difference of latent mean = - .17, z = - 1.91, p = .06, Cohen's d = .25).

3.2.3. Concurrent Validity

In both women and men, the SOBBS Total and Factors showed moderate-to-strong positive correlations with the SOQ and OBC-Surv scores (see Table 8). However, the correlations between SOBBS Factor 1 and Factor 2 and the SOQ were still below the threshold value for concurrent validity in men (see Table 8). In line with Hypothesis 2, the concurrent validity of the SOBBS Total and Factors with the SOQ and OBC-Surv was supported in both women and men, except for the SOQ in men.

3.2.4. Convergent Validity

3.2.4.1. Drive for Muscularity in Men. In men, SOBBS Total and Factors, and OBC-Surv scores showed moderate-to-strong positive correlations with drive for muscularity, while SOQ scores were weakly and positively correlated with drive for muscularity (see Table 8). In line with Hypothesis 3, the convergent validity of the SOBBS in men was supported. The OBC-Surv also demonstrated convergent validity, whereas the SOQ did not.

3.2.4.2. Sexual Objectification Experience. In women and men, the SOBBS Total and OBC-Surv scores were moderately and positively related to interpersonal sexual objectification experience (see Table 8). SOBBS Factor 1 scores in women and SOBBS Factor 2 scores in men were moderately and positively correlated with interpersonal sexual objectification experience. SOQ scores in men were weakly and positively related to interpersonal sexual objectification experience, and SOQ scores in women were not significantly related to interpersonal sexual objectification experience. In women and men, scores on the SOBBS Total and SOBBS Factors and OBC-Surv were weakly and positively correlated with witnessed sexual objectification, except for the SOBBS Factor 2 in women, which was not correlated with sexual objectification witnessed in the media. SOQ scores in women and men were not significantly related to witnessed sexual objectification. In line

with Hypothesis 4, the convergent validity of the SOBBS Total with interpersonal sexual objectification experience was supported in both women and men. However, the SOBBS Total and Factors did not show convergent validity with witnessed sexual objectification. The OBC-Surv demonstrated convergent validity with interpersonal sexual objectification experience in both women and men, but did not show convergent validity with witnessed sexual objectification. The SOQ failed to demonstrate convergent validity with both interpersonal sexual objectification experience and witnessed sexual objectification in women and men.

3.2.5. Discriminant Validity

3.2.5.1. BMI. The SOBBS Total and Factors, SOQ and OBC-Surv scores were not significantly correlated with BMI in women and men (see Table 8). In line with Hypothesis 5, the discriminant validity of the SOBBS was supported in both women and men. The SOQ and OBC-Surv also demonstrated discriminant validity.

3.2.5.2. Self-dehumanization. The SOBBS and OBC-Surv scores in women and men were weakly and positively correlated with SDS scores and showed weak-to-moderate negative correlations with MAT scores, except for SOBBS Factor 2 in women, which was not correlated with the MAT (see Table 8). SOQ scores in women and men were not significantly correlated with self-dehumanization measured by both the MAT and SDS. At odds with Hypothesis 6, the discriminant validity of the SOBBS was not supported in either women or men. The SOQ demonstrated discriminant validity in both women and men, while the OBC-Surv did not.

3.2.5.3. Subclinical Grandiose Narcissism. In women, SOBBS Total and Factors, SOQ and OBC-Surv scores were not significantly correlated with narcissism (see Table 8). In men, SOBBS Factor 1 and OBC-Surv scores were not significantly correlated with narcissism, while SOBBS Total, Factor 2 and SOQ scores were weakly and positively correlated with narcissism. In line with Hypothesis 7, the discriminant validity of the SOBBS was supported in women. However, it was not supported in men. The SOQ and OBC-Surv demonstrated discriminant validity in both women and men, except for the SOQ in men.

3.2.5.4. Drive for Muscularity in Women. In women, SOBBS Factor 2 and SOQ scores were not significantly correlated with drive for muscularity (see Table 8). However, SOBBS Total and Factor 1, and OBC-Surv, were weakly and positively correlated with drive for muscularity. At odds with Hypothesis 8, the discriminant validity of the SOBBS was not supported. The SOQ demonstrated discriminant validity, while the OBC-Surv did not.

3.2.6. Differentiation by Gender

Age-representative samples were recruited in Study 2 to avoid the need to control for effects of age when examining gender differences in self-objectification scores. As such, independent t-tests were performed to examine differences in SOBBS, SOQ, and OBC-Surv scores as a function of gender. Compared with men, women scored significantly higher on the SOBBS Total (t (273) = 3.67, $p < .001$, $d = .45$), SOBBS Factor 1 (t (273) = 4.56, $p < .001$, $d = .54$), SOQ (t (265) = 3.01 $p < .001$, $d = .45$) and OBC-Surv (t (273) = 5.08, $p < .001$, $d = .61$). No significant difference between women and men was found in SOBBS Factor 2 scores, t (273) = 1.81, $p = .072$, $d = .23$. In line with Hypothesis 9, differentiation by gender was supported for the SOBBS Total and Factor 1, and not supported for SOBBS Factor 2. Differentiation by gender was also supported for the SOQ and OBC-Surv.

3.2.7. Differentiation by Sexual Objectification Experience

Hierarchical multiple regressions were conducted with self-objectification measures as outcome variables, and sexual objectification experience and gender as predictor variables, controlling for age (see Table 9). The three scales measuring sexual objectification experience were entered into the model in Step 1, followed by age in Step 2, and gender in Step 3. The *VIF* (ranging from 1.2 to 2.5) suggested no large degree of collinearity among predictor variables, thus meeting the assumption of regression.

Sexual objectification experience significantly predicted SOBBS Total and Factors, SOQ, and OBC-Surv scores in Step 1. Adding age resulted in a significant R^2 change from Step 1 to Step 2 for all self-objectification scale scores. Controlling for sexual objectification experience and age in Step 3, gender significantly predicted SOQ and OBC-Surv scores, but not the SOBBS Factors and Total scores. Adding gender resulted in a significant R^2 change in predicting the SOQ and OBC-Surv scores from Step 2 to Step 3. In contrast, adding gender did not result in a significant R^2 change in predicting SOBBS Total or Factors scores from Step 2 to Step 3. Accordingly, in line with Hypothesis 10, sexual objectification experience best differentiated the SOBBS Total and Factor scores. However, gender significantly improved the variance accounted for in the SOQ and OBS-Surv after controlling for sexual objectification experience and age.

3.3. Discussion

The aim of Study 2 was to examine the measurement invariance of the SOBBS and further validate this scale in an age-representative sample of women and men. The multi-group CFA confirmed the measurement invariance of the SOBBS across genders. The latent factor mean differences indicated that women had higher latent SOBBS Factor 1 than men, while there was no gender difference in latent SOBBS Factor 2. The SOBBS demonstrated concurrent and convergent validity via the significant, moderate to strong, positive associations

with the OBC-Surv scores and interpersonal sexual objectification experience in both women and men, as well as drive for muscularity in men. The SOBBS displayed satisfactory discriminant validity with BMI in women and men and was differentiated by sexual objectification experience. Gender did not differentiate the SOBBS scores after controlling for sexual objectification experience and age. However, the concurrent validity with the SOQ, convergent validity with witnessed sexual objectification, and discriminant validity with self-dehumanization, subclinical grandiose narcissism, and drive for muscularity were suboptimal for certain SOBBS Factors or specific participant samples. The SOQ demonstrated satisfactory discriminant validity from BMI and self-dehumanization in women and men, and from narcissism and drive for muscularity in women. The OBC-Surv showed satisfactory convergent validity with interpersonal sexual objectification experience in women and men, and with drive for muscularity in men. Additionally, the OBC-Surv demonstrated discriminant validity from BMI and subclinical grandiose narcissism in women and men. Both the SOQ and OBC-Surv failed some aspects of validation, such as the failure to differentiate scores based solely on sexual objectification experience. Explanations for the unsupported validity across specific questionnaires and samples are outlined below.

The measurement invariance of the SOBBS between women and men indicates that the scores on both SOBBS Factor 1 and Factor 2 can be directly compared across genders. The latent mean difference in SOBBS Factor 1 confirmed that women are more likely than men to view their bodies from an observer's perspective. In contrast, the lack of a difference in SOBBS Factor 2 shows that both women and men have similar tendencies to view their bodies as representations of the self. This finding supports the interpretation from Study 1, suggesting that the lack of gender difference in SOBBS Factor 2 scores reflects true similarities in how men and women perceive their bodies as representations of themselves, rather than measurement bias in the SOBBS Factor 2 subscale.

The SOBBS displayed excellent concurrent validity with both the SOQ and OBC-Surv in age-representative samples of women. However, in men, the SOBBS showed excellent concurrent validity with the OBC-Surv but not with the SOQ. Since the SOQ emphasizes thinness, which is typically associated with women's body standards, and focuses less on muscularity, which may be more relevant to men (Calogero, 2011), the SOQ may not fully capture self-objectification in men. As such, the failure to demonstrate concurrent validity of the SOBBS with the SOQ in men likely reflects a limitation of the SOQ in capturing men's self-objectification rather than an issue with the SOBBS.

The SOBBS and OBC-Surv showed good convergent validity with drive for muscularity in men, and the SOQ showed good discriminant validity with drive for muscularity in women. Higher scores on the SOBBS Factor 1 and OBC-Surv in women were related to stronger levels of drive for muscularity. This may reflect recent changes in female body ideals from thin to toned (Rodgers et al., 2017), such that body monitoring (measured by OBC-Surv and SOBBS Factor 1) is associated with monitoring the body's muscular appearance. As the SOQ does not focus on muscular body monitoring, this may explain the weak correlation between drive for muscularity in men and the absence of a correlation in women. In addition, the weak correlation between SOQ and drive for muscularity in men support the interpretations of poor convergent validity of the SOQ in Study 1, indicating that cognitions valuing physical appearance over physical competence are not strongly associated with appearance-enhancing behaviors in men.

The SOBBS Total and OBC-Surv showed good convergent validity with interpersonal sexual objectification experiences for both women and men, while the SOQ did not display adequate convergent validity in either sample. The OBBS and OBC-Surv do seem to have greater conceptual overlap with the construct measured by the ISOS (i.e., one's body being evaluated by others). Interestingly, none of the measures of self-objectification displayed adequate convergent validity with witnessed sexual objectification in either women or men. This failure possibly reflects the weaker effect of witnessing sexual objectification on individuals' self-objectification relative to directly experiencing sexual objectification. For example, Koval et al. (2019) found that directly experiencing sexual objectification had a more negative effect on women's state self-objectification than witnessing sexual objectification of others. While this explanation has not been empirically tested in men, the current study suggests that similar patterns may be found.

The findings concerning discriminant validity are complex. While the SOBBS, SOQ and OBC-Surv displayed adequate discriminant validity with BMI in women and men, the patterns for subclinical grandiose narcissism and self-dehumanization were less clear. First, the SOBBS, SOQ, and OBC-Surv showed excellent discriminant validity with subclinical grandiose narcissism in women. That is, consistent with past research (e.g., Dryden & Anderson, 2019; Lindner & Tantleff-Dunn, 2017), there were no significant correlations between measures of self-objectification and subclinical grandiose narcissism. However, results were more varied in men. Specifically, while the SOBBS Factor 1and OBC-Surv displayed excellent discriminant validity in men, the SOBBS Total and Factor 2 and SOQ did not - exhibiting significant positive (though small) correlations with subclinical grandiose narcissism. People with high levels of narcissistic grandiosity may direct attention to their body in order to strategically alter their appearance (Fox & Rooney, 2015), which in turn may

contribute to greater value being attached to their physical appearance. However, there may be differences in the magnitude of this effect for women and men. Swami et al (2015) found that only pathological (vs. subclinical) levels of grandiose narcissism predicted women's body image, which may explain why the subclinical grandiose narcissism captured by the NPI is correlated with self-objectification captured in the SOQ and SOBBS Factor 2 only in men.

The SOQ showed excellent discriminant validity with self-dehumanization measured by the adapted MAT and SDS in women and men. However, at odds with predictions, women and men with higher SOBBS Total and Factor 1 and OBC-Surv scores reported lower self-dehumanization on the MAT, such that greater self-objectification is associated with higher engagement in humanizing mind activities. In contrast, when measuring self-dehumanization using the SDS, women and men with higher SOBBS Total and Factor 1, and SOQ scores were more likely to self-dehumanize, perceiving themselves as lacking human nature and human uniqueness. Given research indicating that women who are sexually objectified are more likely to be dehumanized by others than non-sexually objectified women (Loughnan et al., 2013; Vendemia, 2024), in hindsight, the positive association between self-objectification and self-dehumanization is not entirely unexpected- though it is less clear why these associations were not found for the SOQ. Consistent with the arguments from Study 1, these findings also suggest that the adapted MAT may not be an adequate measure of self-dehumanization.

Study 2 replicated the findings of Study 1 and indicated that women had higher SOBBS Total and Factor 1 scores than men, while no gender differences were observed for SOBBS Factor 2. Building on the findings of Study 1, Study 2 found that SOBBS Total and Factors were primarily differentiated by sexual objectification experience, with gender no longer predicting SOBBS scores once sexual objectification experience and age were considered. This suggests that sexual objectification is the key predictor of SOBBS scores. However, while sexual objectification experience predicted SOQ and OBC-Surv scores, gender still accounted for additional variance in these measures. This indicates that participant gender may influence how participants respond to the SOQ and OBC-Surv scales. It is possible that women and men interpret the scale items differently (Chen & Russo, 2010; Hazzard et al., 2022). For example, in the SOQ, the item "Strength" may be interpreted by women as a physical competence-based attribute, while men may view it more as a physical appearance-based attribute (Calogero, 2011). In the OBC-Surv, the item "I am more concerned about what my body can do than how it looks" may be interpreted by women as moving away from physical appearance monitoring, whereas men may see it aligning with traditional masculine norms that value strength

and power over physical appearance (Pope et al., 2000). Additionally, as appearance is perceived to be more important for women, while intelligence and social status are considered more important for men (Fales et al., 2016), the constructs measured by the SOQ (i.e., valuing physical appearance over physical competence) and OBC-Surv (habitually monitoring one's physical appearance) may be more relevant for women's lived experience than for men.

4. General Discussion

Two studies were conducted to evaluate the psychometric properties of the SOBBS in cisgender heterosexual women and men. In Study 1, the two-factor structure of the SOBBS was supported for both genders. Study 2 further confirmed the measurement invariance of the SOBBS, indicating that the SOBBS captures true latent differences and can be used to compare self-objectification between women and men. Specifically, Study 2 results indicated that women were more likely to internalize an observer's perspective on their bodies than men, although both genders similarly treated their bodies as capable of representing themselves. Across two studies, the SOBBS demonstrated satisfactory concurrent and convergent validity with measures such as the OBC-Surv, appearance orientation, appearance-contingent self-worth, internalization of sociocultural standards of appearance, and interpersonal sexual objectification experience in women and men. Concurrent validity with the SOQ was supported in women (Study 2 only) and convergent validity with drive for muscularity was supported in men. For both women and men, the SOBBS displayed discriminant validity from BMI (Study 2 only), predictive validity with appearance-related reasons for exercise, incremental validity with exercise for attractiveness above and beyond the SOQ and OBC-Surv, internal consistency and 2-week test-retest reliability. Regarding differentiation by known groups, sexual objectification experience was the best differentiator of SOBBS scores, and gender did not contribute to the additional variance in predicting the SOBBS. However, some limitations of the SOBBS were noted, including issues with concurrent validity with the SOQ (men only), convergent validity with witnessed sexual objectification experience (women and men), and the discriminant validity from self-dehumanization (women and men), narcissism (men only), and drive for muscularity (women).

The current research also explored the psychometric properties of the SOQ and OBC-Surv. The SOQ showed good convergent validity with appearance-contingent self-worth and internalization of sociocultural ideals of appearance, discriminant validity from BMI and self-dehumanization, predictive validity with appearance-related reasons for exercise, and two-week test-retest reliability in women and men. The SOQ also demonstrated good convergent validity with appearance orientation, and discriminant validity from narcissism

and drive for muscularity in women. However, the SOQ failed to demonstrate convergent validity with interpersonal and witnessed sexual objectification experience and lacked internal consistency in both women and men. The SOQ also failed to show convergent validity with appearance orientation and drive for muscularity, as well as discriminant validity from narcissism in men.

The OBC-Surv showed convergent validity with appearance orientation, appearance-contingent self-worth, internalization of sociocultural ideals of appearance, and interpersonal sexual objectification experience in both women and men. It also demonstrated discriminant validity from BMI, self-dehumanization (Study 1 only), and narcissism, as well as predictive validity for appearance-related reasons for exercise, internal consistency, and two-week test-retest reliability in both gender groups. Additionally, the OBC-Surv showed convergent validity with drive for muscularity in men. However, the OBC-Surv failed to demonstrate convergent validity with witnessed sexual objectification and lacked discriminant validity from self-dehumanization (Study 2) in both women and men. It also failed to show discriminant validity from drive for muscularity in women.

Objectification theory posits that sexually objectifying cultures socialize individuals to view themselves as objects to be evaluated by others (Fredrickson & Roberts, 1997), with sexual objectification experience serving as a precursor to self-objectification (Moradi & Huang, 2008). In line with this theory, sexual objectification experience predicted SOBBS, SOQ, and OBC-Surv scores. We also argued that the higher levels of self-objectification in women compared to men primarily stem from women's greater experiences of sexual objectification. It is important to rule out measurement bias related to gender when assessing and comparing self-objectification across genders, as this may account for the observed gender differences in self-objectification measured by these scales. Importantly, SOBBS scores were no longer differentiated by gender after controlling for sexual objectification experience and age. This supports our hypothesis that gender differences in self-objectification measured by the SOBBS are due to gender differences in sexual objectification experience. The support for measurement invariance in the SOBBS also indicates that women and men interpret SOBBS items in similar ways. In contrast, gender was found to differentiate SOQ and OBC-Surv scores even after controlling for sexual objectification experience and age. This suggests that observed gender differences in self-objectification measured by these scales (e.g., Grabe & Jackson, 2009; Smolak & Murnen, 2011; Vendemia et al., 2024) may be partly due to measurement bias related to participant gender. As discussed earlier, this is likely due to gender differences in item interpretation, construct relevance, and

sociocultural norms. Therefore, we recommend the SOBBS as a valid tool for measuring and comparing self-objectification in women and men.

The evidence for measurement invariance of the SOBBS between women and men indicate that the SOBBS can adequately compare self-objectification in cisgender heterosexual women and men. Interestingly, the tendency to see the body as representing the self (measured by SOBBS Factor 2) was equally likely in women and men. That is, both women and men prioritized physical appearance over personal attributes (e.g., emotions, feelings, personality and intellect) to the similar degree. While this appears at odds with explanations for gender differences in self-objectification that are based in differential experiences of sexual objectification, it is important to note that SOBBS Factor 2 measures relative differences in the importance of physical appearance vs. personal attributes, rather than absolute levels of each. As such, although women may place a higher value on their physical appearance than men (e.g., as measured by the SOQ), they may also place a higher value on their competence and other personal qualities than men, a nuance which cannot be captured by the SOBBS. For example, relative to men, women need to demonstrate better competence, morality, and sociability to be competitive in career contexts (Prati et al., 2019; Moscatelli et al., 2020) and meet more stringent qualification standards to be voted for in political elections (Beuer, 2015).

4.1. Practice Implications

The current research findings have a number of implications for clinicians, activists, policy makers and the general public. First, the current research findings can give clinicians greater confidence in measuring and comparing self-objectification in women and men, using the SOBBS as a validated measure. For individuals reporting body image or mental health concerns, clinicians can also use the SOBBS to identify specific aspects of self-objectification related to those concerns and develop targeted interventions.

The finding that experiences of sexual objectification predict self-objectification is also of practical importance. For the general public, better awareness of the role that experiences of sexual objectification play in self-objectification may act as a protective factor that helps to prevent internalization of objectifying perspectives through more critical awareness of their impacts (Sáez et al., 2019). Activists and clinicians may design community workshops to help individuals better identify and label instances of sexual objectification (Tylka & Augustus-Horvath; 2011). More broadly, these findings also suggest that more should be done to regulate people's exposure to sexual objectification. Given the adverse outcomes of exposure to sexually objectifying media content on self-objectification in women and men (Aubrey, 2006a; Vandenbosch et al., 2015), social activism may play a role in prompting better regulation of media outlets' use of sexually

objectifying images (Tylka & Augustus-Horvath; 2011), along with changes in policy. While research conducted by Ofcom (the United Kingdom's regulator of communication services including TV and digital media), indicates that people perceive there to have been a reduction in sexual objectification on TV in recent years (Ofcom, October 2023), there may be further room for improvement.

4.2. Limitations and Future Research Directions

Although the current study contributes to the understanding of optimal measurement of self-objectification in cisgender heterosexual women and men, some limitations need to be acknowledged. First, the current study sampled only cisgender, heterosexual adults, mostly White. While broader validation would be ideal, the focus on cisgender heterosexual samples was pragmatic. Given the potential influence of gender identity, sexual orientation, and ethnicity on self-objectification (Tebbe et al., 2021), these findings may not generalize to other identities. Future research should test the validity and reliability of self-objectification measures across transgender, non-binary, and more diverse ethnic groups to ensure broader applicability.

The decision to examine measurement invariance of the SOBBS was made after completing data collection for Study 2. As a result, sample size calculations for Study 2 did not account for the larger sample needed to examine measurement invariance – a recommended 200 participants per group for multi-group CFA (Meade & Kroustalis, 2006). As a result, these analyses were underpowered. Future research should use a larger sample size to provide a more robust evaluation of potential differences in latent self-objectification across genders. In addition, we note that our strategy for conducting power analyses (basing the estimated effect size on the lowest observed effect size between the SOBBS and variables broadly relevant to self-objectification) may have resulted in the failure to consistently support the discriminant validity of the SOBBS. That is, we operationalized discriminant validity as a significant association between relevant variables, and thus our analyses are not sufficiently powered to detect relationships between the SOBBS, BMI and self-dehumanization that are smaller than our estimated effect size ($r = .21$). Future research with larger sample sizes is necessary to further test discriminant validity.

The psychometric properties of the SOBBS were largely supported in men. However, the SOBBS was initially developed based specifically on women's behaviors and attitudes (Lindner & Tantleff-Dunn, 2017). It is therefore possible that some aspects of self-objectification that are uniquely or more commonly experienced by men are not adequately captured in the SOBBS. It would be useful to investigate the association between the SOBBS and muscularity-driven consequences such as steroid use and muscle dysmorphia (Daniel & Bridges, 2010; Grieve & Helmick, 2008), to better understand the validity of the SOBBS in men.

The primary focus of the current research was to evaluate the psychometric properties of the SOBBS, although we also included exploratory analyses validating the SOQ and OBC-Surv. However, beyond evaluating incremental validity in predicting appearance-related reasons for exercise, we did not directly compare whether the SOBBS had superior validity to the SOQ and OBC-Surv. Future research should address this gap by directly comparing the different scales across the different components of validity. Additionally, while the SOBBS demonstrated incremental validity in predicting exercise for attractiveness using a cross-sectional approach due to financial and time constraints, future studies should employ more rigorous longitudinal designs to test predictive validity across the three self-objectification measures and continue to explore the unique contribution of the SOBBS Total.

Finally, there are limitations to the measures of sexual objectification experience used in the current research. According to objectification theory, interpersonal sexually objectifying encounters and exposure to sexually objectifying media content are two major sources of sexual objectification experiences (Fredrickson & Roberts, 1997). Sexually objectifying media content ranges from visual media depicting interpersonal and social encounters, text emphasizing the importance of physical appearance, to sexualized images or videos underscoring individuals' sexuality and bodies (Aubrey, 2010). Recent research indicated that experiences of interpersonal sexual objectification can also occur via social media in the form of sexual comments, explicit sexual messages and appearance-related feedback (Guizzo et al., 2021; Luo et al., 2019; Seekis et al., 2021; Vendemia & Fox., 2024). However, the current research was conducted during the COVID-19 pandemic, which has implications for the nature and sources of sexual objectification during the data collection period. During the pandemic, individuals in the UK and other countries were recommended (or required) to stay at home and avoid face-to-face contact to reduce the spread of infections (Bird et al., 2021). Accordingly, screen time increased (e.g., Dutta et al., 2022), and face-to-face interactions were replaced by video calls (Pfund et al., 2020). Accordingly, the key sources of sexual objectification may have shifted from face-to-face interactions to online interactions, a facet of sexual objectification experience not adequately captured in the measures of sexual objectification used in the current study. If exposure to sexually objectifying media and interpersonal sexual objectification experience online are better captured, the variance in self-objectification explained by sexual objectification experience may increase. Further research is therefore needed.

4.3. Conclusion

In conclusion, the current studies demonstrate that the SOBBS is a valid and reliable scale for measuring and comparing self-objectification in cisgender heterosexual women and men. Our research supports

the two-factor structure of the SOBBS for both women and men, and demonstrates that this scale has good concurrent, convergent, predictive and incremental validity, internal consistency, and 2-week test-retest reliability in women and men. We also showed that sexual objectification experience is a key precursor to self-objectification, with SOBBS scores best differentiated by sexual objectification experience. Future research should test the validity of the SOBBS with larger and more diverse samples.

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Table 1

Study 1: Confirmatory Factor Analysis of the SOBBS Items and Factor Loading in women and men

SOBBS Item	Women (n = 180)		Men (n = 163)	
	Factor 1	Factor 2	Factor 1	Factor 2
I try to imagine what my body looks like to others (i.e., like I am looking at myself from the outside).	.80		.81	
I choose specific clothing or accessories based on how they make my body appear to others.	.55		.68	
When I look in the mirror, I notice areas of my appearance that I think others will view critically.	.68		.65	
I consider how my body will look to others in the clothing I am wearing.	.73		.73	
I often think about how my body must look to others.	.91		.86	
I try to anticipate others' reactions to my physical appearance.	.73		.80	
I have thoughts about how my body looks to others even when I am alone.	.77		.78	
Looking attractive to others is more important to me than being happy with who I am inside.		.78		.73
How I look is more important to me than how I think or feel.		.77		.76
My physical appearance is more important than my personality.		.76		.68
My physical appearance says more about who I am than my intellect.		.66		.70
How sexually attractive others find me says something about who I am as a person.		.54		.67
My physical appearance is more important than my physical abilities.		.68		.70
My body is what gives me value to other people.		.73		.64

Notes. Women: correlation between Factor 1 and Factor 2 = .56; Men: correlation between Factor 1 and Factor 2 = .72. SOBBS = Self-Objectification Beliefs and Behaviors Scale. Factor 1= Observer's Perspective; SOBBS Factor 2 = Body as Self.

Table 2

Study 1: Descriptive Statistics, Partial Correlations (Controlling for Age) among Variables in Women and Men

Variable	*n*	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13
							Women									
1. SOQ	171	-1.34	14.07													
2. OBC-Surv	171	4.87	1.09	.46***												
3. SOBBS Factor 1	171	3.69	0.85	.38***	.64***											
4. SOBBS Factor 2	171	2.06	0.74	.48***	.58***	.56***										
5. SOBBS Total	171	2.87	0.70	.49***	.70***	.89***	.87***									
6. MBSRQ-AO	171	3.64	0.69	.32***	.72***	.50***	.50***	.57***								
7. CSWS-AS	171	5.46	1.01	.40***	.70***	.61***	.47***	.62***	.57***							
8. SATAQ3- IG	171	3.03	1.04	.35***	.45***	.43***	.34***	.44***	.43***	.31***						
9. BMI	171	24.13	6.29	-.01	.07	.24**	.05	.17*	-.10	.06	.10					
10. MAT	171	3.12	0.75	-.06	-.03	-.28***	-.05	-.19**	-.08	-.21**	-.04	-.04				
11. REI- WC	171	4.71	1.30	.21**	.31***	.30***	.22**	.30***	.24**	.17*	.21**	.09	-.12			
12. REI- A	171	4.49	1.49	.39***	.53***	.51***	.46**	.55***	.46***	.39***	.27***	.02	-.25***	.44***		
13. REI- T	171	4.83	1.29	.29***	.45***	.39***	.34**	.41***	.46***	.3***	.32***	.07	-.23**	.51***	.62***	
							Men									
1. SOQ	163	-8.08	12.60													
2. OBC-Surv	163	3.65	1.18	.45***												
3. SOBBS Factor 1	163	2.91	0.95	.39***	.74***											
4. SOBBS Factor 2	163	2.02	0.73	.48***	.62***	.62***										
5. SOBBS Total	163	2.47	0.76	.48***	.76***	.92***	.88***									
6. MBSRQ-AO	163	2.94	0.73	.25**	.74***	.60***	.48***	.60***								
7. CSWS-AS	163	4.37	1.23	.45***	.67***	.64***	.49***	.64***	.52***							
8. SATAQ3-IG	163	2.32	0.92	.35***	.45***	.54***	.45***	.56***	.34***	.36***						
9. BMI	163	25.88	6.23	.01	.13	.15*	.09	.14*	.06	.08	.08					
10. MAT	163	3.42	0.73	-.13	.00	-.07	.03	-.03	-.01	-.02	.04	-.06				
11. REI-WC	163	4.26	1.36	.26***	.23**	.22**	.26***	.27***	.17*	.23**	.18**	.19**	-.04			
12. REI-A	163	4.45	1.46	.44***	.46***	.51***	.43***	.52***	.40***	.49***	.54***	.09	-.10	.44***		
13. REI-T	163	4.37	1.31	.31***	.40***	.38***	.34***	.40***	.35***	.32***	.36***	.15*	-.09	.51***	.61***	

Note. SOQ = Self-Objectification Questionnaire; OBC-Surv = Objectified Body Consciousness Body Surveillance Scale; SOBBS Factor 1 = Self-Objectification Beliefs and Behaviors Scale- Observer's Perspective; SOBBS Factor 2 = Self-Objectification Beliefs and Behaviors Scale- Body as Self; SOBBS Total = Self-Objectification Beliefs and Behaviors Scale Total Score; MBSRQ-AO= Appearance Orientation Subscale of the Multidimensional Body-Self Relations Questionnaire; CSWS-AS = Appearance Subscale of Contingencies of Self- Worth Scale; SATAQ3-IG= Internalisation General Subscale of The Sociocultural Attitudes Towards Appearance Scale-3; MAT = Mind Attribution Task; BMI = Body Mass Index; REI-WC = Reason for Exercise Inventory-Exercise for Weight Control; REI-A = Reason for Exercise Inventory-Exercise for Attractiveness; Reason for Exercise Inventory-T = Reason for Exercise Inventory-Exercise for Tone.

*p< .05, one-tailed. **p < .01, one-tailed. ***p< .001, one-tailed.

Table 3

Study 1: Multiple Regression Analysis Predicting SOBBS, SOQ and OBC-Surv Scores from Age and Gender

Independent variable	Out variable: Self-objectification measurement score																			
	SOQ				OBC-Surv				SOBBS Factor 1				SOBBS Factor 2				SOBBS Total			
	B	*SE B*	*β*	*t*	*B*	*SE B*	*β*	*t*	*B*	*SE B*	*β*	*t*	*B*	*SE B*	*β*	*t*	*B*	*SE B*	*β*	*t*
Constant	3.43	1.76		1.94	5.90	0.14		43.17**	4.37	0.11		38.92**	2.30	0.10		23.38**	3.34	0.09		35.61**
Age	-0.18	0.06	-0.18	-3.31*	-0.04	0.00	-0.41	-9.04**	-0.03	0.00	-0.35	-7.29**	-0.01	0.00	-0.16	-2.83*	-0.02	0.00	-0.31	-5.86**
Gender	-5.19	1.49	-0.19	-3.48*	-0.91	0.12	-0.36	-7.89**	-0.58	0.10	-0.30	-6.08**	0.02	0.08	0.02	0.28	-0.28	0.08	-0.18	-3.49*

Note. $N = 340$. Gender was coded as a dichotomous variable (0 = female; 1 = male). SOQ = Self-Objectification Questionnaire; OBC-Surv = Objectified Body Consciousness Body Surveillance Scale; SOBBS Factor 1 = Self-Objectification Beliefs and Behaviors Scale- Observer's Perspective; SOBBS Factor 2 = Self-Objectification Beliefs and Behaviors Scale- Body as Self; SOBBS Total = Self-Objectification Beliefs and Behaviors Scale Total Score. *B* = unstandardized regression weight; *SE B* = standard error of unstandardized regression weight; *β* = standardized regression weight.

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

Table 4

Study 1 Multiple Regression Analysis for Predictive Validity of the SOQ, OBC-Surv and SOBBS Total Scores in Predicting Appearance-Related Exercise in Women and Men

	Women											
	Reason for exercise											
Variable	Exercise for weight control (*n* =172)				Exercise for attractiveness (*n* =172)				Exercise for tone (*n* = 170)			
	B	*SE B*	*β*	*t*	*B*	*SE B*	*β*	*t*	*B*	*SE B*	*β*	*t*
Constant	5.10	0.25		20.67***	5.35	0.26		20.91***	5.62	0.23		24.34***
Age	-0.01	0.01	-0.12	-1.50	-0.03	0.01	-0.23	-3.25**	-0.03	0.01	-0.25	-3.47***
SOQ	0.02	0.01	0.20	2.63**	0.04	0.01	0.37	5.31***	0.03	0.01	0.29	4.02***
Constant	2.88	0.62		4.63***	1.10	0.61		1.81	2.51	0.56		4.49***
Age	0.00	0.01	-0.02	-0.25	-0.01	0.01	-0.08	-1.08	-0.01	0.01	-0.12	-1.62
OBC-Surv	0.39	0.10	0.33	4.11***	0.75	0.09	0.56	8.03***	0.55	0.09	0.47	6.40***
Constant	3.47	0.51		6.83***	1.98	0.49		4.05***	3.41	0.46		7.35***
Age	-0.01	0.01	-0.10	-1.29	-0.03	0.01	-0.19	-3.08**	-0.03	0.01	-0.23	-3.33***
SOBBS Total	0.54	0.14	0.29	3.92***	1.12	0.13	0.53	8.42***	0.73	0.13	0.40	5.85***
	Men											
	Reason for exercise											
Variable	*Exercise for weight control (n = 163)*				Exercise for attractiveness (*n* = 163)				Exercise for tone (*n* =163)			
	B	*SE B*	*β*	*t*	*B*	*SE B*	*β*	*t*	*B*	*SE B*	*β*	*t*
Constant	3.89	0.27		14.6***	5.83	0.25		22.94***	5.07	0.25		20.12***
Age	0.02	0.01	0.18	2.39*	-0.03	0.01	-0.28	-4.21***	-0.01	0.01	-0.14	-1.89
SOQ	0.03	0.01	0.26	3.4***	0.05	0.01	0.42	6.26***	0.03	0.01	0.31	4.13***
Constant	2.36	0.55		4.30***	2.66	0.51		5.17***	2.54	0.50		5.12***
Age	0.03	0.01	0.26	3.10**	-0.01	0.01	-0.12	-1.55	0.00	0.01	0.02	0.25
OBC-Surv	0.29	0.10	0.25	2.92**	0.60	0.09	0.48	6.53***	0.49	0.09	0.44	5.48***
Constant	2.20	0.52		4.26***	2.46	0.47		5.24***	2.65	0.47		5.63***
Age	0.02	0.01	0.25	3.15**	-0.01	0.01	-0.14	-2.11*	0.00	0.01	-0.02	-0.32
SOBBS Total	0.50	0.14	0.28	3.51***	1.01	0.13	0.53	7.77***	0.73	0.13	0.43	5.60***

Note. SOQ = Self-Objectification Questionnaire; OBC-Surv = Objectified Body Consciousness Body Surveillance Scale; SOBBS Factor 1 = Self-Objectification Beliefs and Behaviors Scale- Observer's Perspective; SOBBS Factor 2 = Self-Objectification Beliefs and Behaviors Scale- Body as Self; SOBBS Total = Self-Objectification Beliefs and Behaviors Scale Total Score. *B* = unstandardized regression weight; *SE B* = standard error of unstandardized regression weight; *β* = standardized regression weight.

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

Table 5

Study 1 Hierarchical Regression Analysis for Incremental Validity of the SOBBS Total Scores Relative to The SOQ and OBC-Surv in Predicting Appearance- Related Exercise in Women and Men

Women																		
	Reason for exercise																	
Variable	Exercise for weight control (n =172)						Exercise for attractiveness (n =172)						Exercise for tone (n = 170)					
	ΔR^2	$\Delta R^2(F)$	*B*	*SE B*	*β*	*t*	ΔR^2	$\Delta R^2(F)$	*B*	*SE B*	*β*	*t*	ΔR^2	$\Delta R^2(F)$	*B*	*SE B*	*β*	*t*
Model 1	0.07	6.00**					0.23	25.51***					0.19	18.95***				
Constant			5.10	0.25		20.67***			5.35	0.26		20.91***			5.62	0.23		24.34***
Age			-0.01	0.01	-0.12	-1.50			-0.03	0.01	-0.23	-3.25**			-0.03	0.01	-0.25	-3.47***
SOQ			0.02	0.01	0.20	2.63**			0.04	0.01	0.37	5.31***			0.03	0.01	0.29	4.02***
Model 2	0.05	10.42**					0.14	37.96***					0.11	25.26***				
Constant			3.10	0.67		4.66***			1.66	0.64		2.59**			2.83	0.59		4.77***
Age			0.00	0.01	-0.02	-0.21			-0.01	0.01	-0.07	-10.00			-0.01	0.01	-0.11	-1.56
SOQ			0.01	0.01	0.08	0.95			0.02	0.01	0.17	2.44*			0.01	0.01	0.12	1.55
OBC-Surv			0.35	0.11	0.29	3.23***			0.64	0.10	0.47	6.16***			0.48	0.10	0.41	5.03***
Model 3	0.01	1.71					0.04	11.82***					0.11	25.26				
Constant			2.92	0.68		4.31***			1.22	0.64		1.92			2.62	0.60		4.34***
Age			0.00	0.01	-0.03	-0.38			-0.01	0.01	-0.10	-1.48			-0.02	0.01	-0.13	-1.79
SOQ			0.01	0.01	0.05	0.57			0.01	0.01	0.11	1.51			0.01	0.01	0.08	1.04
OBC-Surv			0.24	0.14	0.20	1.78			0.37	0.13	0.28	2.96**			0.35	0.12	0.30	2.94**
SOBBS Total			0.26	0.20	0.14	1.31			0.63	0.18	0.30	3.44***			0.31	0.18	0.17	1.77
Men																		
	Reason for exercise																	
Variable	*Exercise for weight control (n = 163)*						Exercise for attractiveness (n = 163)						Exercise for tone (n = 163)					
	ΔR^2	$\Delta R^2(F)$	*B*	*SE B*	*β*	*t*	ΔR^2	$\Delta R^2(F)$	*B*	*SE B*	*β*	*t*	ΔR^2	$\Delta R^2(F)$	*B*	*SE B*	*β*	*t*
Model 1	0.09	7.83***					0.28	31.78***					0.12	11.32***				
Constant			3.89	0.27		14.60***			5.83	0.25		22.94***			5.07	0.25		20.12***
Age			0.02	0.01	0.18	2.39*			-0.03	0.01	-0.28	-4.21***			-0.01	0.01	-0.14	-1.89
SOQ			0.03	0.01	0.26	3.4***			0.05	0.01	0.42	6.26***			0.03	0.01	0.31	4.13***
Model 2	0.01	2.51					0.07	18.39***					0.08	16.03***				
Constant			3.02	0.61		4.93***			3.68	0.56		6.61***			3.07	0.56		5.52***
Age			0.02	0.01	0.24	2.86**			-0.02	0.01	-0.15	-2.06*			0.00	0.01	0.00	0.02
SOQ			0.02	0.01	0.20	2.32*			0.03	0.01	0.28	3.92***			0.02	0.01	0.16	2.03*
OBC-Surv			0.17	0.11	0.15	1.59			0.42	0.10	0.34	4.29***			0.40	0.10	0.36	4.00***
Model 3	0.01	2.17					0.04	10.79**					0.02	3.21				
Constant			2.73	0.64		4.26***			3.11	0.57		5.48***			2.75	0.58		4.74***
Age			0.02	0.01	0.24	2.91**			-0.01	0.01	-0.14	-2.04*			0.00	0.01	0.01	0.06
SOQ			0.02	0.01	0.17	1.94			0.03	0.01	0.23	3.20**			0.01	0.01	0.13	1.59
OBC-Surv			0.02	0.15	0.02	0.12			0.12	0.13	0.10	0.88			0.22	0.14	0.20	1.64
SOBBS Total			0.33	0.23	0.19	1.47			0.66	0.20	0.34	3.29***			0.37	0.20	0.21	1.79

Note. Women: Degrees of freedom for comparisons when outcome variable was exercise for weight control and attractive: Model 1 (2, 169); Model 2 (1, 168); Model 3 (1, 167). Degrees of freedom for comparisons when outcome variable was exercise for tone: Model 1 (2, 167); Model 2 (1, 166); Model 3 (1, 165). Men: Degrees of freedom for

comparison: Model 1 (2, 160); Model 2 (1, 159); Model 3 (1, 158). SOQ = Self-Objectification Questionnaire; OBC-Surv= Objectified Body Consciousness Body Surveillance Scale; SOBBS = Self-Objectification Beliefs and Behaviors Scale Total Score; REI-WC= Reason for Exercise Inventory - Exercise for Weight Control; REI-A= Reason for Exercise Inventory-Exercise for Attractiveness; REI-T= Reason for Exercise Inventory-Exercise for Tone. ΔR^2 = R squared change made by adding new predictors to the model; A significant $\Delta R^2(F)$ indicates the difference made by adding new predictors to the model is significant; $\Delta R^2(F)$ = F change of R squared change; *B* = unstandardized regression weight; *SE B* = standard error of unstandardized regression weight; β = standardized regression weight.

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

Table 6

Study 1: Intraclass Correlation Coefficients of the SOQ, OBC-Surv and SOBBS in Women and Men

Variable	Women (*n* =133)		Men (*n* =136)	
	ICC	95% CI	ICC	95% CI
SOQ	.73	[.62, .81]	.64	[.52, .73]
OBC-Surv	.82	[.76, .87]	.88	[.83, .91]
SOBBS Factor 1	.83	[.77, .88]	.82	[.76, .87]
SOBBS Factor 2	.83	[.77, .88]	.86	[.81, .90]
SOBBS Total	.88	[.83, 91]	.87	[.82, .90]

Note. ICC estimates and their 95% confidence intervals based on single measure, absolute agreement, 2-way mixed effects model; SOQ = Self-Objectification Questionnaire; OBC-Surv= Objectified Body Consciousness Body Surveillance Scale; SOBBS = Self-Objectification Beliefs and Behaviors Scale Total Score. 95% CI = 95% confidence interval

Table 7

Study 2: Goodness-of-Fit Indices of the Two-Factor Correlational Model and Measurement Invariance of the SOBBS between Women and Men

Model	X^2 (*df*)	CFI	RMSEA (90%CI)	SRMR	Model Comparison	Δ X^2 (*df*)	ΔCFI	ΔRMSEA	ΔSRMR	Invariance?
Confirmatory factor analysis										
Total sample	232.03 (76) *	.934	.087 (.074, .099)	.051						
Women	163.36 (76) *	.925	.092 (.073, .111)	.063						
Men	166.91 (76) *	.920	.093 (.074, .113)	.056						
Tests for measurement invariance: Multigroup confirmatory factor analysis										
Configural Invariance	330.27 (152) *	.923	.066 (.056; .075)	.063						✓
Metric Invariance	341.94 (165) *	.923	.063 (.053, .072)	.064	Configural Invariance	11.67 (13)	0.00	.003	.001	✓
Scalar Invariance	358.10 (177) *	.921	.061 (.052, .070)	.066	Metric Invariance	16.16 (12)	.002	.002	.002	✓

Note. $N = 275$; $n_{women} = 137$; $n_{men} = 138$. X^2 = Chi square test; CFI = comparative fit index; RMSEA = root mean square error of approximation; CI = confidence interval; SRMR = standardized root-mean square residual; Δ X^2 = X^2 change; ΔCFI = CFI change; ΔRMSEA = RMSEA change; ΔSRMR = SRMR change. Mark "✓" indicates that the relevant measurement invariance of the SOBBS is supported

* $p \leq .001$.

Table 8

Study 2: Descriptive Statistics and Bivariate Correlations among Variables in Women and Men

Variable	*n*	*M*	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14
								Women									
1. SOQ	137	-6.80	13.77														
2. OBC-Surv	137	4.31	1.29	.53***													
3. SOBBS Factor 1	137	3.30	0.95	.48***	.76***												
4. SOBBS Factor 2	137	2.11	0.80	.55***	.60***	.65***											
5. SOBBS Total	137	2.70	0.80	.56***	.75***	.92***	.89***										
6. BMI	137	27.80	6.79	.01	-.03	.06	-.05	.01									
7. MAT	137	3.41	0.84	-.04	-.31***	-.38***	-.08	-.26**	.02								
8. SDS	137	2.96	0.76	.12	.21**	.19*	.25**	.24**	.10	.12							
9. NPI	137	0.14	0.14	.12	-.09	.03	.01	.02	.04	-.10	-.32***						
10. DMS	137	1.52	0.52	.08	.24**	.27**	.14	.23**	-.04	-.19*	.05	.06					
11. ISOS	137	2.02	0.72	.06	.39***	.42***	.25**	.38***	-.03	-.34***	.04	.14	.30***				
12. In-Person SO	137	1.91	0.86	.05	.28***	.27**	.21**	.26**	.01	-.22**	.05	.08	.14	.71***			
13. Media SO	136	2.78	0.94	.09	.24**	.28**	.12	.23**	.09	-.21**	-.03	.09	.06	.42***	.55***		
14. Age	137	45.36	15.61	-.24**	-.38***	-.41***	-.30***	-.39***	.00	.26**	-.21**	-.01	-.27**	-.50***	-.48***	-.28***	
								Men									
1. SOQ	138	-11.42	11.68														
2. OBC-Surv	138	3.51	1.30	.39***													
3. SOBBS Factor 1	138	2.77	0.99	.39***	.77***												
4. SOBBS Factor 2	138	1.94	0.7	.36***	.68***	.70***											
5. SOBBS Total	138	2.35	0.78	.41***	.79***	.95***	.89***										
6. BMI	138	26.11	5.10	-.03	-.04	.02	.06	.04									
7. MAT	138	3.55	0.92	-.01	-.24**	-.19*	-.22**	-.22**	.15								
8. SDS	138	2.98	0.73	.06	.18*	.19*	.15*	.19*	.13	.22**							
9. NPI	138	0.16	0.16	.19*	.06	.12	.29***	.20**	.10	-.21**	-.11						
10. DMS	138	2.18	0.91	.15*	.52***	.51***	.45***	.53***	-.14	-.32***	.01	.20*					
11. ISOS	138	1.42	0.43	.14*	.30***	.29***	.41***	.37***	-.07	-.33***	-.02	.27**	.45***				
12. In-Person SO	138	1.46	0.59	.06	.16*	.19*	.24**	.23**	-.06	-.17*	.03	.27**	.39***	.57***			
13. Media SO	138	1.98	0.82	.05	.25**	.26**	.25**	.28***	-.02	-.31***	.06	.20**	.23**	.47***	.51***		
14. Age	138	45.62	15.95	-.09	-.35***	-.33***	-.17*	-.29***	.30***	.23**	-.11	-.03	-.55***	-.34***	-.29***	-.27**	

Note. SOQ = Self-Objectification Questionnaire; OBC-Surv = Objectified Body Consciousness Body Surveillance Scale; SOBBS Factor 1 = Self-Objectification Beliefs and Behaviors Scale- Observer's Perspective; SOBBS Factor 2 = Self-Objectification Beliefs and Behaviors Scale- Body as Self; SOBBS Total = Self-objectification Beliefs and Behaviors Scale Total Score; BMI= Body Mass Index; MAT = Mind Attribution Task; SDS = Self-Dehumanisation Scale; NPI = Narcissistic Personality Inventory-16; DMS = The Drive for Muscularity Scale; ISOS = The Interpersonal Sexual Objectification Scale; In-Person SO = Witnessed Sexual Objectification in person; Media SO = Witnessed Sexual Objectification via the media.

*p< .05, one- tailed. **p < .01, one-tailed. ***p< .001, one- tailed.

Table 9

Study 2: Hierarchical Regression Analysis Predicting SOQ, OBC-Surv and SOBBS Scores from Sexual Objectification Experience, Gender and Age

Variable	ΔR^2	ΔR^2 (*F*)	*B*	*SE B*	β	*t*
SOQ						
Model 1	.03	2.82*				
ISOS			2.80	1.68	0.14	1.67
In-Person SO			-0.98	1.51	-0.06	-0.65
Media SO			1.32	1.01	0.10	1.30
Model 2	.02	4.47*				
ISOS			2.19	1.69	0.11	1.30
In-Person SO			-1.52	1.53	-0.09	-1.00
Media SO			1.32	1.01	0.10	1.31
Age			-0.11	0.05	-0.14	-2.11*
Model 3	.02	4.81*				
ISOS			0.78	1.80	0.04	0.43
In-Person SO			-1.15	1.52	-0.07	-0.76
Media SO			0.70	1.04	0.05	0.68
Age			-0.14	0.05	-0.17	-2.53*
Gender			-3.99	1.82	-0.15	-2.19*
OBC-Surv						
Model 1	.20	22.27***				
ISOS			0.81	0.16	0.39	5.05***
In-Person SO			-0.16	0.14	-0.09	-1.10
Media SO			0.24	0.10	0.17	2.51*
Model 2	.04	15.64***				
ISOS			0.70	0.16	0.34	4.44***
In-Person SO			-0.25	0.14	-0.14	-1.78
Media SO			0.24	0.09	0.17	2.57*
Age			-0.02	0.01	-0.23	-3.95***
Model 3	.01	5.27*				
ISOS			0.56	0.17	0.27	3.35**
In-Person SO			-0.22	0.14	-0.12	-1.52
Media SO			0.18	0.10	0.13	1.88
Age			-0.02	0.01	-0.26	-4.37***

Variable	ΔR^2	ΔR^2 (*F*)	*B*	*SE B*	β	*t*
Gender			-0.39	0.17	-0.14	-2.30*
SOBBS Factor 1						
Model 1	.20	23.01***				
ISOS			0.59	0.12	0.39	5.02***
In-Person SO			-0.14	0.11	-0.11	-1.33
Media SO			0.21	0.07	0.20	2.92**
Model 2	.05	17.64***				
ISOS			0.51	0.12	0.34	4.38***
In-Person SO			-0.21	0.10	-0.16	-2.05*
Media SO			0.21	0.07	0.20	3.00**
Age			-0.02	0.00	-0.24	-4.20***
Model 3	.01	2.57				
ISOS			0.44	0.12	0.29	3.53***
In-Person SO			-0.20	0.10	-0.15	-1.86
Media SO			0.18	0.07	0.17	2.47*
Age			-0.02	0.00	-0.26	-4.45***
Gender			-0.20	0.13	-0.10	-1.60
SOBBS Factor 2						
Model 1	.10	10.26***				
ISOS			0.32	0.09	0.28	3.42**
In-Person SO			0.02	0.08	0.02	0.22
Media SO			0.03	0.06	0.04	0.56
Model 2	.02	4.73*				
ISOS			0.29	0.09	0.25	3.03**
In-Person SO			-0.01	0.09	-0.01	-0.14
Media SO			0.03	0.06	0.04	0.56
Age			-0.01	0.00	-0.14	-2.17*
Model 3	.00	0.20				
ISOS			0.30	0.10	0.27	2.98**
In-Person SO			-0.02	0.09	-0.02	-0.19
Media SO			0.04	0.06	0.05	0.66
Age			-0.01	0.00	-0.13	-2.03*
Gender			0.05	0.10	0.03	0.45
SOBBS Total						

Variable	*ΔR²*	*ΔR² (F)*	*B*	*SE B*	*β*	*t*
Model 1	.18	20.04***				
ISOS			0.46	0.10	0.37	4.76***
In-Person SO			-0.06	0.09	-0.06	-0.70
Media SO			0.12	0.06	0.14	2.07*
Model 2	.04	13.27***				
ISOS			0.40	0.10	0.33	4.18***
In-Person SO			-0.11	0.09	-0.11	-1.32
Media SO			0.12	0.06	0.14	2.11*
Age			-0.01	0.00	-0.22	-3.64***
Model 3	.00	0.56				
ISOS			0.37	0.10	0.30	3.63***
In-Person SO			-0.11	0.09	-0.10	-1.23
Media SO			0.11	0.06	0.13	1.83
Age			-0.01	0.00	-0.23	-3.72***
Gender			-0.08	0.10	.005	-0.75

Note. $N = 274$. Gender was coded as a dichotomous variable (0 = female; 1= male). Degree of freedom for comparison: Model 1 (3, 270); Model 2 (4, 269); Model 3 (5, 268). SOQ = Self-Objectification Questionnaire; OBC-Surv = Objectified Body Consciousness Body Surveillance Scale. SOBBS Factor 1 = Self-Objectification Beliefs and Behaviors Scale- Observer's Perspective; SOBBS Factor 2 = Self-Objectification Beliefs and Behaviors Scale- Body as Self; SOBBS Total = Self-Objectification Beliefs and Behaviors Scale Total Score. ISOS = The Interpersonal Sexual Objectification Scale; In-Person SO = Witnessed Sexual Objectification in-person; Media-SOS = Witnessed Sexual Objectification via the media. ΔR^2= R squared change made by adding new predictors to the model; A significant $\Delta R^2(F)$ indicates the difference made by adding new predictors to the model is significant; $\Delta R^2(F)$ = F change of R squared change; *B* = unstandardized regression weight; *SE B* = standard error of unstandardized regression weight; ß = standardized regression weight

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