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Self-objectification occurs through the internalization of unrealistic social standards of attractiveness which leads to excessive valuing of one's physical features over functionality. Previous studies have associated self-objectification with a host of negative consequences including two opposing exercise-related outcomes, public exercise avoidance and exercise dependence. The main purpose of the present study was to examine whether social appearance anxiety and upward appearance comparison were the underlying mechanisms that explained the relationship between self-objectification and public exercise avoidance and exercise dependence, respectively. In addition, I wanted to explore if loneliness had a moderating effect on the path from self-objectification and these variables. Previous literature associated salient exercise-related factors – exercise participation, exercise location, presence of exercise partner, exercise frequency and duration, and motivation for exercise – with the variables of interest stated above and warranted further investigation. Therefore, the current study was divided into two major parts. The first focused on determining significant differences on mean self-objectification, loneliness, social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence scores across exercise-related factors through ANCOVAs. The second tested two moderated mediation models whereby social appearance anxiety mediated the relationship between self-objectification and public exercise avoidance and

upward appearance comparison mediated the relationship between self-objectification and exercise dependence with loneliness as a moderator. The models were analyzed via the PROCESS macro (Hayes, 2018) in SPSS version 27. Gender and body mass index (BMI) were used as covariates in all analyses. Three hundred eligible participants, 72 men (age = 20.57, *SD* = 3.13) and 229 women (age = 19.54, *SD* = 2.24), were recruited to answer an online survey. Results demonstrated that individuals not currently exercising, in general, reported greater negative outcomes related to self-objectification, loneliness, social appearance anxiety, and public exercise avoidance. Other significant differences were elaborated upon in the study. In addition, loneliness was not a significant moderator in the models. However, social appearance anxiety and upward appearance comparison fully mediated the relationship between self-objectification and public exercise avoidance and exercise dependence, respectively. These findings identified key mechanisms that predict unhealthy exercise behavior in self-objectified young adults and can inform intervention efforts.

Divergent Exercise Outcomes of Self-Objectification in Young Adults

by
John Richmond Sy

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I understand that my thesis will become part of the permanent collection of Oregon State University libraries. My signature below authorizes release of my thesis to any reader upon request.

John Richmond Sy, Author

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Divergent Exercise-Related Outcomes of Self-Objectification in Young Adults

Fredrickson and Roberts (1997) defined self-objectification as the internalization of repeated sexual evaluation by others which causes an individual to treat their body and body parts as objects; excessively valuing their physical attractiveness at the cost of functionality and competence. According to the authors, women disproportionately experience self-objectification due to the internalization of the "male gaze" – men's sexually objectifying gaze that reduces women's body parts into objects for sexual consumption. Later studies defined self-objectification in a broader sense, not just sexual self-objectification exclusively, and demonstrated that women could internalize idealized body media representations from ads and TV shows (Ward, 2016), magazines and social media, (Fardouly et al., 2018) and video games (Karsay et al., 2018). While the experience of women's self-objectification has been extensively researched, we still do not fully understand self-objectification in men.

Moradi (2010) explained self-objectification differed between women and men because the idealized social standard for women was "thinness" and for men, "muscularity". Therefore, self-objectification in men was proposed to originate from the internalization of Western media's portrayal of idealized muscular male bodies (Cafri et al., 2005, Strelan & Hargreaves, 2005). This was exemplified by Oehlhof and colleagues (2009) who found that men who scored higher in self-objectification desired a more muscular physique. Drive for muscularity – the motivation to gain a socially idealized muscular physique (McCreary & Sasse, 2000) – was proposed as the framework to understand self-objectification in men as it shares the same etiology with self-objectification in women (Parent & Moradi, 2011).

Previous research has demonstrated that young adults are chronically exposed to highly sexualized content in social media which was associated with greater levels of self-

objectification (Barlett et al., 2008; Carrotte et al., 2017; Feltman & Szymanski, 2017; Karsay et al., 2018; Tiggemann & Zaccardo, 2015), making this age group of particular interest in the current study. For example, Aubrey (2006) found that exposure to sexually objectifying imagery in television and magazines at year 1 predicted an increase in trait self-objectification the following year for both young adult men and women. Self-objectification is related to a host of negative outcomes for women, including increased alcohol use (Baildon, et al., 2021), disruption of flow states and higher anxiety (Fredrickson & Roberts, 1997), depressive symptomology (Lamp et al., 2019; Scheel et al., 2020), body shame (Greenleaf, 2005), loneliness, (Teng et al., 2019), poorer body esteem and self-esteem (Strelan & Hargreaves, 2005), decreased self-worth (Noser & Zeigler-Hill, 2014; Woodward et al., 2019), poorer cognitive performance and more restrictive eating (Fredrickson et al., 1998), disordered eating (Prichard & Tiggemann, 2007, Schneider et al., 2016), diminished physical activity (Greenleaf, 2005), infrequent exercise in fitness settings (Melbye et al., 2007), and compulsive exercise (Homan, 2010). In addition, self-objectification is also related to negative outcomes for young adult men, although evidence is more limited. For example, Barlett and colleagues (2008) performed a meta-analysis and found that chronic exposure to muscular imagery in mass media influenced young adult men's overall negative body image, increased body shame, body dissatisfaction, low self-esteem, depression, and excessive exercise. They further proposed that it is through the internalization of the idealized muscular standard from mass media, similar to the mechanism behind self-objectification, that resulted in these negative behavioral outcomes as evidenced in studies by Cafri et al., (2005) and Smolak et al. (2005). In addition, drive for muscularity, the analogous experience of self-objectification in men, was also positively associated with frequent body

comparison, poorer self-esteem, depression (McCreary & Sasse, 2000), exercise dependence and supplement use (Chittester & Hausenblas, 2009), and steroid use (Cafri et al., 2005).

Two physical activity-related outcomes of self-objectification for both men and women were of interest in this study – avoidance of exercise in public settings (e.g., Brewer et al., 2004; Melbye et al., 2007) and excessive exercise behaviors (e.g., Chittester & Hausenblas, 2009; Homan, 2010). How is self-objectification predictive of seemingly opposite outcomes? As exercise has been shown to lead to a wide array of physiological and psychological benefits (Mayo Clinic, 2019), I wanted to understand the underlying mechanisms that predict exercise behaviors in young adults through the lens of self-objectification.

Public Exercise Avoidance

Several studies have demonstrated that women who self-objectify were *less* likely to be physically active (Greenleaf, 2005, Melbye et al., 2007). Individuals who have higher body mass index (BMI) and engage in consistent body monitoring, an outcome of self-objectification (Fredrickson & Roberts, 1997), were likely to be dissatisfied with their body when exposed to aspirational bodies during exercise which may inhibit exercise behavior (Fuller-Tyszkiewicz et al., 2013). This may be particularly true in fitness environments like the gym. Brudzynski and Ebben (2010) surveyed over a thousand undergraduates and found that, while negative body image was one of the primary reasons for people to exercise, exercise *location* was a barrier to engage in physical activity. Participants in their study expressed preference to exercise in private or alone, felt self-conscious, and feared negative evaluation in public exercise settings. The gym setting has been associated with body image concerns for women (Prichard & Tiggemann, 2005) due to idealized imagery surrounding the location, form-fitting clothing worn by other women, and an atmosphere emphasizing leanness (Prichard & Tiggemann, 2008). In addition, exercise

locations with mirrors may elicit self-surveillance, a behavioral consequence of self-objectification (McKinley & Hyde, 1996), and increased physical appearance state anxiety for sedentary women (Martin Ginis et al., 2003). Women anticipating the male gaze were found to express higher levels of body shame and social physique anxiety than those anticipated a female gaze (Calogero, 2004) which may occur more often in the fitness-oriented environments such as the gym. This immersion in an objectifying environment may elicit *social appearance anxiety* – the fear of negative social appearance evaluation – which can deter individuals from exercising in public exercise settings.

According to Roberts and Gettman (2004), female participants experienced greater feelings of appearance anxiety when self-objectification was induced experimentally through subtle exposure to objectifying words, making them self-conscious of their appearance. Hart and colleagues (2008) defined social appearance anxiety as the fear of negative evaluation of one's overall appearance and found that social appearance anxiety was correlated with social anxiety, social physique anxiety, preoccupation with one's appearance and weight, negative body image, and depression but was unrelated to gender. Social physique anxiety, subsumed under social appearance anxiety, was defined as the apprehension of evaluation of one's body size and shape specifically (Hart et al., 1989). Women, in general, experience higher levels of physique anxiety compared to men, which consequently predicted greater self-consciousness in public, more social avoidance and distress, and lower self-esteem (Dion et al., 1990). Exposure to idealized imagery, which is prevalent in fitness centers, also elicited greater appearance anxiety and body shame in women. Moreover, women with higher self-objectification scores experienced greater appearance anxiety compared to those with lower self-objectification scores (Monro & Huon, 2005).

Applied to fitness settings, Finkenberg et al. (1998) reported that young adult women who experience the highest levels of physique anxiety also had the lowest commitment to physical activity. Social physique anxiety was related to exercise avoidance due, in part, to perceptions of physical activity incompetence especially for those who did not regularly go to the gym (Hagger et al., 2011). Melbye and colleagues (2007) found that women with higher levels of self-objectification reported lower exercise adherence or non-exercise and this relationship was mediated by social physique anxiety. The authors added that when women in their study do go to the gym, they opt to exercise at a more hidden location. This in contrast to women with lower self-objectification, who preferred to exercise outdoors and exercised more consistently. Findings by Brunet and Sabiston (2009) echoed these results and added that women experienced higher levels of social physique anxiety and tended to report lower perceived competence towards, motivation for, and engagement in, physical activity than men. Consequently, self-objectified individuals, particularly women, may be more likely to avoid exercising in public places due to appearance anxiety. When they do workout, they tended to exercise privately (Spink, 1992), exercised further from the instructor in group classes, and wore more concealing clothing (Brewer et al., 2004).

There were mixed results for how a fitness-oriented environment impacted men. Lamarche et al. (2018) interviewed young adult men in college and reported that the gym environment represented both comfortable and uncomfortable body-related situations for them. For example, social comparisons in the gym led to both positive (e.g., showing off one's physique) and negative (e.g., comparing oneself to fitter men) experiences. Men in the study reported that expectations of masculinity may inhibit them from talking about body insecurities. They coped with this through avoidance of uncomfortable body-related situations, mirroring women's

avoidance behaviors discussed previously (e.g., Melbye et al., 2007). They also utilized positive self-talk, exercising to change their appearance, and seeking social support to cope. Carron and Prapavessis (1997) also suggested that men and women with high social physique anxiety reported less anxiety when exercising with a friend or group of friends.

Based on these findings, I hypothesize that individuals with high levels of self-objectification may avoid exercising in public fitness settings such as the gym due to fear of negative appearance evaluation. This may be particularly true for women and those with higher BMI who may be more likely to avoid exercising in public than men and individuals with lower BMI.

Exercise Dependence

Hausenblas and Symons-Downs (2002) defined exercise dependence as the "craving for leisure-time physical activity, resulting in uncontrollable excessive exercise behavior that manifests in physiological (e.g., tolerance/withdrawal) and/or psychological (e.g., anxiety/depression) symptoms" (p. 90). This form of pathological exercise behavior may be a consequence of self-objectification through the internalization of unrealistic body ideals which fuels the desire to enhance one's physique to conform to these standards. Strelan and Hargreaves (2005), for example, found that the motivation to exercise to enhance their appearance to fit the social standard was consistent with both men and women who self-objectify. While being motivated by appearance enhancement is not inherently pathological, Prichard and Tiggemann (2008) reported that women who self-objectify also emphasized appearance enhancement motivations, such as losing weight, better body tone, and increasing physical attractiveness as the reasons for their workout, rather than exercising for health and wellbeing. The pursuit of *looking* healthy, however, is different from *being* healthy as the primacy of this appearance-enhancement mindset can lead to deleterious consequences to one's health. Mooney et al. (2017) suggested

that individuals who internalized the unrealistic beauty ideals, a predictor of self-objectification (Skowronski & Krahe, 2022), may be more likely to report use of performance and image enhancing drugs and exercise dependence. Internalized athletic ideal or thin ideal also predicted greater time spent exercising (Prichard & Tiggemann, 2008) and compulsive exercise in women (Bell et al., 2016; Homan, 2010). These findings were similarly found in men. Hallsworth et al. (2005) observed that male bodybuilders reported higher self-objectification and drive for muscularity (i.e., appearance-focused) than male weightlifters, who were dedicated to gaining strength (i.e., function-focused). Drive for muscularity has been associated with lower self-esteem, body dissatisfaction, and depression (Bergeron & Tylka, 2007), compulsive exercise (Brewster et al., 2017), exercise dependence and increased supplement use (Chittester & Hausenblas, 2009), use of performance enhancing substances and greater time spent lifting weights (Litt & Dodge, 2008), particularly for male bodybuilders (Hale et al., 2010).

Exercise dependence was positively associated with addictions (e.g., sex and drug addictions), eating disorders, social isolation, injury, anxiety, depression, and muscle dysmorphia (Lichtenstein et al., 2017). Pope et al. (1997) defined muscle dysmorphia as a mental disorder characterized by an excessive preoccupation with becoming more muscular which causes impairment on different aspects of one's life. Symptoms include excessive exercise and attention to diet, use of anabolic steroids and other performance enhancing drugs despite adverse health consequences, and avoidance of situations where one's body is exposed to others which may cause intense distress and anxiety. In addition, a systematic review by Marques et al. (2019) noted that the prevalence of exercise dependence was higher for young adult university students (ranging from 3% to 7%) compared to the general population and was proposed to be associated with appearance enhancement.

Social comparison may be the mechanism that links self-objectification and exercise dependence. Hanna et al. (2017), for example, reported that self-objectification was associated with social comparison in young adults. Festinger's (1954) social comparison theory proposed that individuals innately engage in social comparison to evaluate themselves against others. Social factors such as media, peer, and parental influence, teasing and peer popularity promoted social body comparison which, in turn, increased body dissatisfaction and culminated with risky health behaviors such as steroid use (Cafri et al., 2005). Therefore, when someone internalized unrealistic social standards for their bodies, they were more likely to engage in upward appearance comparison – comparing their bodies with those who they perceive as meeting those ideals (Fitzsimmons-Craft et al., 2012) – which in turn results in greater drive for muscularity (Karazsia & Crowther, 2009) and potentially excessive exercise behaviors. Social comparison orientation was found to be higher in young adults compared to older adults (Callan et al., 2015) which makes them prone to negative outcomes. For example, men briefly exposed to images of muscular models in contrast to average models increased their body dissatisfaction (Lorenzen et al., 2004). Kelly et al. (2015) proposed that men who perceive themselves as not meeting the muscular ideal were at higher risk for disordered eating and body image dissatisfaction. This may be particularly true for men who consume fitspiration content on social media.

"Fitspiration" or "fitspo", a portmanteau of "fitness" and "inspiration", contained images of lean and muscular people, people in a gym setting, healthy meals, and motivational quotes regarding diet and exercise (Tiggemann & Zaccardo, 2016). Men who view this type of content who internalized the muscular ideal scored higher in appearance comparison which, in turn predicted body dissatisfaction. Further, high appearance comparison was related to and appearance enhancement motives for exercise, rather than health enhancement motivation (Fatt

et al., 2019). Similarly for women, Engeln et al. (2020) noted that the use of image-based social media platform, Instagram, led to higher rates of appearance comparison for women which correlated with a decrease in their body satisfaction. Furthermore, in other studies, social appearance comparison was associated with increased body dissatisfaction (Myers & Crowther, 2009), decreased body confidence, anxiety (Lin & Kulik, 2002), poorer self-esteem mental health, and higher body shame (Hanna et al., 2017), higher body surveillance (McKinley & Hyde, 1996) and disordered eating (Tylka & Sabik, 2010) in women. Further, Fardouly et al. (2017) found that women who engaged in upward social comparison through social media reported higher body dissatisfaction and thoughts of dieting (i.e., restricting food intake) and exercise. Both male and female personal trainers who engaged in frequent body comparisons also had higher drive for muscularity (Diehl & Baghurst, 2016), a predictor of exercise dependence (Chittester & Hausenblas, 2009).

In summary, I hypothesize that upward appearance comparison may be the underlying mechanism that predicts exercise dependence for young adults with high trait self-objectification. Young adults who have internalized the athletic or muscular ideals may resort to excessive exercise behaviors as an attempt to achieve their goal physique.

However, the relationship of the two proposed mediators, social appearance anxiety and upward appearance comparison, on public exercise avoidance and exercise dependence respectively, do not appear clear cut and may present some overlap. Russell (2002) reported that social physique anxiety, which I proposed to decrease exercise activity in public places, was unrelated to gym exercise frequency in male university students. In addition, Frederick and Morrison (1996) proposed that individuals with high social physique anxiety share similar characteristics with those who are dependent on exercise, particularly the preoccupation with

their weight. Martin Ginis et al. (2007), on the other hand, found that women exposed to better physiques experienced an increase their body dissatisfaction through upward comparison, but it did not increase their motivation to exercise. Ingledew and Markland (2008) further stated that individuals driven to exercise for weight or appearance reasons exercised less; in contrast, those who were motivated to exercise for health tended to exercise more. This suggested that while appearance enhancement motivation for exercise which was associated with upward appearance comparison may reduce exercise participation, contrary to the proposed hypothesis. Young adult men and women who endorsed high drive for muscularity, which was highly related to exercise dependence, reported more frequent general, weight-, and muscle-related body comparisons which predicted social physique anxiety (McCreary & Saucier, 2009) suggesting an intertwined relationship between the two mediators of interest. Furthermore, men with muscle dysmorphia expressed higher appearance anxiety *and* social comparison which led to exercise dependence (Pope et al., 1997). Therefore, it is critical to test whether the mediators – social appearance anxiety and upward appearance comparison – uniquely and independently predict their proposed outcomes – public exercise avoidance and exercise dependence, respectively.

The Potential Role of Loneliness

Humans are undeniably social creatures. Social psychologists have long suggested that humans have an intrinsic need to belong and are motivated to affiliate with others (Myers, 2010). Therefore, when our connections are severed or unsatisfied, as in the case of loneliness, we experience social pain – a pain that shares the same neurological pathways with physical pain within our brains (Lieberman, 2013). Pepalu and Perlman (1982) defined loneliness as negative affect due to the discrepancy between one's desired interpersonal connection and their current level of social connectedness. Similarly, de Jong-Gierveld (1987) stated that loneliness stems

from a *subjective* evaluation of the quality of these relationships; therefore, one can feel lonely even when surrounded by people. Heu et al. (2021) validated this cognitive evaluation with cross-cultural consensus that loneliness was caused by unsatisfying social relationships, separation, or the perception of being different from others. This perception of being different from others was emphasized by Tharayil (2012) who stated that a critical component of loneliness was negative self-perceptions. Hawkley and Cacioppo (2010) added that lonely individuals also tend to view their social world more negatively. They further stated that lonely individuals are more vigilant to social threats and have negative social expectations. This in turn makes lonely people avoid others, creating a self-perpetuating self-fulling prophecy. It is unsurprising, therefore that loneliness is significantly related to negative affectivity, fear of social evaluation, poor social skills, low self-esteem, and pessimism (Cacioppo et al., 2006).

Psychological consequences of loneliness, such as negative self-perceptions and fear of social evaluation, run parallel with self-objectification. Individuals who experience body shame may avoid social interactions which, in turn lead to loneliness (Teng et al., 2019). However, Mills et al. (2014) suggested a bidirectional relationship between loneliness and body dissatisfaction, a correlate of body shame and self-objectification (Sun, 2018). While body dissatisfaction led to social avoidance, women who avoided social interactions experienced an increase in body dissatisfaction (Mills et al., 2014). This finding is in line with the increased negative self-perception that lonely individuals experience discussed by Hawkley and Cacioppo (2010). Therefore, it is unsurprising that individuals can experience greater body dissatisfaction as their loneliness increases (Pritchard & Yalch, 2009). Furthermore, Leary (1992) stated that some individuals are motivated to exercise to achieve an idealized physique but may want to avoid exercise in social settings due to their apprehension of being evaluated. Self-objectified

individuals, therefore, may avoid social evaluation by exercising alone or avoid exercise altogether which may increase social isolation and, perhaps, loneliness. Consequently, loneliness may increase negative self-perceptions (i.e., negative body image), which can, in turn, increase their motivation to exercise for appearance enhancement.

According to Dibb and Foster (2021) in their study on Facebook users, loneliness was associated with upward social comparison, not downward social comparison, perhaps in part due to most Facebook posts highlighting successful events or milestones. Yang (2016) found a similar phenomenon in Instagram use such that individuals with higher social comparison orientation did not experience a reduction in loneliness from interaction on the social media platform in contrast to those with lower social comparison orientation. She added that those with higher comparison orientation may feel disconnected with peers and consequently disengage socially.

Most studies on loneliness and physical activity revealed an inverse relationship (Hawkley et al., 2009). A systematic review conducted by Pels and Kienert (2016) showed a negative relationship between loneliness and physical activity in cross-sectional studies. While longitudinal studies were inconclusive as to which preceded the other, the relationship between physical activity and loneliness remained the same. Richard et al. (2017), in a Swiss national survey, found that the negative association between loneliness and physical activity was independent of age in adulthood and proposed that loneliness may reduce motivation to engage in physical activity. High loneliness was also associated with physical inactivity with both young adults in university settings (Diehl et al., 2018, Page & Hammermeister, 1995) and late adolescents (Pinto et al., 2021).

While there are currently limited studies that directly investigated the relationship between loneliness and exercise dependence, we can look to the relationship of loneliness with other compulsive behaviors to provide a possible framework. Lukacs et al. (2019) proposed that some runners may run excessively to achieve positive affect and mitigate loneliness and anxiety. Lonely gay and bisexual men were found to engage in compulsive sexual behavior to self-regulate negative affect (Chaney & Burns-Wortham, 2015) and decrease anxiety (Torres & Gore-Felton, 2007). Savolainen and colleagues (2020) noted that loneliness was related to compulsive internet use for young adults across three countries (USA, Finland, and South Korea) because the internet may provide opportunities for social interaction and alleviate loneliness. It seems one of the common themes in compulsive behavior may be that it is an urge to perform a certain behavior to ease anxiety and stress as defined by Luigjes and colleagues (2019). This was exemplified for men suffering from anorexia nervosa who exercise compulsively to assuage negative affect (Murray et al., 2014). If we view self-objectification as a negative state, individuals who score high in both self-objectification and loneliness may be at higher risk for compulsive exercise as this behavior may satisfy the need to attain an idealized body. Chaney (2008) reported that lonely sexual minority men had higher incidence of muscle dysmorphia, a condition significantly related to self-objectification (Heath et al., 2016). In addition, increased symptoms of muscle dysmorphia concurrently increased feelings of loneliness which may be due to increased time spent exercising in the gym thus negatively impacting their social relationships.

Loneliness may magnify the negative effects of self-objectification such that lonelier individuals would experience greater levels of social appearance anxiety, upward appearance comparison, public exercise avoidance and exercise dependence than less lonely individuals. It is

therefore critical to determine whether loneliness plays a moderating role in the proposed models (Figure 1).

Hypotheses

Gender and BMI were consistent covariates in multiple studies. While both men and women were reported to self-objectify (Hebl et al., 2016), reported outcomes appear to suggest gender patterns. For example, there was more studies on infrequent exercise for women (e.g., Brunet & Sabiston, 2009, Hagger et al., 2011, Melbye et al., 2007) and excessive exercise for men (e.g., Chittester & Hausenblas, 2009, Hale et al., 2010, Lichtenstein et al., 2017). Body mass index (BMI) was also a common covariate used in several studies that measure self-objectification and body dissatisfaction (Hale et al., 2015, Frederick et al., 2007, Fredrickson et al., 1998, Fuller-Tyszkiewicz et al., 2012). While some studies have shown BMI to not be the most accurate predictor for diet, exercise, and use of performance enhancing drugs in men (Cafri et al., 2005) the salience of BMI in most studies warranted inclusion in all planned analyses in the current study.

First, I wanted to understand how exercise-related factors were associated with the variables of interest in the study. Salient variables from the literature review include exercise participation (e.g., Pinto et al., 2021), exercise location (e.g., Melbye et al., 2007), partner (e.g., Carron & Prapavessis, 1997), frequency (e.g., Page & Hammermeister, 1995), duration (e.g., Prichard & Tiggemann, 2008), and motivation (e.g., Strelan & Hargreaves, 2005). Therefore, the hypotheses for this part of the study are as follows:

H1: There will be significant differences on mean self-objectification, loneliness, social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence scores between current exercisers and non-exercisers.

H2: There will be significant differences on mean self-objectification, loneliness, social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence scores among different exercise locations.

H3: There will be significant differences on mean self-objectification, loneliness, social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence scores among different exercise partners.

H4: There will be significant differences on mean self-objectification, loneliness, social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence scores within exercise frequencies.

H5: There will be significant differences on mean self-objectification, loneliness, social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence scores within exercise durations.

H6: There will be significant differences on mean self-objectification, loneliness, social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence scores among primary exercise motivation.

Second, I wanted to test two proposed models in parts to explain the divergent outcomes of self-objectification (Figure 1). The following hypotheses are as follows:

H7: Social appearance anxiety will mediate the relationship between self-objectification and public exercise avoidance.

H8: Upward appearance comparison will mediate the relationship between self-objectification and exercise dependence.

H9: Loneliness will moderate the relationships between self-objectification and social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence.

H10: Testing proposed model 1 by examining the mediating effect of social appearance anxiety on self-objectification and public exercise avoidance with loneliness moderating the effect of self-objectification on social appearance anxiety and public exercise avoidance.

H11: Testing proposed model 2 by examining the mediating effect of upward appearance comparison on self-objectification and exercise dependence with loneliness moderating the effect of self-objectification on upward appearance comparison and exercise dependence.

Method

Participants

Three hundred fifty-five Oregon State University students were recruited using fliers and the School of Psychological Science subject pool sign-up system (SONA) to complete an online survey administered through Qualtrics. Eligible undergraduate participants enrolled in general psychology courses were awarded class credit after completing the study. Participants were screened for comprehension of consent, were between 18-30 years old, and were able to comprehend an English-language survey. Thirty-seven participants failed the screening criteria. Three hundred eighteen participants (72 men, 229 women, 15 trans/gender non-conforming persons, and 2 who preferred to not disclose their gender) were eligible for the study and completed the online survey. Participants' mean age was 19.79 (*SD* = 2.52). Mean age for men was 20.57 (*SD* = 3.13), for women was 19.54 (*SD* = 2.24) and for trans/gender nonconforming persons was 19.13 (*SD* = 2.61). Seventy-five percent of participants identified as White/European American, 10% as Asian, 2% as Black/African American, 0.6% as American

Indian/Alaskan Native, 0.3% as Pacific Islander/Native Hawaiian, 7.5% as belonging to more than 1 race, 3.1% as Other, and 1.3% who preferred not to disclose.

Gender and body mass index (BMI) were covariates in the analyses and informed exclusion of certain participants after data collection. One participant entered a height and weight that was deemed improbable to calculate BMI with (reporting a height of 6 feet and 4 inches and a weight of 50 pounds) and was therefore excluded from analysis. The number of transgender and gender non-conforming participants (n = 15) and participants who did not disclose their gender (n = 2) was too small for reliable analysis in the study and, therefore, were not included from analysis. This limitation will be further addressed in the discussion section. A final total of 300 participants (72 men and 229 women) were included in the study analysis. Please refer to Table 1 for demographic information and mean scores of study measures.

Measures

Demographic Information

Participants were asked to self-report their age, sex assigned at birth, gender identity, sexual orientation, ethnicity, race, height, and weight.

Body mass index (BMI)

BMI was calculated with the standard formula, weight in lbs * 703/height in inches^2 (Center for Disease Control and Prevention, n.d.).

Self-Objectification

Self-objectification, the degree with which someone values their physical appearance over personal thoughts, feelings, and functional ability, was measured with the 14-item Self-Objectification Beliefs and Behaviors Scale (SOBBS, Lindner & Tantleff-Dunn, 2017). The scale was reported to have good construct validity and was reliable for measuring self-

objectification for women ages 18 – 30 (Cronbach's alpha = 0.91, Lindner & Tantleff-Dunn, 2017). Participants were asked to rate their level of agreement with a 5-point response format (1 – *Strongly disagree* to 5 – *Strongly agree*) on statements such as "My body is what gives me value to other people." Total item scores were averaged, with higher scores indicating greater levels of self-objectification, and can range from 1 to 5. Inter-item reliability for SOBBS was robust in this study (Cronbach's α = .89).

Loneliness

Loneliness, the negative affect experienced due to perceived social isolation, was measured with the 20-item UCLA Loneliness Scale version 3 (UCLA-3) developed by Russell (1996). The scale had good construct validity and was reliable in measuring loneliness of young adult undergraduate students (Cronbach's α = 0.92, Russel, 1996). Participants were asked to rate the frequency of experience with a 4-point response format (1 – *Never* to 4 – *Often*) on questions such as "How often do you feel alone?" Higher frequency reflected higher incidence of loneliness on positively worded items. Items worded negatively were reverse scored. Ratings for each item were summed, with higher scores indicating greater experience of loneliness. Total item scores can range from 20 to 80. Inter-item reliability of the UCLA-3 was robust in this study (Cronbach's α = .93).

Social Appearance Anxiety

Social appearance anxiety, the apprehension from perceived negative evaluation of others based on one's appearance, was measured with the 16-item Social Appearance Anxiety Scale (SAAS) developed by Hart et al. (2008). The scale possessed good construct validity and was reliable in measuring social appearance anxiety of young adults (Cronbach's α = 0.94, Hart et al., 2008). Participants were asked to rate if the statement is characteristic of them with a 5-point

response format (1 – *Not at all* to 5 – *Extremely*) on questions such as "I get tense when it is obvious people are looking at me." Ratings for each item were summed, with higher scores indicating greater experience of social appearance anxiety. Total item scores can range from 16 to 80. Inter-item reliability of the SAAS was robust in this study (Cronbach's $\alpha = 0.96$).

Upward Appearance Comparison

Upward appearance comparison, the tendency to compare oneself to others perceived as having a better physical appearance, was measured by a modified 10-item Upward Physical Appearance Comparison Scale (UPACS) by O'Brien et al. (2009). The original scale possessed good construct validity and was reliable in measuring upward appearance comparison of young adult undergraduate students (Cronbach's $\alpha = 0.94$, O'Brien et al., 2009). Participants were asked to rate their level of agreement with a 5-point response format (1 – S*trongly disagree* to 5 – *Strongly agree*) on statements such as "When I see a person with a great body, I tend to wonder how I 'match up' with them." Two new items were added to the scale by using stems of existing questions to capture upward appearance comparison on social media. The new scale now contained 12 items and will be referred to as UPACS-M in the study. Rationale for this addition was due to the increased exposure of young adults to social media personalities with idealized bodies (Barlett et al., 2008, Tiggemann & Zaccardo, 2015, Carrotte et al., 2017). In addition, Fardouly and colleagues (2017) found that women exposed to traditional media did not report an increase on thoughts of dieting and exercise, in contrast to women exposed to social media, which was a robust predictor of likelihood to engage in diet and exercise. The two new items were edited from "I tend to compare my own physical attractiveness to that of magazine models." to "I tend to compare my own physical attractiveness to that of attractive people on social media (e.g., fitness influencers)." and "I find myself thinking about whether my own

appearance compares well with models and movie stars" to "I find myself thinking about whether my own appearance compares well with attractive people on social media (e.g., fitness influencers)." Ratings for each item were summed, with higher scores reflecting greater tendency for upward appearance comparison. Total item scores can range from 12 to 75. Inter-item reliability of the UPACS-M was robust in this study (Cronbach's $\alpha = 0.94$).

Public Exercise Avoidance

Public exercise avoidance, refraining from exercising at the gym and other public settings due to fear of negative social evaluation, was measured by a modified version of the 4-item Gym Avoidance (GA) subscale of the Social Exercise and Anxiety Measure (SEAM) by Levinson et al. (2013). The original GA subscale had good construct validity and was reliable in measuring gym avoidance of young adult undergraduate students (Cronbach's $\alpha = 0.91$, Levinson et al., 2013). For the purposes of this study, four new items were added to the scale to capture behaviors related to the avoidance of exercise in other public settings by using stems from original items. For example, "I don't go to the *gym* because I feel like people are looking at me." was modified to "I don't exercise in *public settings (e.g., running in a crowded park or swimming in public)* because I feel like people are looking at me.". This modified 8-item scale will be referred to as Gym Avoidance – Modified (GA-M) in this study. Participants were asked to rate their level of agreement with the statement on a 7-point response format (1 – *Not like me at all* to 7 – *Completely like me*). Ratings for each item were summed, with higher scores reflecting greater exercise avoidance in public settings. Total item scores can range from 8 to 56. Inter-item reliability for GA-M was robust in this study (Cronbach's $\alpha = 0.94$).

Exercise Dependence

Exercise Dependence, the compulsion to exercise excessively leading to negative impacts one's physical, psychological, and social well-being, was measured by the 8-item Commitment to Exercise Scale (CES) by Davis et al. (1993). The scale had good construct validity and was reliable in measuring compulsive exercise behaviors of adults across various age groups (Cronbach's $\alpha = 0.94$, Davis et al., 1993). The original scale asked participants to mark level of importance and frequency of exercise-related statements on a bipolar scale (i.e., not at all important to very important and never to always). The current study replicated Thome and Espelage's (2007) response format which mirrored an existing exercise dependence scale – the Obligatory Exercise Questionnaire (OEQ) by Thompson and Pasman (1991). Participants were asked to rate level of importance in the first question on a 4-point response format (1 – *Not at all important* to 4 – *Very important*) which stated, "How important do you think it is to your general well-being not to miss your exercise sessions?". The following 7 questions, they were asked to rate frequency of experience on a 5-point response format (1 – *Never* to 5 – *Always*) on statements such as "Do you continue to exercise even when you have sustained an exercise-related injury?". Ratings for each item were summed, with higher scores reflecting greater exercise dependence. Total item scores can range from 8 to 39. Inter-item reliability for CES was good in this study (Cronbach's $\alpha = 0.81$).

Exercise-Related Variables

Exercise-related variables were collected via an author created survey. The first question screened participants with a yes or no question asking whether they voluntarily participated in structured physical activity from January 2019 until the time they answered the survey, between

October to December 2021. Participants were also asked exercise location, partner/s, frequency, duration, and primary exercise motivation. For the full survey, please refer to Appendix A.

Procedure

Recruitment

Participants using recruited from fliers and invitations to participants published in the School of Psychological Science subject pool, managed with the SONA system. In both cases, potential participants were provided a link to the Qualtrics survey which provided anonymous online participation. Flier recruitment to diversify the sample was aided by the Diversity and Cultural Engagement Team in OSU, by emailing respective cultural centers, and distribution across campus bulletin boards.

Screening

On the initial survey page, participants read informed consent information and were asked a comprehension question to determine whether they understood their rights and responsibilities in the study. An incorrect answer redirected them to a non-comprehension prompt and terminated the survey. A correct answer allowed them to proceed to eligibility screening. Participants were asked if they fit within the eligible age range (18-30) and their comfort level in answering an English-language questionnaire. Eligible participants proceeded with the questionnaires, otherwise, an ineligibility prompt appeared and terminated the survey.

Main Survey

Eligible participants filled in their demographic information followed by four scales in randomized order, which included the SOBBS, UCLA-3, SAAS, and UPACS-M. Participants were then asked a screener question regarding their voluntary participation in a structured or semi-structured exercise or physical activity since January 2019 to present. Participants who

responded “no”, filled out the GA-M. Participants who responded “yes” were asked exercise-related questions including exercise location, partner, frequency, duration, and primary exercise motivation and was followed by two scales in randomized order which included the CES and GA-M.

After completing the survey, participants were thanked, shown a debriefing message regarding the aim of the study. Eligible participants were redirected back to SONA to receive 1 unit of class credit.

Analyses

The analysis began with a thorough examination of the raw data and decisions regarding blank or erroneous data points, exclusion of certain participants, and collapsing of non-representative categories.

Several categorical variables in the study were collapsed to prevent low response categories from influencing the results. For exercise location categories, there were 4 participants who chose “Other” and wrote multiple locations for their responses (e.g., gym and outdoors) and were considered missing data. In addition, the 9 “Studio” responses were collapsed to the “Gym” category due to limited responses. This decision was made because “studio” overlapped with the most qualities to the gym (i.e., indoor exercise location with other individuals) in contrast to “Outdoors” and “Home”. For exercise frequency categories, one participant reported exercising “Less than once a month” and was reassigned to the subsequent category of “Few times a month” and the new category was renamed “Few times a month or less” in the results. For exercise duration categories, one participant reported exercising for “Less than 15 minutes” and was reassigned to the next category of “15 to 30 minutes” and the new category was renamed “30 minutes or less”. Finally, 14 participants reported “Other” for their primary exercise

motivation. Five participants who wrote in their answer had responses that fit into existing categories. For more information regarding their reassignment, please refer to Table 2. Nine participants wrote “All of the above” or similar statements and their responses were considered missing data.

Analyses for the study were conducted in IBM SPSS version 27. Participant demographic information and mean scores for measures were presented in Table 1. Correlations between variables were presented in Table 3. Significant group differences for hypotheses 1 to 6 were tested with ANCOVA, controlling for BMI and gender. Pairwise comparisons were assessed using a least significance test (LSD). Hypotheses 7 and 8 were tested using Model 4 (mediation) and hypothesis 9 was tested using Model 1 (moderation). Continuous variables were mean centered and conditioning values (i.e., loneliness scores) were expressed in -1 *SD*, mean and +1 *SD*. The two proposed moderated mediation models were tested using Model 8 of the PROCESS macro version 3.5 (Hayes, 2018). Forward selection regression was conducted to determine strongest predictors of dependent variables – public exercise avoidance and exercise dependence – and test robustness of mediators while accounting for theoretically significant co-variates. Variance inflation factors (VIF) in the regressions were all less than 3 which suggested lack of multicollinearity.

Results

Exercise Participation

Self-Objectification Between Non-Current vs. Current Exercisers

A one-way ANCOVA demonstrated a significant difference in mean self-objectification scores between participants who reported that they were not currently exercising and those who were currently exercising, $F(1, 296) = 7.11$, $p = .008$, with gender and BMI as covariates. Both

gender, $F(1, 296) = .04$, $p = .84$, and BMI, $F(1, 296) = 1.03$, $p = .31$, were non-significant in the model. Results indicated that participants who were not currently exercising ($M_{adj} = 3.10$) had significantly higher mean self-objectification than participants who are currently exercising ($M_{adj} = 2.85$). Please refer to Table 4 for full ANCOVA results and descriptive statistics.

Loneliness Between Non-Current vs. Current Exercisers

A one-way ANCOVA demonstrated a significant difference in mean loneliness scores between participants who reported that they were not currently exercising and those who were currently exercising, $F(1, 296) = 22.44$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 296) = 2.17$, $p = .14$ and BMI, $F(1, 296) = 2.03$, $p = .15$, were non-significant in the model. Results indicated that participants who were not currently exercising ($M_{adj} = 51.25$) had significantly higher mean loneliness than participants who are currently exercising ($M_{adj} = 44.42$). Please refer to Table 5 for full ANCOVA results and descriptive statistics.

Social Appearance Anxiety Between Non-Current vs. Current Exercisers

A one-way ANCOVA demonstrated a significant difference in mean social appearance anxiety scores between participants who reported that they were not currently exercising and those who were currently exercising, $F(1, 296) = 17.17$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 290) = 8.89$, $p = .003$, and BMI $F(1, 290) = 19.94$, $p < .001$ were significant in the model with women and those with higher BMI reporting greater social appearance anxiety. Results indicated that participants who were not currently exercising ($M_{adj} = 51.67$) had significantly higher mean social appearance anxiety than participants who are currently exercising ($M_{adj} = 43.22$). Please refer to Table 6 for full ANCOVA results and descriptive statistics.

Upward Appearance Comparison Between Non-Current vs. Current Exercisers

A one-way ANCOVA demonstrated a non-significant difference in mean upward appearance comparison scores between participants who reported that they were not currently exercising and those who were currently exercising, $F(1, 296) = .55$, $p = .46$. with gender and BMI as covariates. Results indicated that mean upward appearance comparison scores between participants who were not currently exercising ($M_{adj} = 45.29$) and participants who are currently exercising ($M_{adj} = 44.28$) were not statistically significant. Please refer to Table 7 for full ANCOVA results and descriptive statistics.

Public Exercise Avoidance Between Non-Current vs. Current Exercisers

A one-way ANCOVA demonstrated a significant difference in mean public exercise avoidance scores between participants who reported that they were not currently exercising and those who were currently exercising, $F(1, 296) = 30.81$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 296) = 26.93$, $p < .001$, and BMI, $F(1, 296) = 10.25$, $p = .002$, were significant in the model with women and those with higher BMI reporting greater public exercise avoidance. Results indicated that participants who were not currently exercising ($M_{adj} = 38.96$) had significantly higher mean public exercise avoidance than participants who are currently exercising ($M_{adj} = 29.47$). Please refer to Table 8 for full ANCOVA results and descriptive statistics.

Exercise Dependence Between Non-Current vs. Current Exercisers

A one-way ANCOVA demonstrated a significant difference in mean exercise dependence scores between participants who reported that they were not currently exercising and those who were currently exercising, $F(1, 270) = 10.47$, $p = .001$ with gender and BMI as covariates. Gender, $F(1, 270) = 7.80$, $p = .006$, was significant in the model with men reporting greater

exercise dependence compared to women, while BMI, $F(1, 270) = .95$, $p = .33$, was not. Results indicated that participants who were currently exercising ($M_{adj} = 16.96$) had significantly higher mean exercise dependence than participants who are not currently exercising ($M_{adj} = 14.64$). Please refer to Table 9 for full ANCOVA results and descriptive statistics.

To summarize results for hypothesis 1, there were significant differences between current and non-current exercisers in self-objectification, loneliness, social appearance anxiety, public exercise avoidance and exercise dependence but not in upward appearance comparison, after controlling for gender and BMI.

Exercise Location

Self-Objectification Between Exercise Locations

A one-way ANCOVA demonstrated a significant difference in mean self-objectification scores between participant exercise locations, $F(3, 290) = 3.04$, $p = .03$, with gender and BMI as covariates. Both gender, $F(1, 290) = .16$, $p = .69$, and BMI, $F(1, 290) = 1.25$, $p = .27$, were non-significant in the model. Please refer to Table 10 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing least significant difference (LSD) suggested that participants who were not currently exercising ($M_{adj} = 3.10$) had significantly higher mean self-objectification than those who were exercising at the gym ($M_{adj} = 2.89$), in the outdoors ($M_{adj} = 2.85$), and at home ($M_{adj} = 2.68$). Please refer to Table 11 for pairwise comparisons.

Loneliness Between Exercise Locations

A one-way ANCOVA demonstrated a significant difference in mean loneliness scores between participant exercise locations, $F(3, 290) = 7.34$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 290) = 1.85$, $p = .17$ and BMI, $F(1, 290) = 2.04$, $p = .16$, were non-significant in the model. Please refer to Table 12 for full ANCOVA results and descriptive

statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently exercising (M_{adj} = 51.22) had significantly higher mean loneliness than those who were exercising at the gym (M_{adj} = 44.65), in the outdoors (M_{adj} = 44.26), and at home (M_{adj} = 43.68). Please refer to Table 13 for pairwise comparisons.

Social Appearance Anxiety Between Exercise Locations

A one-way ANCOVA demonstrated a significant difference in mean social appearance anxiety scores between participant exercise locations, $F(3, 290) = 5.66$, $p = .001$, with gender and BMI as covariates. Both gender, $F(1, 290) = 9.31$, $p = .002$, and BMI, $F(1, 290) = 19.89$, $p < .001$, were significant variables in the model with women and those with higher BMI reporting greater social appearance anxiety. Please refer to Table 14 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently exercising (M_{adj} = 51.60) had significantly higher mean social appearance anxiety than those who were exercising at the gym (M_{adj} = 43.70), in the outdoors (M_{adj} = 42.64), and at home (M_{adj} = 42.64). Please refer to Table 15 for pairwise comparisons.

Upward Appearance Comparison Between Exercise Locations

A one-way ANCOVA demonstrated a significant difference in mean upward appearance comparison scores between participant exercise locations, $F(3, 290) = 3.23$, $p = .02$, with gender and BMI as covariates. Gender, $F(1, 290) = 38.45$, $p < .001$, was a significant in the model with women reporting greater upward appearance comparison compared to men, while BMI, $F(1, 290) = .29$, $p = .59$ was not. Please refer to Table 16 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were exercising at home (M_{adj} = 39.52) had significantly lower mean upward appearance comparison than those

who were not exercising (M_{adj} = 45.24), exercising at the gym (M_{adj} = 45.32) and in the outdoors (M_{adj} = 44.64). Please refer to Table 17 for pairwise comparisons.

Public Exercise Avoidance Between Exercise Locations

A one-way ANCOVA demonstrated a significant difference in mean public exercise avoidance scores between participant exercise locations, $F(3, 290) = 13.14$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 290) = 26.53$, $p < .001$, and BMI, $F(1, 290) = 9.14$, $p = .003$, were significant in the model with women and those with higher BMI reporting greater public exercise avoidance. Please refer to Table 18 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently exercising (M_{adj} = 39.00) had significantly higher mean public exercise avoidance than those who were exercising at the gym (M_{adj} = 27.57), in the outdoors (M_{adj} = 32.25), and at home (M_{adj} = 33.15). Participants who are exercising at the gym had significantly lower mean lower public exercise avoidance compared to those who were not currently exercising, exercising outdoors, or exercising at home. Please refer to Table 19 for pairwise comparisons.

Exercise Dependence Between Exercise Locations

A one-way ANCOVA demonstrated a significant difference in mean exercise dependence scores between participant exercise locations, $F(3, 264) = 5.81$, $p = .001$, with gender and BMI as covariates. Gender, $F(1, 264) = 6.25$, $p = .01$ was significant in the model with men reporting greater exercise dependence compared to women, while BMI, $F(1, 264) = .68$, $p = .41$, was not. Please refer to Table 20 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who exercised at the gym (M_{adj} = 17.51) had significantly higher mean exercise dependence than those who were not exercising (M_{adj} =

14.60) and those exercising outdoors (M_{adj} = 15.88). Please refer to Table 21 for pairwise comparisons.

To summarize, results for hypothesis 2 indicated that there were significant differences between exercise locations in self-objectification, loneliness, social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence. Post-hoc analysis revealed that non-exercisers tended to experience greater self-objectification, loneliness, and social appearance anxiety than current exercisers regardless of location. Participants exercising at home had the least upward appearance comparison compared to other categories. Participants who were not currently exercising had the highest levels of public exercise avoidance while those who exercised in the gym reported the least avoidance. Finally, participants who exercised in the gym reported higher levels of exercise dependence compared to those who were not currently exercising and those who exercised outdoors.

Exercise Partners

Self-Objectification Between Exercise Partners

A one-way ANCOVA demonstrated a significant difference in mean self-objectification scores between participant exercise partners, $F(4, 293) = 5.04$, $p = .001$, with gender and BMI as covariates. Both gender, $F(1, 293) = .27$, $p = .60$, and BMI, $F(1, 293) = 1.16$, $p = .28$, were non-significant in the model. Please refer to Table 22 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently exercising (M_{adj} = 3.10) had significantly higher mean self-objectification than those exercising with a significant other (M_{adj} = 2.30), with friend/s, (M_{adj} = 2.79), and with a group (M_{adj} = 2.68). Participants who were exercising with a significant other had lower mean self-objectification

than those exercising by themselves (M_{adj} = 2.95) and with friend/s. Please refer to Table 23 for pairwise comparisons.

Loneliness Between Exercise Partners

A one-way ANCOVA demonstrated a significant difference in mean loneliness scores between participant exercise partners, $F(4, 293) = 6.96$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 293) = 1.82$, $p = .18$, and BMI, $F(1, 293) = 2.36$, $p = .13$, were non-significant in the model. Please refer to Table 24 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently exercising (M_{adj} = 51.21) had significantly higher mean loneliness than those exercising by themselves (M_{adj} = 45.65) with a significant other (M_{adj} = 41.04), with friend/s, (M_{adj} = 42.66), and with a group (M_{adj} = 43.07). Please refer to Table 25 for pairwise comparisons.

Social Appearance Anxiety Between Exercise Partners

A one-way ANCOVA demonstrated a significant difference in mean social appearance anxiety scores between participant exercise partners, $F(4, 293) = 5.18$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 293) = 9.54$, $p = .002$, and BMI, $F(1, 293) = 20.63$, $p < .001$, were significant in the model with women and those with higher BMI reporting greater social appearance anxiety. Please refer to Table 26 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently exercising (M_{adj} = 51.61) had significantly higher mean social appearance anxiety than those exercising by themselves (M_{adj} = 44.63), with a significant other (M_{adj} = 39.11), with friend/s, (M_{adj} = 41.76), and with a group (M_{adj} = 40.58). Please refer to Table 27 for pairwise comparisons.

Upward Appearance Comparison Between Exercise Partners

A one-way ANCOVA demonstrated a non-significant difference in mean upward appearance comparison scores between participant exercise partners, $F(4, 293) = .40$, $p = .81$, with gender and BMI as covariates. Please refer to Table 28 for full ANCOVA results and descriptive statistics and Table 27 for pairwise comparisons.

Public Exercise Avoidance Between Exercise Partners

A one-way ANCOVA demonstrated a significant difference in mean public exercise avoidance scores between participant exercise partners, $F(4, 293) = 8.36$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 293) = 26.32$, $p < .001$, and BMI, $F(1, 293) = 10.34$, $p = .001$, were significant in the model with women and those with higher BMI reporting greater public exercise avoidance. Please refer to Table 30 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently exercising ($M_{adj} = 38.95$) had significantly higher mean public exercise avoidance than those exercising by themselves ($M_{adj} = 28.95$), with friend/s, ($M_{adj} = 31.11$), and with a group ($M_{adj} = 27.22$). Please refer to Table 31 for pairwise comparisons.

Exercise Dependence Between Exercise Partners

A one-way ANCOVA demonstrated a significant difference in mean exercise dependence scores between participant exercise partners, $F(4, 267) = 4.05$, $p = .003$, with gender and BMI as covariates. Gender, $F(1, 267) = 8.35$, $p = .004$, was significant in the model with men reporting greater exercise dependence compared to women, but BMI, $F(1, 267) = 1.09$, $p = .30$ was not. Please refer to Table 32 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently exercising ($M_{adj} = 14.65$) had

significantly lower mean exercise dependence than those exercising by themselves (M_{adj} = 17.01) and with a group (M_{adj} = 18.63). Please refer to Table 33 for pairwise comparisons.

To summarize, results for hypothesis 3 indicated that there were significant differences between exercise partners in self-objectification, loneliness, social appearance anxiety, public exercise avoidance, and exercise dependence but not in upward appearance comparison. Post-hoc analysis revealed that participants who are not currently exercising tended to have significantly higher levels of loneliness, social appearance anxiety, and public exercise avoidance compared to those who exercised regardless of exercise partner/s. Participants who were not exercising had higher self-objectification compared to those who exercised with others. Those with a significant other tended to have lower levels of self-objectification. Participants who exercised with groups had higher levels of exercise dependence (vs. not currently exercising and friends) followed by those who exercised alone (vs. not currently exercising).

Exercise Frequencies

Self-Objectification Between Exercise Frequencies

A one-way ANCOVA demonstrated a non-significant difference in mean self-objectification scores between participant exercise frequencies, $F(4, 293) = 2.32$, $p = .06$, with gender and BMI as covariates. Both gender, $F(1, 293) = .04$, $p = .84$, and BMI, $F(1, 293) = 1.10$, $p = .30$, were non-significant in the model. Please refer to Table 34 for full ANCOVA results and descriptive statistics. Exercise frequency was trending towards significance in the model. A post-hoc analysis utilizing LSD suggested that participants who were not currently exercising (M_{adj} = 3.10) had significantly higher mean self-objectification than those exercising a few times a month or less (M_{adj} = 2.74), 1 – 2 times a week (M_{adj} = 2.87), 3 – 5 times a week (M_{adj} = 2.84)

but had comparative scores to those exercising 6 – 7 times a week (M_{adj} = 3.01). Please refer to Table 35 for pairwise comparisons.

Loneliness Between Exercise Frequencies

A one-way ANCOVA demonstrated a significant difference in mean loneliness scores between participant exercise frequencies, $F(4, 293) = 6.47$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 293) = 2.39$, $p = .12$, and BMI, $F(1, 293) = 1.77$, $p = .19$, were non-significant in the model. Please refer to Table 36 for full ANCOVA results and descriptive statistics. Post-hoc analyses utilizing LSD suggested that participants who were not currently exercising (M_{adj} = 51.28) had significantly higher mean loneliness than those exercising a few times a month or less (M_{adj} = 45.59), 1 – 2 times a week (M_{adj} = 45.13), 3 – 5 times a week (M_{adj} = 44.03), and 6 – 7 times a week (M_{adj} = 40.83). Please refer to Table 37 for pairwise comparisons.

Social Appearance Anxiety Between Exercise Frequencies

A one-way ANCOVA demonstrated a significant difference in mean social appearance anxiety scores between participant exercise frequencies, $F(4, 293) = 4.43$, $p = .002$, with gender and BMI as covariates. Both gender, $F(1, 293) = 8.47$, $p = .004$, and BMI, $F(1, 293) = 19.29$, $p < .001$, were significant in the model with women and those with higher BMI reporting greater social appearance anxiety. Please refer to Table 38 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently exercising (M_{adj} = 51.69) had significantly higher mean loneliness than those exercising a few times a month or less (M_{adj} = 43.61), 1 – 2 times a week (M_{adj} = 43.89), 3 – 5 times a week (M_{adj} = 42.95), and 6 – 7 times a week (M_{adj} = 40.93). Please refer to Table 39 for pairwise comparisons.

Upward Appearance Comparison Between Exercise Frequencies

A one-way ANCOVA demonstrated a non-significant difference in mean upward appearance comparison scores between participant exercise frequencies, $F(4, 293) = 1.14$, $p = .34$, with gender and BMI as covariates. Please refer to Table 40 for full ANCOVA results and descriptive statistics and Table 41 for pairwise comparisons.

Public Exercise Avoidance Between Exercise Frequencies

A one-way ANCOVA demonstrated a significant difference in mean public exercise avoidance scores between participant exercise frequencies, $F(4, 293) = 11.27$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 293) = 23.91$, $p < .001$, and BMI, $F(1, 293) = 9.63$, $p = .002$, were significant in the model with women and those with higher BMI reporting greater public exercise avoidance. Please refer to Table 42 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently exercising ($M_{adj} = 39.04$) had significantly higher mean public exercise avoidance than those exercising a few times a month or less ($M_{adj} = 31.67$), 1 – 2 times a week ($M_{adj} = 32.50$), 3 – 5 times a week ($M_{adj} = 26.70$), and 6 – 7 times a week ($M_{adj} = 25.21$). Participants who exercise a few times a month or less had higher mean public exercise avoidance than those who exercise 3 – 5 times a week. Those who exercise 1 – 2 times a week had higher public exercise avoidance than those who exercise 3 – 5 times and 6 – 7 times a week. Please refer to Table 43 for pairwise comparisons.

Exercise Dependence Between Exercise Frequencies

A one-way ANCOVA demonstrated a significant difference in mean exercise dependence scores between participant exercise frequencies, $F(4, 267) = 21.67$, $p < .001$, with gender and BMI as covariates. Gender, $F(1, 267) = 7.31$, $p = .007$, was significant in the model with men

reporting greater exercise dependence but BMI, $F(1, 267) = .43$, $p = .51$ was not. Please refer to Table 44 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested participants who were exercising 6 – 7 times a week ($M_{adj} = 22.96$) had significantly higher mean exercise dependence than those not currently exercising ($M_{adj} = 14.56$), exercising a few times a month or less ($M_{adj} = 14.56$), 1 – 2 times ($M_{adj} = 15.95$), and 3 – 5 times ($M_{adj} = 17.65$). Participants exercising 3 – 5 times a week had higher mean exercise dependence than those not currently exercising, exercising a few times a month or less, and 1 – 2 times a week. Please refer to Table 45 for pairwise comparisons.

To summarize, results for hypothesis 4 indicated that there were significant differences between exercise frequencies in loneliness, social appearance anxiety, public exercise avoidance, and exercise dependence but not in self-objectification and upward appearance comparison. Post-hoc analysis revealed that participants who were not currently exercising had higher levels of loneliness, social appearance anxiety, and public exercise avoidance compared to those exercising regardless of frequency. In addition, those who exercised a few times a month or less (vs. 3 – 5 times a week) or 1 – 2 times a week (vs. 3 – 5 times and 6 – 7 times a week) had significantly higher avoidance compared to those who exercised more frequently. Participants who reported the greatest frequencies (3 – 5 times a week and 6 – 7 times a week) also tended to report greater levels of exercise dependence compared to lower frequencies. While self-objectification was not significant in the model, it was noteworthy to point out that those who were not currently exercising had significantly higher levels of self-objectification except against those exercising 6 – 7 times a week.

Exercise Duration

Self-Objectification Between Exercise Duration

A one-way ANCOVA demonstrated a non-significant difference in mean self-objectification scores between participant exercise duration, $F(4, 293) = 2.06$, $p = .09$, with gender and BMI as covariates. Both gender, $F(1, 293) = .03$, $p = .87$, and BMI, $F(1, 293) = 1.09$, $p = .30$, were non-significant in the model. Please refer to Table 46 for full ANCOVA results and descriptive statistics and Table 47 for pairwise comparisons.

Loneliness Between Exercise Duration

A one-way ANCOVA demonstrated a significant difference in mean loneliness scores between participant exercise duration, $F(4, 293) = 5.86$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 293) = 2.20$, $p = .14$, and BMI, $F(1, 293) = 2.07$, $p = .15$, were non-significant in the model. Please refer to Table 48 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently exercising ($M_{adj} = 51.25$) had significantly higher mean loneliness than those exercising less than 30 minutes ($M_{adj} = 42.99$), 30 mins – 1 hour ($M_{adj} = 45.15$), 1 hour – 1.5 hours ($M_{adj} = 43.94$), and over 1.5 hours ($M_{adj} = 44.36$). Please refer to Table 49 for pairwise comparisons.

Social Appearance Anxiety Between Exercise Duration

A one-way ANCOVA demonstrated a significant difference in mean social appearance anxiety scores between participant exercise duration, $F(4, 293) = 4.44$, $p = .002$, with gender and BMI as covariates. Both gender, $F(1, 293) = 8.54$, $p = .004$, and BMI, $F(1, 293) = 19.85$, $p < .001$, were significant in the model with women and those with higher BMI reporting greater social appearance anxiety. Please refer to Table 50 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently

exercising (M_{adj} = 51.66) had significantly higher mean social appearance anxiety than those exercising less than 30 minutes (M_{adj} = 42.84), 30 mins – 1 hour (M_{adj} = 43.81), 1 hour – 1.5 hours (M_{adj} = 43.27), and over 1.5 hours (M_{adj} = 41.05). Please refer to Table 49 for pairwise comparisons.

Upward Appearance Comparison Between Exercise Duration

A one-way ANCOVA demonstrated a non-significant difference in mean upward appearance comparison scores between participant exercise duration, $F(4, 293) = .43$, $p = .79$, with gender and BMI as covariates. Please refer to Table 40 for full ANCOVA results and descriptive statistics and Table 53 for pairwise comparisons.

Public Exercise Avoidance Between Exercise Duration

A one-way ANCOVA demonstrated a significant difference in mean public exercise avoidance scores between participant exercise duration, $F(4, 293) = 9.07$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 293) = 23.46$, $p < .001$, and BMI, $F(1, 293) = 8.91$, $p = .003$, were significant in the model with women and those with higher BMI reporting greater public exercise avoidance. Please refer to Table 54 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested that participants who were not currently exercising (M_{adj} = 39.06) had significantly higher mean public exercise avoidance than those exercising less than 30 minutes (M_{adj} = 33.29), 30 mins – 1 hour (M_{adj} = 30.31), 1 hour – 1.5 hours (M_{adj} = 27.35), and over 1.5 hours (M_{adj} = 28.37). Participants who exercise less than 30 minutes had higher public exercise avoidance than those who exercise between 1 hour to 1.5 hours. Please refer to Table 55 for pairwise comparisons.

Exercise Dependence Between Exercise Duration

A one-way ANCOVA demonstrated a significant difference in mean exercise dependence scores between participant exercise duration, $F(4, 267) = 8.78$, $p < .001$, with gender and BMI as covariates. Gender, $F(1, 267) = 5.93$, $p = .02$, was significant in the model with men reporting greater exercise dependence compared to women, but BMI, $F(1, 267) = .83$, $p = .36$ was not. Please refer to Table 56 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested participants who exercise for over 1.5 hours ($M_{adj} = 20.04$) had significantly higher mean exercise dependence than those not currently exercising ($M_{adj} = 14.60$), exercising for less than 30 minutes ($M_{adj} = 15.93$), 30 minutes – 1 hour ($M_{adj} = 15.93$) and 1 hour – 1.5 hours ($M_{adj} = 17.68$). Participants exercising 1 hour to 1.5 hours had higher mean exercise dependence than those not currently exercising, exercising for less than 30 minutes, and 30 mins to 1 hour. Please refer to Table 57 for pairwise comparisons.

To summarize, results for hypothesis 5 indicated that there were significant differences between exercise durations in loneliness, social appearance anxiety, public exercise avoidance, and exercise dependence but not in self-objectification and upward appearance comparison. Post-hoc analysis revealed that participants who were not currently exercising reported higher levels of loneliness, social appearance anxiety, and public exercise avoidance compared to those who reported any amount of exercise duration. In addition, participants who exercised for less than 30 mins reported greater public exercise avoidance but significantly against those exercising between 1 – 1.5 hours. Participants who reported the highest levels of exercise duration (1 – 1.5 hours and over 1.5 hours) tended to report the greatest exercise dependence compared to lower durations.

Exercise Motivation

Self-Objectification Between Exercise Motivation

A one-way ANCOVA demonstrated a significant difference in mean self-objectification scores between participant exercise motivation, $F(4, 284) = 13.30$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 284) = .00$, $p = .99$, and BMI, $F(1, 284) = 1.21$, $p = .27$, were non-significant in the model. Please refer to Table 58 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested participants who were not currently exercising had significantly higher mean self-objectification ($M_{adj} = 3.25$) than those exercising for psychological ($M_{adj} = 2.66$) and physical ($M_{adj} = 2.63$) enhancement. Participants who were motivated to enhance their appearance ($M_{adj} = 3.22$) had higher self-objectification scores than those exercising for psychological, physical, and skill ($M_{adj} = 2.94$) enhancement. Those who were motivated by skill enhancement had higher mean self-objectification than those exercising for physical enhancement. Please refer to Table 59 for pairwise comparisons.

Loneliness Between Exercise Motivation

A one-way ANCOVA demonstrated a significant difference in mean loneliness scores between participant exercise motivation, $F(4, 284) = 2.82$, $p = .03$, with gender and BMI as covariates. Body mass index (BMI), $F(1, 284) = 5.39$, $p = .02$, was significant in the model with participants with higher BMI reporting greater loneliness but gender, $F(1, 284) = .31$, $p = 58$, was not. Please refer to Table 60 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested participants who were not currently exercising had significantly higher mean loneliness ($M_{adj} = 50.90$) than those exercising for psychological ($M_{adj} = 43.38$) and physical ($M_{adj} = 44.77$) enhancement. Please refer to Table 60 for pairwise comparisons.

Social Appearance Anxiety Between Exercise Motivation

A one-way ANCOVA demonstrated a significant difference in mean social appearance anxiety scores between participant exercise motivation, $F(4, 284) = 5.80$, $p < .001$, with gender and BMI as covariates. Both gender, $F(1, 284) = .8.55$, $p = .004$, and BMI, $F(1, 284) = 25.06$, $p < .001$, were significant in the model with women and those with higher BMI reporting greater social appearance anxiety. Please refer to Table 62 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested participants who were not currently exercising had significantly higher mean social appearance anxiety ($M_{adj} = 54.28$) than those exercising for psychological ($M_{adj} = 42.13$), physical ($M_{adj} = 41.31$), and skill ($M_{adj} = 45.93$) enhancement. Participants who were motivated by appearance enhancement ($M_{adj} = 48.46$) had significantly higher mean social appearance anxiety than those motivated by psychological and physical enhancement. Please refer to Table 60 for pairwise comparisons.

Upward Appearance Comparison Between Exercise Motivation

A one-way ANCOVA demonstrated a significant difference in mean upward appearance comparison scores between participant exercise motivation, $F(4, 284) = 8.80$, $p < .001$, with gender and BMI as covariates. Gender, $F(1, 284) = 30.32$, $p < .001$, was significant in the model with women reporting greater upward appearance comparison but BMI, $F(1, 284) = .01$, $p = .91$, was not. Please refer to Table 64 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested participants who were not currently exercising had significantly higher mean upward appearance comparison ($M_{adj} = 45.32$) than those exercising for physical ($M_{adj} = 41.01$) enhancement. Participants who were motivated by appearance enhancement ($M_{adj} = 48.97$) had significantly higher mean upward appearance comparison than those motivated by

psychological (M_{adj} = 43.26), physical, and skill (M_{adj} = 43.31) enhancement. Please refer to Table 65 for pairwise comparisons.

Public Exercise Avoidance Between Exercise Motivation

A one-way ANCOVA demonstrated a significant difference in mean public exercise avoidance scores between participant exercise motivation, $F(4, 284) = 2.88$, $p = .02$, with gender and BMI as covariates. Both gender, $F(1, 284) = 27.93$, $p < .001$ and BMI, $F(1, 284) = 14.70$, $p < .001$, were significant in the model with women and those with higher BMI reporting greater public exercise avoidance. Please refer to Table 66 for full ANCOVA results and descriptive statistics. Post-hoc analysis utilizing LSD suggested participants who were exercising for physical enhancement had significantly lower mean public exercise avoidance (M_{adj} = 29.18) than those not currently exercising (M_{adj} = 35.78) and exercising for appearance (M_{adj} = 34.47) enhancement. Please refer to Table 67 for pairwise comparisons.

Exercise Dependence Between Exercise Motivation

A one-way ANCOVA demonstrated a non-significant difference in mean exercise dependence scores between participant exercise motivation, $F(4, 258) = 1.05$, $p = .37$, with gender and BMI as covariates. Please refer to Table 68 for full ANCOVA results and descriptive statistics and Table 69 for pairwise comparisons.

To summarize, results for hypothesis 6 indicated that there were significant differences between exercise motivations in self-objectification, loneliness, social appearance anxiety, upward appearance comparison, and public exercise avoidance but not in exercise dependence. Post-hoc analysis revealed that participants who were not currently exercising had higher self-objectification and loneliness scores against other motivations except appearance and skill enhancement motivations. Those with appearance enhancement motivation had significantly

higher levels of self-objectification against other exercise motivations. Participants who were not currently exercising had higher social appearance anxiety against all other motivations except appearance enhancement. Those with appearance enhancement motivation had significantly higher social appearance anxiety than those who are exercising for physical and psychological enhancement. Participants who exercise for appearance enhancement also reported higher levels of upward appearance comparison compared to other motivations. Those not currently exercising had higher upward appearance comparison against those who were exercising for physical enhancement. Participants who reported physical enhancement motivation for exercise had the lowest public exercise avoidance compared to those not currently exercising and those with appearance enhancement motivations.

The Mediating Effect of Social Appearance Anxiety on Self-Objectification and Public Exercise Avoidance (Figure 2)

Model 4 PROCESS macro version 3.5 (Hayes, 2018) in SPSS was utilized to test whether social appearance anxiety mediated the relationship between self-objectification and public exercise avoidance. Mediation analysis was conducted with 10,000 bootstrapped samples and 95% bias-corrected and accelerated confidence intervals (Preacher & Hayes, 2004) with gender and BMI as covariates. Regression analyses (Table 70) controlling for gender and BMI indicated that self-objectification was a significant predictor of public exercise avoidance (Model 1, b = 6.28, SE = 1.01, $p < .001$) and social appearance anxiety (Model 2, b = 13.65, SE = .97, $p < .001$). Both gender (Model 1, b = 9.46, SE = 1.65, $p < .001$, Model 2, b = 6.26, SE = 1.58, $p < .001$) and BMI (Model 1, b = .55, SE = .14, $p < .001$, Model 2, b = .75, SE = .14, $p < .001$) were significant covariates in both models. However, self-objectification was no longer a significant predictor of public exercise avoidance (Model 3, b = .99, SE = 1.21, p = .42) when

controlling for social appearance anxiety (b = .39, SE = .06, p < 001). Gender remained a significant covariate (b = 7.04, SE = 1.57, p < .001), but BMI did not (b = .26, SE = .14, p = .06). Approximately 35% of the variance in public exercise avoidance was accounted for in Model 3. The total effect of self-objectification on public exercise avoidance was significant (TE = 6.28, SE = 1.01, p <.001, 95% CI [4.29, 8.27]) but the direct effect was not (DE = .99, SE = 1.21, p = .42, 95% CI [-.40, 3.37]). The indirect effect of social appearance anxiety was significant (IE = 5.29, SE = .86, 95% CI [3.63, 7.01], completely standardized IE = .27, SE = .04, 95% CI [.18, .35]) indicating full mediation. These results supported the hypothesis and suggested that social appearance anxiety was the mechanism that explained the relationship between self-objectification and public exercise avoidance in the sample.

The Mediating Effect of Upward Appearance Comparison on Self-Objectification and Exercise Dependence (Figure 3)

Model 4 PROCESS macro version 3.5 (Hayes, 2018) in SPSS was utilized to test whether upward appearance comparison mediated the relationship between self-objectification and exercise dependence. Mediation analysis was conducted with 10,000 bootstrapped samples and 95% bias-corrected and accelerated confidence intervals (Preacher & Hayes, 2004) with gender and BMI as covariates. Regression analyses (Table 71) controlling for gender and BMI indicated that self-objectification was a significant predictor of exercise dependence (Model 1, b = .86, SE = .38, p = .02) and upward appearance comparison (Model 2, b = 8.68, SE = .67, p < .001). Gender (Model 1, b = -1.81, SE = .60, p = .002, Model 2, b = 8.01, SE = 1.06, p < .001) was a significant covariate in both models, but BMI (Model 1, b = -.10, SE = .05, p =.05, Model 2, b = -.07, SE = .09, p =.46) was not. However, self-objectification was no longer a significant predictor of exercise dependence (Model 3, b = .08, SE = .48, p = .87) when controlling for

upward appearance comparison (b = .09, SE = .03, p =.009). Gender remained a significant covariate (b = -2.54, SE = .66, p < .001), but BMI remained non-significant (b = -.10, SE = .05, p = .07). Approximately 8% of the variance in exercise dependence was accounted for in Model 3. The total effect of self-objectification on exercise dependence was significant (TE = .86, SE = .38, p =.02, 95% CI [.12, 1.61]) but the direct effect was not (DE = .08, SE = .48, p = .87, 95% CI [-.87,1.02]). The indirect effect of upward appearance comparison was significant (IE = .79, SE = .30, 95% CI [.21, 1.40], completely standardized IE = .12, SE = .05, 95% CI [.03, .22]) indicating full mediation. These results supported the hypothesis and suggested that upward appearance comparison was the mechanism that explained the relationship between self-objectification and exercise dependence in the sample.

Results for Inverting Mediators (Figures 4 & 5)

To test if the mediators uniquely predicted the target outcome variable in the proposed models, I tested whether upward appearance comparison mediated the relationship between self-objectification and public exercise avoidance and if social appearance anxiety mediated the relationship between self-objectification and exercise dependence.

Following the analysis procedure from the previous models, results of the hierarchical regression (Table 72) indicated that upward appearance comparison (Model 3, b = .18, SE = .09, p = .05) was not a significant predictor of public exercise avoidance when accounting for self-objectification (Model 3, b = 4.75, SE = 1.27, p < .001), gender (Model 3, b = 8.11, SE = 1.76, p < .001), and BMI (Model 3, b = .56, SE = .14, p < .001). The total effect of self-objectification on public exercise avoidance was significant (TE = 6.28, SE = 1.01, p <.001, 95% CI [4.29, 8.27]) as well as the direct effect (DE = 4.75, SE = 1.27, p < .001, 95% CI [2.24, 7.25]). The indirect effect of upward appearance comparison was non-significant (IE = 1.53, SE = .89, 95%

CI [-.28, 3.17], completely standardized IE = .08, *SE* = .04, 95% CI [-.01, .16]) indicating no mediation. On the other hand, results of the hierarchical regression (Table 73) indicated that social appearance anxiety (Model 3, *b* = .00, *SE* = .02, *p* = .85) was not a significant predictor of exercise dependence when accounting for self-objectification (Model 3, *b* = .81, *SE* = .49, *p* = .10), gender (Model 3, *b* = -1.84, *SE* = .62, *p* = .003), and BMI (Model 3, *b* = -.11, *SE* = .06, *p* = .06). The total effect of self-objectification on exercise dependence was significant (TE = .86, *SE* = .38, *p* =.02, 95% CI [.12, 1.61]) but not the direct effect (DE = .81, *SE* = .49, *p* = .10, 95% CI [-.16, 1.77]). The indirect effect of social appearance anxiety was non-significant (IE = .06, *SE* = .34, 95% CI [-.62, .71], completely standardized IE = .01, *SE* = .05, 95% CI [-.10, .11]) indicating no mediation. In summary, results suggested that the mediators distinctively predicted their respective outcome variables in the proposed models but not alternative models

Moderation Analyses

Model 1 PROCESS macro (Hayes, 2018) was used to test for the moderating effect of loneliness between self-objectification and the outcome variables – social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence – controlling for gender and BMI.

Social Appearance Anxiety

Regression analysis (summarized in Table 74) suggested that the overall model was significant (R^2 = .56, $F(5, 294) = 75.82$, $p < .001$). The main effects of self-objectification (*b* = 11.38, *SE* = .93, $p < .001$), loneliness (*b* = .47, *SE* = .06, $p < .001$), gender (*b* = 6.89, *SE* = 1.45, $p < .001$), and BMI (*b* = .65, *SE* = .13, $p < .001$) were significant, but the interaction effect of self-objectification and loneliness (*b* = -.07, *SE* = .08, *p* = .39) was not. The lack of interaction effect

suggested that loneliness did not moderate the relationship between self-objectification and social appearance anxiety.

Upward Appearance Comparison

Regression analysis (summarized in Table 75) suggested that the overall model was significant (R^2 = .46, F(5, 294) = 49.42, p < .001). The main effects of self-objectification (b = 8.37, SE = .68, p < .001) and gender (b = 7.52, SE = 1.05, p < .001) and the interaction effect of self-objectification and loneliness (b = -.14, SE = .06, p = .02) were significant (Table 75). However, the main effect of loneliness (b = .03, SE = .04, p = .43) and BMI (b = -.04, SE = .09, p = .63) was not significant in the model. Simple slopes analysis (Figure 6) revealed statistically significant differences between self-objectification and upward appearance comparison at mean-centered values of low (-1 SD = -10.83), average (mean = 0.00), and high (+1 SD = 10.83) levels of loneliness. At low (b = 9.83, SE = .90, p < .001, 95% CI [98.07, 11.60]), mean (b = 8.37, SE = .68, p < .001, 95% CI [7.04, 9.70]), and high levels of loneliness (b = 6.91, SE = .97, p < .001, 95% CI [5.00, 8.81]) the relationship between self-objectification and upward appearance comparison was significant.

Public Exercise Avoidance

Regression analysis (summarized in Table 76) suggested that the overall model was significant (R^2 = .32, F(5, 294) = 27.20, p < .001). The main effects of self-objectification (b = 4.58, SE = 1.01, p < .001), loneliness (b = .37, SE = .07, p < .001), gender (b = 10.09, SE = 1.58, p < .001), and BMI (b = .46, SE = .14, p < .001) were significant, but the interaction effect of self-objectification and loneliness (b = .04, SE = .09, p = .67) was not, therefore, loneliness did not moderate the relationship between self-objectification and public exercise avoidance in this sample.

Exercise Dependence

Regression analysis (summarized in Table 77) suggested that the overall model was significant (R^2 = .07, F(5, 268) = 3.94, p =.002). The main effects of self-objectification (b = 1.00, SE = .40, p =.01) and gender (b = -1.90, SE = .61, p = .002) were significant. However, loneliness (b = -.04, SE = .03, p = .16), BMI (b = -.09, SE = .05, p = .09), and the interaction effect of self-objectification and loneliness (b = -.02, SE = .04, p = .62) were not, therefore, loneliness did not moderate the relationship between self-objectification and exercise dependence.

Testing Moderated Mediation Model 1 (Figure 7)

Model 8 PROCESS macro version 3.5 (Hayes, 2018) in SPSS was utilized to test the hypothesized moderated mediation model wherein loneliness was proposed to moderate paths a (self-objectification to social appearance anxiety) and c' (self-objectification to public exercise avoidance) in Figure 1. Moderated mediation analysis was conducted with 10,000 bootstrapped samples and 95% bias-corrected and accelerated confidence intervals (Preacher & Hayes, 2004) with gender and BMI as covariates. Regression analyses (Table 78) controlling for gender and BMI indicated that loneliness did not moderate the effect of self-objectification on social appearance anxiety (b = -.07, SE = .08, p = .39) and public exercise avoidance (b = .06, SE = .09, p = .49). This was further evidenced by the index of moderated mediation of -.02 (SE = .03, 95% CI [-.09, .04]) crossing zero within the confidence interval. However, the main effect of loneliness was a significant predictor of both social appearance anxiety (b = .47, SE = .06, p < .001) and public exercise avoidance (b = .23, SE = .07, p = .001). The conditional direct effect of self-objectification on public exercise avoidance was non-significant across -1 SD, mean and

+1 *SD* values of loneliness. However, the conditional indirect effects were significant throughout these values (Table 78).

Testing Moderated Mediation Model 2 (Figure 8)

Model 8 PROCESS macro version 3.5 (Hayes, 2018) in SPSS was utilized to test the hypothesized moderated mediation model wherein loneliness was proposed to moderate paths a (self-objectification to upward appearance comparison) and c' (self-objectification to exercise dependence). Moderated mediation analysis was conducted with 10,000 bootstrapped samples and 95% bias-corrected and accelerated confidence intervals (Preacher & Hayes, 2004) with gender and BMI as covariates. Regression analyses (Table 79) controlling for gender and BMI indicated that loneliness did not moderate the effect of self-objectification on upward social comparison (b = -.12, SE = .06, p = .06) and exercise dependence (b = -.01, SE = .04, p = .85). This was further evidenced by the index of moderated mediation of -.01 (SE = .01, 95% CI [-.03, .00]) including a zero within the confidence interval. Regression analysis further suggested that the main effect of loneliness was not a significant predictor of both upward appearance comparison (b = .05, SE = .04, p =.32) and exercise dependence (b = -.04, SE = .03, p =.12). The conditional direct effect of self-objectification on exercise dependence was non-significant across -1 *SD*, mean and +1 *SD* values of loneliness. However, the conditional indirect effects were significant throughout these values (Table 79).

Results of Forward Selection Regression

Two forward selection regressions using IBM SPSS version 27 were conducted to add further evidence to the robustness of social appearance anxiety and upward appearance comparison in predicting public exercise avoidance and exercise dependence, respectively. Eleven predictors were selected for analysis and divided into 2 blocks. Block 1 consisted of

control variables which included BMI, gender, exercise location, partner, frequency, duration, and motivation. Block 2 consisted of study variables which included self-objectification, loneliness, social appearance anxiety and upward appearance comparison. Non-continuous categorical variables (i.e., exercise location, partner, and motivation) were dummy coded to be incorporated in the regression. Stepwise regression with criteria probability-of-*F*-to enter < = .05 was chosen to determine significant predictors.

Predictors of Public Exercise Avoidance (Table 80)

Results indicated that exercise frequency (b = -1.54, SE = .57, p < .001), gender (b = 6.86, SE = 1.52, p < .001), exercising at the gym (b = -5.60, SE = 1.43, p < .001), appearance enhancement motivation for exercise (b = 3.39, SE = 1.38, p = .01), social appearance anxiety (b = .31, SE = .05, p < .001), and loneliness (b = .17, SE = .07, p = .02), were robust predictors of public exercise avoidance. This suggested that social appearance anxiety remained a significant predictor of public exercise avoidance even with other statistically significant control variables in the regression. In summary, participants who identified as a woman, reported greater social appearance anxiety and greater loneliness, exercised less often, who were less likely to exercise at the gym, and whose exercise behavior was motivated primarily by appearance enhancement were more likely to avoid exercising in public fitness settings such as the gym.

Predictors of Exercise Dependence (Table 81)

Results indicated that exercise frequency (b = 1.71, SE = .20, p < .001), exercising outdoors (b = -1.55, SE = .59, p = .009), gender (b = -1.90, SE = .58, p = .001), and upward appearance comparison (b = .08, SE = .03, p = .002) were robust predictors of exercise dependence. Exercising with friends and exercising at home were two control variables that were inversely related to exercise dependence and were significant in the model (in Step 5) until

upward appearance comparison was introduced into the model. This suggested that upward appearance comparison remained a significant predictor of exercise dependence even with other statistically significant control variables in the regression. In summary, participants who identified as a man, reported high levels of exercise frequency, who were less likely to be exercising outdoors, and tended to compare their appearance to those who they view as better looking were more likely to exercise compulsively.

Discussion

The current study had two primary goals. The first was to understand how physical activity factors such as exercise participation, location, partnership, frequency, duration, and motivation were associated with psychological outcomes and exercise behaviors. The second goal of the study was to elucidate whether self-objectification was statistically predictive of two divergent behaviors – public exercise avoidance and exercise dependence – through the intermediary mechanisms of social appearance anxiety and upward appearance comparison. Moreover, I wanted to understand if loneliness moderated the relationship between self-objectification and these variables.

To begin, I was to understand the how exercise-related variables were associated with self-objectification, loneliness, social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence.

Self-Objectification and Exercise-Related Variables

In line with previous research, non-exercisers reported higher levels of self-objectification than current exercisers (Melbye et al., 2007). Greenleaf (2005) proposed that exercising was associated with reduced levels of self-objectification. In line with this, the current study found that those currently exercising, regardless of location, had lower self-objectification

scores. However, individuals who were not currently exercising had comparable levels of self-objectification than those who exercised alone, which adds a caveat to Greenleaf's proposition. Previous literature has shown that fitness settings, like the gym, tended to be associated with greater feelings of self-objectification, especially for women (e.g., Prichard & Tiggemann, 2005, Prichard & Tiggemann, 2008), which explained why women with higher self-objectification tended to report infrequent gym attendance or non-attendance (Melbye et al., 2007).

The current study may not have captured differences in self-objectification scores of gym goers by not accounting for specific activities and exercise sites within gym settings. As Prichard and Tiggemann (2008) stated, women who did cardio alone reported higher levels of self-objectification than those who participated in yoga classes. Brewer and colleagues (2004) added that women with higher physique anxiety, which was highly correlated with self-objectification (Melbye et al., 2007), tended to prefer exercising further away from the instructor in aerobics classes. Exercising with others may alleviate some of the objectifying effects of fitness settings. Attention may be directed towards one's exercise companion/s instead of potentially objectifying imagery and situations in the gym as well as consequent body monitoring and appearance anxiety. Prichard and Tiggemann (2008), for example, reported that doing cardio-based exercises alone was associated with self-objectification but participating in group exercise classes was not. This was exemplified by those who exercised with a significant other, friend/s, or with a group having significantly lower levels self-objectification than those who were not exercising in the study. Furthermore, those who exercised with a significant other tended to report the lowest levels of self-objectification compared to other partner categories. Some explanation for the buffering effect of having a significant other on self-objectification may be linked to physical attractiveness playing a role in seeking intimate partnerships (McKinley, 2011). Sanchez and

Broccoli (2008) reported that young single women primed with romantic relationships were found to have higher self-objectification scores in contrast to coupled women, which may suggest that self-objectification could be mitigated by having a romantic partner. Partnered young adults may be less concerned with their appearance because they are no longer as heavily invested in their appearance to attract a mate. Another potential explanation borrows from literature on social appearance anxiety, a significant correlate of self-objectification in the study. Carron and Prapavessis (1997) stated that participants who were accompanied by their best friend when exercising experienced the least appearance anxiety. This may be due to feelings of security afforded by the presence of strong social support, not unlike working out with a significant other. The small sample size of participants who exercised with a significant other, however, warrants caution in generalization.

While the model for exercise frequency was only trending towards significance, post hoc-analysis revealed that participants not currently exercising also reported significantly higher self-objectification scores than those exercising a few times a month to 3 - 5 times a week, but they did not significantly differ in scores with those who were exercising six to seven times a week. This outcome supported the hypothesis of divergent exercise outcomes of self-objectification – highly self-objectified individuals tend to either avoid exercise (Melbye et al., 2007) or exercise excessively (Homan, 2010, Litt & Dodge, 2008). Exercise duration, in contrast, was not a significant predictor of self-objectification. This outcome differed from previous literature that indicated self-objectified women spent more time exercising in fitness centers (Prichard & Tiggemann, 2008). In fact, the results of the study showed that those who exercised for over 1.5 hours had, on average, the lowest self-objectification scores while those not currently exercising

had the highest in the sample. Future research could shed light on potential mediating factors to clarify these results.

Finally, participants whose primary exercise motivation was appearance enhancement reported the highest levels of self-objectification compared to those who were motivated to improve their physical health, psychological wellbeing, or skills. Consistent with previous research, participants who were motivated to improve their appearance also tended to report greater levels of self-objectification (Prichard & Tiggemann, 2008, Strelan & Hargreaves, 2005). The emphasis on the changing one's appearance to fit an ideal body shape falls in line with self-objectification theory whereby a self-objectified person excessively focuses on their physical attributes over functionality and competence (Fredrickson & Roberts, 1997). Further evidence to support this claim can be seen with participants who focused on health outcomes (i.e., physical and psychological health) who concurrently had the lowest self-objectification scores. Ingledew and Markland (2008) stated that appearance- or weight-based motivations for exercise were associated with less exercise participation which may provide some insight as to why non-exercisers also had high self-objectification scores. Physical activity may turn their attention towards their body, which can elicit feelings of dissatisfaction and shame. Negative affect brought about by self-objectification could prompt certain individuals to avoid exercise.

Loneliness and Exercise-Related Variables

Like Hawkley et al. (2009), the current study found that non-exercisers tended to report higher loneliness scores compared to those currently exercising, regardless of location, presence of exercise partners, frequency, and duration. It may be that exercise, by itself, has a salubrious effect on loneliness as even participants who exercised by themselves reported lower loneliness scores than those not currently exercising. Intervention studies have demonstrated that physical

activity helped ease loneliness, with some studies suggesting that the relationship was moderated or mediated by social support and social competence (Pels & Kleinert, 2016). Therefore, those who are not exercising may not experience the assuaging effect of exercise on loneliness and concurrently lose opportunities for socialization (VanKim & Nelson, 2013). Participants who did not exercise had the highest loneliness scores relative to those who reported any exercise motivation but significantly higher than those with a psychological and physical enhancement motivation to exercise. Perhaps health-oriented motivations for exercise conferred greater alleviation of loneliness than other exercise motivations. Interestingly, individuals who exercised for skill or appearance enhancement were not significantly different from other motivation categories contrary to previous studies. Marques et al. (2019) proposed that some athletes who become obsessed with developing their skills exhibited symptoms of exercise dependence. Individuals with exercise dependence may prioritize physical activity over social commitments (Davis, 1993, Thompson & Pasman, 1991) which leads to greater social isolation and loneliness. On the other hand, certain individuals motivated to enhance their appearance could either exercise excessively (Prichard & Tiggemann, 2008, Litt & Dodge, 2008) or exercise less (Ingledew & Markland, 2008), both of which could result in greater loneliness.

Social Appearance Anxiety and Exercise-Related Variables

Consistent with previous research, non-exercisers tended to report higher levels of social appearance anxiety (Brunet & Sabiston, 2009, Melbye et al., 2007) compared to those currently exercising. Similar to self-objectification and loneliness, exercise seem to reduce appearance anxiety in both men and women in line with previous literature (e.g., McAuley et al., 1995). The current study provided some support that exercise on its own has a beneficial effect on appearance anxiety. Levels of appearance anxiety did not significantly vary across exercise

locations, presence of exercise partner, frequency, and duration – only those who reported non-exercise was significantly distinct due to having the highest reported mean scores. Even those exercising by themselves and those exercising in the privacy of their home reported significantly less social appearance anxiety than inactive individuals. The presence of exercise companions, however, seem to lessen social appearance anxiety, a finding which is supported by literature (Carron & Prapavessis, 1997). Finally, participants who were not currently exercising tended to report higher levels of social appearance anxiety than those motivated by physical, psychological, and skill enhancement but had comparative levels against those who exercise for appearance enhancement. A preoccupation with self-presentation appears to be a common thread between low exercise behavior (Lantz et al., 1997) and those motivated to enhance their appearance (Leary, 1992) which may explain the greater intensity of social appearance anxiety for both groups.

Given these results, social appearance anxiety may be related to loneliness and sedentariness. Individuals with appearance anxiety tended to avoid social interactions and social environments (Dion et al., 1990) which may lead to social isolation and, consequently, loneliness. The moderate correlation of these two variables in the current study provided support for this relationship. Loneliness, being associated with negative perception and negative social expectation (Hawkley & Caccioppo, 2010), can increase body dissatisfaction (Mills et al., 2014) which may lead to greater appearance anxiety. I speculate that this self-reinforcing loop may inhibit individuals with high appearance anxiety to exercise, thus fostering physical inactivity. However, further research needs to be conducted to understand this association.

Upward Appearance Comparison and Exercise-Related Variables

Exercise participation, partners, frequency, and duration were not associated with upward appearance comparison in the study. Mean upward comparison scores differed between exercise locations with those exercising at home having the lowest scores. The privacy afforded by exercising at home may limit opportunities for upward social comparison as the individual would be less likely to be exposed to idealized imagery or peers with better physiques. Unsurprisingly, participants whose primary goal for exercise was appearance enhancement tended to report the highest levels of upward appearance comparison than any other motivation. Internalized social standards of attractiveness, which fuels appearance enhancement behaviors (Fardouly et al., 2017), was associated with social comparison (Fitzsimmons-Craft et al., 2012). Upward appearance comparison was positively associated with both public exercise avoidance and exercise dependence which was in line with literature. Guo and Wu (2021) noted that appearance comparison was connected to social avoidance while Diehl and Baghurst (2016) found that body comparison was related to drive for muscularity, a significant predictor to compulsive exercise behaviors (Chittester & Hausenblas, 2009).

Public Exercise Avoidance and Exercise-Related Variables

Non-exercisers tended to report higher levels of public exercise avoidance (Martin Ginis et al., 2003) compared to those currently exercising in the study. Non-exercisers consistently had the highest levels of public exercise avoidance across exercise locations, partners, frequency, and duration. Across exercise locations, gym goers reported the least public exercise avoidance. Concerns over social evaluation in the gym (Brudzynski & Ebben, 2010, Levinson et al., 2013, Lamarche et al., 2018) may pressure certain individuals to exercise in secluded outdoor locations

or at home. Expectedly, participants who reported less exercise frequency and duration also reported relatively higher public exercise avoidance than those who exercised more frequently.

Participants who were not currently exercising and those with appearance enhancement motivation for exercise had significantly higher avoidance scores than those exercising for physical health. In addition, the stark contrast in scores between appearance motive and physical health motive was supported by self-objectification theory. As noted earlier, those with high self-objectification tended to be more motivated to enhance their appearance over their health (Fatt et al., 2019) but also had the least exercise participation (Ingledew & Markland, 2008). This will be discussed in greater detail at a later section.

Exercise Dependence and Exercise-Related Variables

Participants who reported greater exercise frequency and duration reported higher levels of exercise dependence as predicted. In addition, participants who exercised in the gym displayed higher levels of exercise dependence than other locations. The weights and machines accessible in the gym could be used for building larger muscle for men (Hallsworth et al., 2005, Homan, 2010) or enhancing sexualized body parts such as the hips and thighs for women (Fargo & Burcham, 2021) to conform to modern body ideals. Results further indicated that those exercising by themselves or with a group had higher levels of compulsive exercise behaviors than those not currently exercising. Lone exercisers concurrently possessed higher levels of self-objectification which may fuel their desire to achieve an ideal body through excessive exercise. However, it is uncertain why those exercising with a group reported the highest mean score for exercise dependence. A speculation for this was that some participants may have interpreted the "group" category as "athletic team". Athletes were found to have the highest prevalence of exercise dependence due to passion towards athletic improvement (Marques et al., 2019).

Distinction between group affiliations such as group fitness classes versus athletic teams is necessary for future research. Finally, exercise dependence did not significantly vary across motivations, contrary to the hypothesis. Previous research noted that those who aspire to enhance their appearance (Bell et al., 2016, Hallsworth et al., 2005) manifested greater exercise dependence. Mediating mechanisms discussed in the following section will provide further insight on this relationship.

Moderated Mediation Models

The proposed moderated mediation models for the divergent outcomes of self-objectification were not supported by the current data (Figures 7 & 8). Loneliness did not moderate the predicted paths in the model. However, as seen in Table 78, loneliness had a significant main effect on both social appearance anxiety and public exercise avoidance. Negative self-perception, poor social expectations, and fear of negative evaluation brought about by loneliness (Hawkley & Caccioppo, 2010) could inadvertently worsen feelings of appearance anxiety and avoidance of public exercise settings. Moreover, anxiety over one's appearance was related to avoidance behaviors (Dion et al., 1990) which, in turn, leads to greater loneliness creating a negative feedback loop. Loneliness was not a predictor of upward appearance comparison nor of exercise dependence in the proposed model. Yet, upward appearance comparison and loneliness were positively correlated in this study, which is supported by previous research (Dibb & Foster, 2021). Loneliness moderated the relationship between self-objectification and upward appearance comparison (Table 75). While upward appearance comparison scores increased with self-objectification scores; less lonely individuals appeared to have a steeper slope than those with higher levels of loneliness. It may be that less lonely self-objectified individuals are more likely to be exposed to attractive peers, increasing the likelihood

for upward appearance comparison. However, the low change in R-squared value warrants cautious interpretation. Exercise dependence, on the other hand, was neither correlated with, nor significantly predicted by loneliness.

Proposed mediation paths in the model were supported by the current data. Social appearance anxiety fully mediated the relationship between self-objectification and public exercise avoidance while upward appearance comparison fully mediated the relationship between self-objectification and exercise dependence. Switching the mediators – using social appearance anxiety to predict exercise dependence and upward appearance comparison to predict public exercise avoidance – yielded non-significant mediation paths. Results of forward selection regression further cemented the conclusion that social appearance anxiety and upward appearance comparison were uniquely predictive of public exercise avoidance and exercise dependence, respectively.

Previous literature has consistently found associations with self-objectification and social appearance anxiety (e.g., Melbye et al., 2007). Fredrickson and Roberts (1997), in their seminal work on self-objectification theory, stated that constant body surveillance brought about by internalized evaluation of others elicited feelings of appearance anxiety and body shame. Apprehension over potential evaluation of one's appearance can subsequently lead to avoidance behaviors towards objectifying settings such as the gym. The presence of fitter individuals (Lamarche et al., 2018), images of ideal bodies (Prichard & Tiggemann, 2008), and wall-to-wall mirrors (Martin Ginis et al., 2003) in the gym could elicit feelings of appearance anxiety. Moreover, results from demonstrated that social appearance anxiety was associated with less exercise frequency and non-exercise suggesting that individuals who feared social evaluations not only avoided the gym but, perhaps, avoided exercise altogether, echoing Melbye et al's

(2007) findings. Moreover, women (e.g., Martin Ginis et al., 2003) and those with higher BMI (e.g., Fuller-Tyszkiewicz et al., 2013) reported a greater level of social appearance anxiety in line with previous research. Salvatore and Marecek (2010) suggested that women avoided the gym due to apprehension over body evaluations (i.e., social appearance anxiety) and scrutiny of their exercise activity by others. Individuals with higher BMI, on the other hand, may feel greater appearance anxiety due to experiences of weight stigma, such as from the promotion of thin ideals in advertising (Selensky & Carels, 2021). However, BMI was not predictive of public exercise avoidance when social appearance anxiety was accounted for in the model. Schvey et al. (2017) stated that the experience of weight stigma in the gym was not related to exercise frequency for overweight and obese individuals even though these experiences were negatively associated with their emotional and physical health.

Self-objectification and upward appearance comparison were highly related, in line with previous literature (Hanna et al., 2017). Frequent upward comparisons could motivate self-objectified individuals to use exercise excessively to change their appearance (Fardouly et al., 2017) and/or assuage negative affect educed by self-objectification, comparable to how some runners increase their running volume to relieve anxiety and loneliness (Lukacs et al., 2019). Exercise behavior can become pathological because the physiques that self-objectified individuals compare themselves to may be unattainable without the aid of photomanipulation and/or use of performance enhancing drugs (Grindell, 2020). In other words, self-objectified individuals may never feel muscular or lean enough in comparison to their internalized ideal, so their only recourse is to exercise excessively or engage in other risky health behaviors such as steroid use (Parent & Moradi, 2011). Men were more likely to report exercise dependence in the study as muscularity is congruent with the Western societal standard for men (Strelan &

Hargreaves, 2005). Body mass index, on the other hand, was not a significant covariate in the model (Table 71). Chittester and Hausenblas (2009) noted that drive for muscularity, a predictor of exercise dependence, was not associated with BMI and other anthropometric measurements. The pathological preoccupation with one's musculature may be independent of BMI, as exemplified by muscular dysmorphia (Pope et al., 1997).

Because social appearance anxiety and upward appearance comparison were highly correlated with each other, the question of how one state becomes salient to influence the divergence of outcomes arises. A study by Halliwell et al. (2007) may elucidate a potential mechanism through exercise participation. They reported that non-exercising men who were exposed to images of muscular men, a method to induce state self-objectification (e.g., Michaels et al., 2013), experienced greater physical appearance anxiety than currently exercising men. In other words, the authors proposed that participating in physical activity influenced how a person interpreted an idealized image. Sedentary individuals may experience greater appearance anxiety when exposed to "fit" people on social media while those currently active may use the same visual stimulus as aspirational targets (Halliwell et al., 2007). This may explain why non-exercisers in the study tended to experience greater appearance anxiety than those currently exercising. The saturation of idealized imagery and presence of lean and muscular people in the gym (Prichard & Tiggemann, 2008) may exacerbate appearance anxiety for less active individuals, consequently inhibiting them from exercising in public fitness-oriented settings. Unfortunately, this may lead to less physical activity or physical inactivity altogether as Melbye and colleagues (2007) found. In addition, Halliwell et al.'s (2007) study expanded on how upward appearance comparison can lead current gym-goers to exercise dependence. If a current exerciser consumed idealized imagery and viewed these ideal physiques as aspirational targets,

then they may become reliant on exercise to achieve the "perfect" physique. Given this, locus of control (Rotter, 1966) may be another potential explanation for this divergence and warrants further investigation. Individuals who believe that achieving an ideal physique is contingent upon their own actions may be more likely to exercise (i.e., internal locus of control) and perceive idealized imagery as motivation. On the other hand, those who believe that their body shape is beyond their control may be more likely to avoid exercise (i.e., external locus of control) and view objectifying imagery as discouraging.

Previous research has demonstrated that self-objectification was also related to eating pathologies (Prichard & Tiggemann, 2007, Schneider et al., 2016) and the current study only focused exclusively on exercise-related behaviors as outcome variables of self-objectification. Future researchers may want to investigate determining factors that influence the divergence or co-occurrence of exercise avoidance, exercise dependence, and eating pathologies of self-objectified individuals. Doing so would greatly help intervention efforts by identifying and combating the appropriate psychological mechanisms that influence each specific dysfunctional behavior.

Gender and Body Mass Index (BMI)

Gender and body mass index (BMI) were notable covariates in several contexts within the study and I conducted an exploratory *post hoc* analysis to expand on them. Gender was a consistently significant covariate in analyses involving social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence. However, gender was not predictive of self-objectification in the study. Literature has been inconsistent with gender differences in trait self-objectification. For example, Oehlhof et al. (2009) reported that young adult women had higher levels of self-objectification than young adult men when using

the Self-Objectification Questionnaire (Noll & Fredrickson, 1998). Hebl et al. (2004), using the same measure, found no gender differences in scores within the same age group. In the current study, both male and female participants had similar trait self-objectification scores according to a chi-square analysis (Table 1). The narrowing gap in self-objectification scores in young adult men and women may be due in part to exposure to objectifying media (e.g., Barlett et al., 2008, Karsay et al., 2018). The scores for self-objectification measures may be similar for men and women, but the outcomes of self-objectification were not equivalent between them. While Hebl et al. (2004) found similar levels of trait self-objectification in male and female participants of their study, women tended to report greater body shame and poorer self-esteem than men after state self-objectification was induced.

In line with current literature, the present study demonstrated that women were more likely than men to experience social appearance anxiety (Roberts & Gettman, 2004), engage in upward appearance comparison (Myers & Crowther, 2009), and avoid exercising in public settings such as the gym (Salvatore & Marecek, 2010). Salvatore and Marecek (2010) suggested that women avoided the gym due to fear of body appearance evaluation, evaluations of their exercise activity, concerns about upward social comparison, and feelings of incompetence with weightlifting exercises. The authors suggested that women tended to be socialized to avoid muscle building exercises and weightlifting due to these activities being incongruent with Western feminine social norms. Changing social standards towards a more athletic physiques (Thompson et al., 2004) may have motivated more women to lift weights and build muscle. Current workouts also emphasize accentuating sexualized body parts such as their buttocks, hips, and legs (e.g., #slimthicc, Fargo & Burcham, 2021).

Men, similar to previous research (e.g., Myers & Crowther, 2009), were more likely than women to engage in excessive exercise behaviors in the current sample. Salvatore and Marecek (2010) reported many male participants in their study engaged in upward social comparison which generated feelings of inadequacy. But, as Lamarche et al. (2018) specified, men avoided disclosing body insecurities due to societal pressures to maintain Western masculine norms such as emotional control and self-reliance (Mahalik et al., 2003). Since weightlifting is socially associated with masculinity (Salvatore & Marecek, 2010), men may be more likely to cope with body dissatisfaction through greater weightlifting efforts and increasing supplementation (Lamarche et al., 2018).

There was no association gender and loneliness in the present study. This contrasted with previous studies which found that, while women frequently self-reported more experiences of loneliness in a single-item direct measure, men tended to score higher using an indirect measure (Nicolaisen & Thorsen, 2014). Barreto et al. (2021) suggested that men were reluctant to disclose feelings of loneliness but may feel comfortable with acknowledging it when asked through a questionnaire. Rico-Uribe et al. (2018) added that men reported loneliness directly when experienced in extreme severity. Socialization may explain why men and women answer loneliness scales differently (van Baarsen et al., 2001). Men might be more willing to disclose a lack of social relationships rather than the negative affect from social isolation (Nicolaisen & Thorsen, 2014). Similarity in loneliness scores across this sample may, in part, be due to isolation experienced from the ongoing COVD-19 pandemic.

Body Mass Index (BMI) was a consistently significant covariate for analyses predicting social appearance anxiety and public exercise avoidance. While previous research used BMI as a covariate in self-objectification studies (e.g., Fredrickson et al., 1998), Mercurio and Landry

(2008) stated that women at any size may be preoccupied with their body, which may explain why BMI was not associated with self-objectification in the study. In addition, Chittester and Hausenblas (2009) found that drive for muscularity, the framework to understand self-objectification in men, was uncorrelated with BMI and other anthropometric measurements. Cafri et al. (2005) explained that BMI influenced men differently due to the muscular ideal emphasizing both muscle mass and leanness. The authors elaborated that overeating, steroid use, and supplementation was associated with men with lower BMI while weight loss and dieting behaviors were weakly associated with men with higher BMI. These divergent weight-related goals may also explain why BMI was not predictive of upward appearance comparison and exercise dependence in the current study. Body fat percentage may be more associated with self-objectification, upward appearance comparison, and exercise dependence because leanness, more than scale weight, is emphasized in both the thin (Schaefer et al., 2017) and muscular ideals (Martin et al., 2006).

In line with current results, Tiggemann and Lynch (2001) reported that higher BMI was related to greater appearance anxiety. In addition, overweight and obese men and women reported experiencing weight stigma at fitness facilities (Schvey et al., 2017) which may explain why participants with higher BMI concurrently reported greater public exercise avoidance. Another analysis where BMI was a significant covariate was in predicting loneliness across different exercise motivations, although the effect was very weak. According to Jung and Luck-Sikorski (2019), overweight individuals who experience greater weight-related discrimination and weight bias internalization also reported higher levels of loneliness. Participants with greater muscle mass (which results in higher BMI) may also experience loneliness due to preoccupation

with exercise and muscle building behaviors such as in the case of those with muscle dysmorphia (Pope et al., 1997).

Limitations

To my knowledge, the present study was the first to investigate the mechanisms of how self-objectification predicted two contradictory exercise-related behaviors. Understanding the mechanisms that lead to these outcomes can inform health interventions that seek to increase exercise participation or potential treatment of compulsive exercise behaviors. While study results were promising, findings of the study need to be considered in light of certain limitations. The participant sample was from a single university population which consisted largely of Caucasian heterosexual women which limits outcome generalizations to the broader population. Hanel and Vione (2016) stated that generalizing research results from student sample to the general public can be highly debatable due to significant differences between the two populations. In addition, I want to address the exclusion of transgender persons in the analysis. This is highly problematic as there is already very limited research on self-objectification of trans people in the current literature. Unfortunately, I was not able to recruit a large enough sample of trans-identifying participants to appropriately interpret their experiences. Future research needs to extend greater efforts towards targeted recruitment of diverse populations to determine patterns in self-objectification and related outcomes between ethnicities, sexual orientations, and gender identities.

The ongoing COVID-19 pandemic could have also influenced the participant scores. While younger individuals reported higher levels of loneliness compared to later age groups (Barreto et al., 2021), the mandated isolation and distancing may have increased overall state loneliness which diluted the effect of trait loneliness on the study variables found in previous

literature. In addition, a study by Hawes et al. (2021) demonstrated an increase of social anxiety symptoms, a correlate of social appearance anxiety (Hart et al., 2008), in adolescents and young adults, may have inflated correlational relationships. Avoidance of public places to prevent potential infection may have inhibited certain participants from exercising at the gym. Replication of this study after the pandemic passes will be necessary to verify the results.

Another limitation of the study was the modification of existing scales. Two scales in the study, the Upward Physical Appearance Comparison Scale (O'Brien et al., 2009) and Gym Avoidance Subscale (Levinson et al., 2013), had additional items added to them in the study and has not undergone appropriate psychometric evaluation. However, preliminary evidence of convergent validity, through significant correlations with related variables (Table 3), and reliability, corroborated by high Cronbach's alphas, provided some support to the usefulness of the modified scales. The small effect size of the proposed model for exercise dependence, while significant, warrants caution in interpretation. This may be due in part to participants who were student athletes interpreting items in the Commitment to Exercise Scale (Davis et al., 1993), the scale used to measure exercise dependence, differently than other students in the sample. Szabo and colleagues (2015), for example, reported that elite athletes understood items in an exercise addiction inventory differently due to exercise being intrinsically bound to their careers. This may also explain why self-objectification was not as highly predictive of exercise dependence in the study. A sample of student athletes may exercise intensely due to their commitment to developing their skills for their sport, which is in direct contrast to enhancing their appearance due to self-objectification. The smaller sample size used in test the model for exercise dependence may have also reduced the total power.

Conclusion

In conclusion, the study provided a broad overview of the exercise-related factors associated with self-objectification, loneliness, social appearance anxiety, upward appearance comparison, public exercise avoidance, and exercise dependence. Gender and BMI were effective covariates in some, but not every, analyses. Participants who were not currently exercising experienced greater self-objectification, social appearance anxiety, upward appearance comparison, and public exercise avoidance than those currently engaging in physical activity. The study also identified mediating variables that robustly and uniquely explained divergent exercise behaviors related to self-objectification. Specifically, self-objectification through social appearance anxiety predicted public exercise avoidance while self-objectification through upward appearance comparison predicted exercise dependence. Intervention efforts can target these underlying mechanisms to effectively counteract unhealthy exercise behaviors in self-objectified young adults.

References

Aubrey, J.S. (2006). Effects of sexually objectifying media on self-objectification and body Surveillance in undergraduates: Results of a 2-year panel study. *Journal of Communication, 56*(2), 366–386. https://doi.org/10.1111/j.1460-2466.2006.00024.x

Baildon, A. E., Eagan, S. R., Christ, C. C., Lorenz, T., Stoltenberg, S. F., & Gervais, S. J. (2021). The sexual objectification and alcohol use link: The mediating roles of self-objectification, enjoyment of sexualization, body shame, and drinking motives. *Sex Roles: A Journal of Research*. Advance online publication. https://doi.org/10.1007/s11199-020-01213-2

Barreto, M., Victor, C., Hammond, C., Eccles, A., Richins, M. T., & Qualter, P. (2021). Loneliness around the world: Age, gender, and cultural differences in loneliness. *Personality and Individual Differences*, *169*, 110066–110066. https://doi.org/10.1016/j.paid.2020.110066

Barlett, C. P., Vowels, C. L., & Saucier, D. A. (2008). Meta-analyses of the effects of media images on men's body-image concerns. *Journal of Social and Clinical Psychology*, *27*(3), 279–310. https://doi.org/10.1521/jscp.2008.27.3.279

Bell, H. S., Donovan, C. L., & Ramme, R. (2016). Is athletic really ideal? An examination of the mediating role of body dissatisfaction in predicting disordered eating and compulsive exercise. *Eating Behaviors, 21*, 24–29. https://doi.org /10.1016/j.eatbeh.2015.12.012

Bergeron, D., & Tylka, T. L. (2007). Support for the uniqueness of body dissatisfaction from drive for muscularity among men. *Body Image, 4*(3), 288–295. https://doi.org /10.1016/j.bodyim.2007.05.002

Brewer, B. W., Diehl, N. S., Cornelius, A. E., Joshua, M. D., & Van Raalte, J. L. (2004).

Exercising caution: Social physique anxiety and protective self-presentational behaviour. *Journal of Science and Medicine in Sport, 7*(1), 47–55. https://doi.org /10.1016/s1440-2440(04)80043-4

Brewster, M. E., Sandil, R., DeBlaere, C., Breslow, A., & Eklund, A. (2017). "Do you even lift, bro?" Objectification, minority stress, and body image concerns for sexual minority men. *Psychology of Men & Masculinity, 18*(2), 87–98. https://doi.org /10.1037/men0000043

Brudzynski, L., & Ebben, W.P. (2010). Body image as a motivator and barrier to exercise Participation. *International Journal of Exercise Science, 3*, 3.

Brunet, J., & Sabiston, C. M. (2009). Social physique anxiety and physical activity: A self-determination theory perspective. *Psychology of Sport and Exercise, 10*(3), 329–335. https://doi.org /10.1016/j.psychsport.2008.11.002

Cacioppo, J. T., Hawkley, L. C., Ernst, J. M., Burleson, M., Berntson, G. G., Nouriani, B., & Spiegel, D. (2006). Loneliness within a nomological net: An evolutionary perspective. *Journal of Research in Personality, 40*(6), 1054–1085. https://doi.org/10.1016/j.jrp.2005.11.007

Callan, M. J., Kim, H., & Matthews, W. J. (2015). Age differences in social comparison tendency and personal relative deprivation. *Personality and Individual Differences*, *87*, 196–199. https://doi.org/10.1016/j.paid.2015.08.003

Calogero, R. M. (2004). A test of objectification theory: The effect of the male gaze on appearance concerns in college women. *Psychology of Women Quarterly, 28*(1), 16–21. https://doi.org/10.1111/j.1471-6402.2004.00118.x

Cafri, G., Thompson, J. K., Ricciardelli, L., McCabe, M., Smolak, L., & Yesalis, C. (2005).

Pursuit of the muscular ideal: Physical and psychological consequences and putative risk factors. *Clinical psychology review, 25*(2), 215–239. https://doi.org /10.1016/j.cpr.2004.09.003

Carron, A. V., & Prapavessis, H. (1997). Self-presentation and group influence. *Small Group Research, 28*(4), 500–516. https://doi.org /10.1177/1046496497284002

Carrotte, E. R., Prichard, I., & Lim, M. S. C. (2017). "Fitspiration" on social media: A Content analysis of gendered images. *Journal of Medical Internet Research*, *19*(3), e95. https://doi.org/10.2196/jmir.6368

Center for Disease Control and Prevention (n.d.). *About adult BMI*. Healthy Weight, Nutrition, and Physical Activity. https://www.cdc.gov/healthyweight/assessing/bmi/adult_bmi/index.html

Chaney, M. P. (2008). Muscle dysmorphia, self-esteem, and loneliness among gay and bisexual men. *International Journal of Men's Health, 7*(2), 157–170. https://doi.org/10.3149/jmh.0702.157

Chaney, M. P., & Burns-Wortham, C. M. (2015). Examining coming out, loneliness, and self-esteem as predictors of sexual compulsivity in gay and bisexual men. *Sexual Addiction & Compulsivity, 22*(1), 71–88. https://doi.org/10.1080/10720162.2014.1001543

Chittester, N. I., & Hausenblas, H. A. (2009). Correlates of drive for muscularity: The role of anthropometric measures and psychological factors. *Journal of Health Psychology, 14*(7), 872–877. https://doi.org/10.1177/1359105309340986

Davis, C., Brewer, H., & Ratusny, D. (1993). Behavioral frequency and psychological

commitment: Necessary concepts in the study of excessive exercising. *Journal of Behavioral Medicine, 16*(6), 611–628. https://doi.org /10.1007/BF00844722

de Jong-Gierveld, J. (1987). Developing and testing a model of loneliness. *Journal of Personality and Social Psychology*, *53*(1), 119-128. doi:10.1037/0022-3514.53.1.119

Dibb, B., & Foster, M. (2021). Loneliness and Facebook use: the role of social comparison and rumination. *Heliyon, 7*(1), e05999. https://doi.org/10.1016/j.heliyon.2021.e05999

Diehl, B. J., & Baghurst, T. (2016). Biopsychosocial factors in drives for muscularity and muscle dysmorphia among personal trainers. *Cogent Psychology, 3*(1), Article 1243194. https://doi.org /10.1080/23311908.2016.1243194

Diehl, K., Jansen, C., Ishchanova, K., & Hilger-Kolb, J. (2018). Loneliness at Universities: Determinants of Emotional and Social Loneliness among Students. *International Journal of Environmental Research and Public Health, 15*(9), 1865. https://doi.org/10.3390/ijerph15091865

Dion, K. L., Dion, K. K., & Keelan, J. P. (1990). Appearance anxiety as a dimension of social-evaluative anxiety: Exploring the ugly duckling syndrome. *Contemporary Social Psychology, 14*(4), 220–224.

Engeln, R., Loach, R., Imundo, M. N., & Zola, A. (2020). Compared to Facebook, Instagram use causes more appearance comparison and lower body satisfaction in college women. *Body Image, 34*, 38–45. https://doi.org /10.1016/j.bodyim.2020.04.007

Fardouly, J., Willburger, B. K., & Vartanian, L. R. (2018). Instagram use and young women's body image concerns and self-objectification: Testing mediational pathways. *New Media & Society*, *20*(4), 1380–1395. https://doi.org/10.1177/1461444817694499

Fargo, M., & Burcham, C. (2021, December 30). You asked what 'slim thick' means, so we

asked the experts. Women's Health Magazine. https://www.womenshealthmag.com/uk/fitness/a35334392/slim-thick/

Fatt, S. J., Fardouly, J., & Rapee, R. M. (2019). #malefitspo: Links between viewing fitspiration posts, muscular-ideal internalisation, appearance comparisons, body satisfaction, and exercise motivation in men. *New Media & Society, 21*(6), 1311–1325. https://doi.org/10.1177/1461444818821064

Feltman, C. E., & Szymanski, D. M. (2017). Instagram use and self-objectification: The roles of internalization, comparison, appearance commentary, and feminism. *Sex Roles*, *78*(5-6), 311–324. https://doi.org/10.1007/s11199-017-0796-1

Festinger, L. (1954). A theory of social comparison processes. *Human Relations, 7*,117–140.doi:10.1177/001872675400700202

Finkenberg, M. E., DiNucci, J. M., McCune, S. L., Chenette, T., & McCoy, P. (1998). Commitment to physical activity and anxiety about physique among college women. *Perceptual and Motor Skills, 87*(3 Pt 2), 1393–1394. https://doi.org /10.2466/pms.1998.87.3f.1393

Fitzsimmons-Craft, E. E., Harney, M. B., Koehler, L. G., Danzi, L. E., Riddell, M. K., & Bardone-Cone, A. M. (2012). Explaining the relation between thin ideal internalization and body dissatisfaction among college women: The roles of social comparison and body surveillance. *Body Image, 9*(1), 43–49. https://doi.org /10.1016/j.bodyim.2011.09.002

Frederick, C. M., & Morrison, C. S. (1996). Social physique anxiety: Personality constructs, motivations, exercise attitudes, and behaviors. *Perceptual and Motor Skills, 82*(3), 963–972. https://doi.org/10.2466/pms.1996.82.3.963

Frederick, D. A., Forbes, G. B., Grigorian, K. E., & Jarcho, J. M. (2007). The UCLA Body

Project I: Gender and ethnic differences in self-objectification and body satisfaction among 2,206 undergraduates. *Sex Roles, 57*(5), 317–327. https://doi.org/10.1007/s11199-007-9251-z

Fredrickson, B.L. & Roberts, T. (1997). Objectification theory: Toward an understanding women's lived experiences and mental health risks. *Psychology of Women Quarterly, 21*, 173-206. doi:10.1111/j.1471-6402.1997.tb00108.

Fredrickson, B. L., Roberts, T.-A., Noll, S. M., Quinn, D. M., & Twenge, J. M. (1998). The swimsuit becomes you: Sex differences in self-objectification, restrained eating, and math performance. Journal of Personality and Social Psychology, 75(1), 269–284. https://doi.org/10.1037/0022-3514.75.1.269

Fuller-Tyszkiewicz, M., Skouteris, H., & McCabe, M. (2013). A re-examination of the benefits of exercise for state body satisfaction: consideration of individual difference factors. *Journal of Sports Sciences, 31*(7), 706–713. https://doi.org.oregonstate.edu/10.1080/02640414.2012.746723

Greenleaf, C. (2005). Self-objectification among physically active women. *Sex Roles, 52*(1), 51–62. https://doi.org/10.1007/s11199-005-1193-8

Grindell, S. (2020, April 21). *A bodybuilder showed how fitness influencers can make their bodies look Instagram-perfect in before-and-after photos*. Insider. https://www.insider.com/bodybuilder-showed-how-fitness-photos-can-be-misleading-2019-10

Guo, Q., & Wu, M. (2021). The relationship between self-objectification and social avoidance among Chinese middle adolescent girls: The mediating role of appearance comparison and self-esteem. *Current Psychology: A Journal for Diverse Perspectives on Diverse*

Psychological Issues. Advance online publication. https://doi.org/10.1007/s12144-021-01705-8

Hagger, M. S., Hein, V., & Chatzisarantis, N. L. D. (2011). Achievement goals, physical self-concept, and social physique anxiety in a physical activity context. *Journal of Applied Social Psychology, 41*(6), 1299–1339. https://doi.org /10.1111/j.1559-1816.2011.00761.x

Hale, B. D., Roth, A. D., DeLong, R. E., & Briggs, M. S. (2010). Exercise dependence and the drive for muscularity in male bodybuilders, power lifters, and fitness lifters. *Body Image, 7*(3), 234–239. https://doi.org/10.1016/j.bodyim.2010.02.001

Halliwell, E., Dittmar, H., & Orsborn, A. (2007). The effects of exposure to muscular male models among men: Exploring the moderating role of gym use and exercise motivation. *Body Image, 4*(3), 278–287. https://doi.org /10.1016/j.bodyim.2007.04.006

Hallsworth, L., Wade, T., & Tiggemann, M. (2005). Individual differences in male body-image: An examination of self-objectification in recreational body builders. *British Journal of Health Psychology*, *10*(3), 453–465. https://doi.org/10.1348/135910705X26966

Hanel, P. H., & Vione, K. C. (2016). Do student samples provide an accurate estimate of the general public?. *PloS one, 11*(12), e0168354. https://doi.org/10.1371/journal.pone.0168354

Hanna, E., Ward, L. M., Seabrook, R. C., Jerald, M., Reed, L., Giaccardi, S., & Lippman, J. R. (2017). Contributions of social comparison and self-objectification in mediating associations between Facebook use and emergent adults' psychological well-being. *Cyberpsychology, Behavior and Social Networking, 20*(3), 172–179. https://doi.org /10.1089/cyber.2016.0247

Hart, E. A., Leary, M. R., & Rejeski, W. J. (1989). The measurement of social physique anxiety.

Journal of Sport & Exercise Psychology, 11(1), 94–104.

Hart, T. A., Flora, D. B., Palyo, S. A., Fresco, D. M., Holle, C., & Heimberg, R. G. (2008). Development and examination of the social appearance anxiety scale. *Assessment, 15*(1), 48–59. https://doi.org /10.1177/1073191107306673

Hausenblas, H. A., & Symons-Downs, D. (2002). Exercise dependence: A systematic review. *Psychology of Sport and Exercise, 3*(2), 89–123. https://doi.org /10.1016/S1469-0292(00)00015-7

Hawkley, L. C, & Cacioppo, J. T. (2010). Loneliness matters: a theoretical and empirical review of consequences and mechanisms. *Annals of Behavioral Medicine, 40*(2), 218–227. https://doi.org/10.1007/s12160-010-9210-8

Hawkley, L. C., Thisted, R. A., & Cacioppo, J. T. (2009). Loneliness predicts reduced physical activity: Cross-sectional & longitudinal analyses. *Health Psychology, 28*(3), 354. https://doi.org/10.1037/a0014400

Hawes, M., Szenczy, A., Klein, D., Hajcak, G., & Nelson, B. (2021). Increases in depression and anxiety symptoms in adolescents and young adults during the COVID-19 pandemic. *Psychological Medicine, 1-9*. doi:10.1017/S0033291720005358

Heath, B., Tod, D. A., Kannis-Dymand, L., & Lovell, G. P. (2016). The relationship between objectification theory and muscle dysmorphia characteristics in men. *Psychology of Men & Masculinity, 17*(3), 297–308. https://doi.org /10.1037/men0000022

Hebl, M. R., King, E. B., & Lin, J. (2016). The swimsuit becomes us all: Ethnicity, Gender, and vulnerability to self-objectification. *Personality & Social Psychology Bulletin, 30*(10), 1322–1331. https://doi.org/10.1177/0146167204264052

Heu, L. C., Hansen, N., Zomeren, M., Levy, A., Ivanova, T. T., Gangadhar, A., & Radwan, M.

(2021). Loneliness across cultures with different levels of social embeddedness: A qualitative study. *Personal Relationships*. Advance online publication. https://doi.org /10.1111/pere.12367

Homan K. (2010). Athletic-ideal and thin-ideal internalization as prospective predictors of body dissatisfaction, dieting, and compulsive exercise. *Body image, 7*(3), 240–245. https://doi.org /10.1016/j.bodyim.2010.02.004

Hurst, R., Hale, B., Smith, D., & Collins, D. (2000). Exercise dependence, social physique anxiety, and social support in experienced and inexperienced bodybuilders and weightlifters. *British Journal of Sports Medicine, 34*(6), 431–435. https://doi.org/10.1136/bjsm.34.6.431

Ingledew, D. K., & Markland, D. (2008). The role of motives in exercise participation. *Psychology & Health, 23*(7), 807–828. https://doi.org /10.1080/08870440701405704

Jung, F. U., & Luck-Sikorski, C. (2019). Overweight and lonely? A representative study on loneliness in obese people and its determinants. *Obesity Facts, 12*(4), 440–447. https://doi.org/10.1159/000500095

Karazsia, B. T., & Crowther, J. H. (2009). Social body comparison and internalization: mediators of social influences on men's muscularity-oriented body dissatisfaction. *Body image, 6*(2), 105–112. https://doi.org /10.1016/j.bodyim.2008.12.003

Karsay, K., Knoll, J., & Matthes, J. (2018). Sexualizing media use and self-objectification: A meta-analysis. *Psychology of Women Quarterly, 42*(1), 9–28. https://doi.org/10.1177/0361684317743019

Kelly, N. R., Cotter, E. W., Tanofsky-Kraff, M., & Mazzeo, S. E. (2015). Racial variations in

binge eating, body image concerns, and compulsive exercise among men. *Psychology of Men & Masculinity, 16*(3), 326-336. http://dx.doi.org /10.1037/a0037585

Lamarche, L., Gammage, K. L., & Ozimok, B. (2018). The gym as a culture of body achievement: Exploring negative and positive body image experiences in men attending university. *SAGE Open.* https://doi.org/10.1177/2158244018778103

Lamp, S. J., Cugle, A., Silverman, A. L., Thomas, M. T., Liss, M., & Erchull, M. J. (2019). Picture perfect: The relationship between selfie behaviors, self-objectification, and depressive symptoms. *Sex Roles*, *81*(11), 704–712. https://doi.org/10.1007/s11199-019-01025-z

Lantz, C.D., Hardy, C. J., & Ainsworth, B. E. (1997). Social physique anxiety and perceived exercise behavior. *Journal of Sport Behavior, 20*(1), 83.

Leary, Mark R. (1992). Self-presentational processes in exercise and sport. *Journal of Sport & Exercise Psychology, 14*(4), 339–351. https://doi.org/10.1123/jsep.14.4.339

Levinson, C. A., Rodebaugh, T. L., Menatti, A. R., & Weeks, J. W. (2013). Validation of the Social Exercise and Anxiety Measure (SEAM): Assessing fears, avoidance, and importance of social exercise. *Journal of Psychopathology and Behavioral Assessment, 35*(2). https://doi.org /10.1007/s10862-012-9326-1

Lichtenstein, M. B., Hinze, C. J., Emborg, B., Thomsen, F., & Hemmingsen, S. D. (2017). Compulsive exercise: links, risks and challenges faced. Psychology research and behavior management, 10, 85–95. https://doi.org/10.2147/PRBM.S113093

Lieberman, M. D. (2013). *Social: Why our brains are wired to connect*. Broadway Books.

Lin, L. F., & Kulik, J. A. (2002). Social comparison and women's body satisfaction. *Basic and*

Applied Social Psychology, 24(2), 115–123. https://doi.org /10.1207/153248302753674622

Lindner, D., & Tantleff-Dunn, S. (2017). The development and psychometric evaluation of the self-objectification beliefs and behaviors scale. *Psychology of Women Quarterly, 41*(2), 254–272. https://doi.org/10.1177/0361684317692109

Litt, D., & Dodge, T. (2008). A longitudinal investigation of the Drive for Muscularity Scale: Predicting use of performance enhancing substances and weightlifting among males. *Body image, 5*(4), 346–351. https://doi.org/10.1016/j.bodyim.2008.04.002

Lorenzen, L. A., Grieve, F. G., & Thomas, A. (2004). Exposure to muscular male models decreases men's body satisfaction. *Sex Roles: A Journal of Research, 51*(11-12), 743–748. https://doi.org/10.1007/s11199-004-0723-0

Luigjes, J., Lorenzetti, V., de Haan, S., Youssef, G. J., Murawski, C., Sjoerds, Z., van den Brink, W., Denys, D., Fontenelle, L. F., & Yücel, M. (2019). Defining compulsive behavior. *Neuropsychology Review, 29*(1), 4–13. https://doi.org/10.1007/s11065-019-09404-9

Lukács, A., Sasvári, P., Varga, B., & Mayer, K. (2019). Exercise addiction and its related factors in amateur runners. *Journal of Behavioral Addictions, 8*(2), 343–349. https://doi.org/10.1556/2006.8.2019.28

Mahalik, J. R., Locke, B. D., Ludlow, L. H., Diemer, M. A., Scott, R. P. J., Gottfried, M., & Freitas, G. (2003). Development of the Conformity to Masculine Norms Inventory. *Psychology of Men & Masculinity, 4*(1), 3–25. https://doi.org/10.1037/1524-9220.4.1.3

Marques, A., Peralta, M., Sarmento, H., Loureiro, V., Gouveia, É. R., & Gaspar de Matos, M. (2019). Prevalence of risk for exercise dependence: A systematic review. *Sports Medicine (Auckland, N.Z.), 49*(2), 319–330. https://doi.org/10.1007/s40279-018-1011-4

Martin, J. J., Kliber, A., Kulinna, P. H., & Fahlman, M. (2006). Social physique anxiety and muscularity and appearance cognitions in college men. *Sex Roles: A Journal of Research, 55*(3-4), 151–158. https://doi.org/10.1007/s11199-006-9069-0

Martin Ginis, K. A., Jung, M. E., & Gauvin, L. (2003). To see or not to see: Effects of exercising in mirrored environments on sedentary women's feeling states and self-efficacy. *Health Psychology, 22*(4), 354–361. https://doi.org /10.1037/0278-6133.22.4.354

Martin Ginis, K. A., Prapavessis, H., & Haase, A. M. (2008). The effects of physique-salient and physique non-salient exercise videos on women's body image, self-presentational concerns, and exercise motivation. *Body Image, 5*(2), 164–172. https://doi.org /10.1016/j.bodyim.2007.11.005

Mayo Clinic. (2019, May 11). *Exercise: 7 benefits of regular physical activity*. https://www.mayoclinic.org/healthy-lifestyle/fitness/in-depth/exercise/art-20048389

McAuley, E., Bane, S. M., Rudolph, D. L., & Lox, C. L. (1995). Physique anxiety and exercise in middle-aged adults. *The Journals of Gerontology. Series B, Psychological Sciences and Social Sciences, 50*(5), P229–P235. https://doi.org /10.1093/geronb/50b.5.p229

McCreary, D. R., & Sasse, D. K. (2000). An exploration of the drive for muscularity in adolescent boys and girls. *Journal of American College Health, 48*(6), 297–304. https://doi.org/10.1080/07448480009596271

McCreary, D. R., & Saucier, D. M. (2009). Drive for muscularity, body comparison, and social physique anxiety in men and women. *Body Image, 6*(1), 24–30. https://doi.org /10.1016/j.bodyim.2008.09.002

McKinley, N. M. (2011). *Continuity and change in self-objectification: Taking a life-span*

approach to women's experiences of objectified body consciousness. In R. M. Calogero, S. Tantleff-Dunn, & J. K. Thompson (Eds.), *Self-objectification in women: Causes, consequences, and counteractions* (p. 101–115). American Psychological Association. https://doi.org/10.1037/12304-005

McKinley, N. M., & Hyde, J. S. (1996). The objectified body consciousness scale: Development and validation. *Psychology of Women Quarterly, 20*(2), 181–215. https://doi.org/10.1111/j.1471-6402.1996.tb00467.x

Melbye, L., Tenenbaum, G., & Eklund, R. (2008). Self-objectification and exercise behaviors: The mediating role of social physique anxiety. *Journal of Applied Biobehavioral Research, 12*(3-4), 196–220. https://doi.org /10.1111/j.1751-9861.2008.00021.x

Mercurio, A. E., & Landry, L. J. (2008). Self-objectification and well-being: The impact of self-objectification on women's overall sense of self-worth and life satisfaction. *Sex Roles: A Journal of Research, 58*(7-8), 458–466. https://doi.org/10.1007/s11199-007-9357-3

Michaels, M. S., Parent, M. C., & Moradi, B. (2013). Does exposure to muscularity-idealizing images have self-objectification consequences for heterosexual and sexual minority men? *Psychology of Men & Masculinity, 14*(2), 175–183. https://doi.org/10.1037/a0027259

Mills, J., Fuller-Tyszkiewicz, M., & Holmes, M. (2014). State body dissatisfaction and social interactions: An experience sampling study. *Psychology of Women Quarterly, 38*(4), 551–562. https://doi.org/10.1177/0361684314521139

Monro, F., & Huon, G. (2005). Media-portrayed idealized images, body shame, and appearance anxiety. *The International Journal of Eating Disorders, 38*(1), 85–90. https://doi.org /10.1002/eat.20153

Mooney, R., Simonato, P., Ruparelia, R., Roman-Urrestarazu, A., Martinotti, G., & Corazza, O.

(2017). The use of supplements and performance and image enhancing drugs in fitness settings: A exploratory cross-sectional investigation in the United Kingdom. *Human Psychopharmacology: Clinical and Experimental, 32*(3), 1–6. https://doi.org/10.1002/hup.2619

Moradi, B. (2010). Addressing gender and cultural diversity in body image: Objectification theory as a framework for integrating theories and grounding research. *Sex Roles: A Journal of Research, 63*(1-2), 138–148. https://doi.org /10.1007/s11199-010-9824-0

Murray, S. B., Griffiths, S., Rieger, E., & Touyz, S. (2014). A comparison of compulsive exercise in male and female presentations of anorexia nervosa: What is the difference? *Advances in Eating Disorders (Abingdon, U. K.), 2*(1), 65–70. https://doi.org/10.1080/21662630.2013.839189

Myers, D. G. (2010). *Social psychology* (Tenth edition.). McGraw-Hill.

Myers, T. A., & Crowther, J. H. (2009). Social comparison as a predictor of body dissatisfaction: A meta-analytic review. *Journal of Abnormal Psychology, 118*(4), 683–698. https://doi.org /10.1037/a0016763

Nicolaisen, M., & Thorsen, K. (2014). Who are lonely? Loneliness in different age groups (18–81 years old), using two measures of loneliness. *The International Journal of Aging and Human Development*, *78*(3), 229–257. https://doi.org/10.2190/AG.78.3.b

Noll, S. M., & Fredrickson, B. L. (1998). A mediational model linking self-objectification, body shame, and disordered eating. *Psychology of Women Quarterly, 22*, 623-636. https://doi.org /10.1111/j.1471-6402.1998.tb00181.x

Noser, A., & Zeigler-Hill, V. (2014). Investing in the ideal: Does objectified body consciousness

mediate the association between appearance contingent self-worth and appearance self-esteem in women? *Body Image, 11*(2), 119–125. https://doi.org /10.1016/j.bodyim.2013.11.006

O'Brien, K. S., Caputi, P., Minto, R., Peoples, G., Hooper, C., Kell, S., & Sawley, E. (2009). Upward and downward physical appearance comparisons: development of scales and examination of predictive qualities. *Body Image, 6*(3), 201–206. https://doi.org /10.1016/j.bodyim.2009.03.003

Oehlhof, M. E., Musher-Eizenman, D. R., Neufeld, J. M., & Hauser, J. C. (2009). Self-objectification and ideal body shape for men and women. *Body image, 6*(4), 308–310. https://doi.org/10.1016/j.bodyim.2009.05.002

Page, R. M., & Hammermeister, J. (1995). Shyness and loneliness: relationship to the exercise frequency of college students. *Psychological Reports, 76*(2), 395–398. https://doi.org/10.2466/pr0.1995.76.2.395

Parent, & Moradi, B. (2011). His biceps become him: A test of objectification theory's application to drive for muscularity and propensity for steroid use in college men. *Journal of Counseling Psychology, 58*(2), 246–256. https://doi.org/10.1037/a0021398

Pels, F., & Kleinert, J. (2016). Loneliness and physical activity: A systematic review. *International Review of Sport and Exercise Psychology, 9*(1), 231–260. https://doi.org /10.1080/1750984X.2016.1177849

Peplau, L. A., & Perlman, D. (1982). *Loneliness a sourcebook of current theory, research, and therapy* (pp.81-104). Wiley.

Pinto, A. de A., Oppong Asante, K., Puga Barbosa, R. M. dos S., Nahas, M. V., Dias, D. T., &

Pelegrini, A. (2021). Association between loneliness, physical activity, and participation in physical education among adolescents in Amazonas, Brazil. *Journal of Health Psychology, 26*(5), 650–658. https://doi.org/10.1177/1359105319833741

Pope Jr, H. G., Gruber, A. J., Choi, P., Olivardia, R., & Phillips, K. A. (1997). Muscle dysmorphia: An underrecognized form of body dysmorphic disorder. *Psychosomatics, 38*(6), 548-557.

Preacher, K. J., Rucker, D. D., & Hayes, A. F. (2007). Addressing moderated mediation hypotheses: Theory, methods, and prescriptions. *Multivariate Behavioral Research, 42*(1), 185– 227. https://doi.org/10.1080/00273170701341316

Prichard, I., & Tiggemann, M. (2005). Objectification in fitness centers: Self-objectification, body dissatisfaction, and disordered eating in aerobic instructors and aerobic participants. *Sex Roles: A Journal of Research, 53*(1-2), 19–28. https://doi-org.ezproxy.proxy.library.oregonstate.edu/10.1007/s11199-005-4270-0

Prichard, I., & Tiggemann, M. (2008). Relations among exercise type, self-objectification, and body image in the fitness centre environment: The role of reasons for exercise. *Psychology of Sport and Exercise, 9*(6), 855–866. https://doi.org/10.1016/j.psychsport.2007.10.005

Pritchard, M. E., & Yalch, K. L. (2009). Relationships among loneliness, interpersonal dependency, and disordered eating in young adults. *Personality and Individual Differences, 46*(3), 341-346.

Richard, A., Rohrmann, S., Vandeleur, C. L., Schmid, M., Barth, J., & Eichholzer, M. (2017).

Loneliness is adversely associated with physical and mental health and lifestyle factors: Results from a Swiss national survey. *PloS one, 12*(7), e0181442. https://doi.org/10.1371/journal.pone.0181442

Rico-Uribe, L. A., Caballero, F. F., Martín-María, N., Cabello, M., Ayuso-Mateos, J. L., & Miret, M. (2018). Association of loneliness with all-cause mortality: A meta-analysis. *PloS one, 13*(1), e0190033. https://doi.org/10.1371/journal.pone.0190033

Roberts T.-A., & Gettman, J. Y. (2004). Mere exposure: Gender differences in the negative effects of priming a state of self-objectification. *Sex Roles, 51*(1), 17–27. https://doi.org/10.1023/B:SERS.0000032306.20462.22

Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs: General and Applied, 80*(1), 1–28. https://doi.org/10.1037/h0092976

Russell, D. (1996). UCLA Loneliness Scale (Version 3): Reliability, validity, and factor structure. *Journal of Personality Assessment, 66*, 20-40.

Russell, W. D. (2002). Comparison of self-esteem, body satisfaction, and social physique anxiety across males of different exercise frequency and racial background. *Journal of Sport Behavior, 25*(1), 74–90.

Salvatore, J. & Marecek, J. (2010). Gender in the gym: Evaluation concerns as barriers to women's weight lifting. *Sex Roles, 63*(7-8), 556–567. https://doi.org/10.1007/s11199-010-9800-8

Sanchez, D. T., & Broccoli, T. L. (2008). The Romance of self-objectification: Does priming romantic relationships induce states of self-objectification among women? *Sex Roles*, *59*(7), 545–554. https://doi.org/10.1007/s11199-008-9451-1

Savolainen, I., Oksanen, A., Kaakinen, M., Sirola, A., & Paek, H. J. (2020). The role of perceived loneliness in youth addictive behaviors: Cross-national survey study. JMIR Mental Health, 7(1), e14035. https://doi.org/10.2196/14035

Schaefer, L. M., Harriger, J. A., Heinberg, L. J., Soderberg, T., & Kevin Thompson, J. (2017). Development and validation of the sociocultural attitudes towards appearance questionnaire-4-revised (SATAQ-4R). *The International Journal of Eating Disorders, 50*(2), 104–117. https://doi.org /10.1002/eat.22590

Scheel, C. N., Eisenbarth, H., & Rentzsch, K. (2020). Assessment of different dimensions of shame proneness: Validation of the SHAME. Assessment, 27(8), 1699–1717. https://doi.org/10.1177/1073191118820130

Schneider, C., Rollitz, L., Voracek, M., & Hennig-Fast, K. (2016). Biological, psychological, and sociocultural factors contributing to the drive for muscularity in weight-training men. *Frontiers in Psychology, 7*, Article 1992. https://doi.org /10.3389/fpsyg.2016.01992

Schvey, N. A., Sbrocco, T., Bakalar, J. L., Ress, R., Barmine, M., Gorlick, J., Pine, A., Stephens, M., & Tanofsky-Kraff, M. (2017). The experience of weight stigma among gym members with overweight and obesity. *Stigma and Health, 2*(4), 292–306. https://doi.org /10.1037/sah0000062

Selensky, J. C., & Carels, R. A. (2021). Weight stigma and media: An examination of the effect of advertising campaigns on weight bias, internalized weight bias, self-esteem, body image, and affect. *Body Image, 36*, 95–106. https://doi.org/10.1016/j.bodyim.2020.10.008

Silberstein, L. R., Striegel-Moore, R. H., Timko, C., & Rodin, J. (1988). Behavioral and psychological implications of body dissatisfaction: Do men and women differ? *Sex Roles: A Journal of Research, 19*(3-4), 219–232. https://doi.org/10.1007/BF00290156

Skowronski, M., Busching, R., & Krahé, B. (2022). Links between exposure to sexualized Instagram images and body image concerns in girls and boys. *Journal of Media Psychology: Theories, Methods, and Applications, 34*(1), 55–62. https://doi.org /10.1027/1864-1105/a000296

Smolak, L., Murnen, S. K., & Thompson, J. K. (2005). Sociocultural influences and muscle building in adolescent boys. *Psychology of Men & Masculinity, 6*(4), 227–239. https://doi.org/10.1037/1524-9220.6.4.227

Spink, K. S. (1992). Relation of anxiety about social physique to location of participation in physical activity. *Perceptual and Motor Skills, 74*(3, Pt 2), 1075–1078. https://doi.org /10.2466/PMS.74.4.1075-1078

Strelan, P., & Hargreaves, D. (2005). Reasons for exercise and body esteem: Men's responses to self-objectification. *Sex Roles: A Journal of Research, 53*(7-8), 495–503. https://doi.org/10.1007/s11199-005-7137-5

Sun Q. (2018). Materialism, body surveillance, body shame, and body dissatisfaction: Testing a mediational model. *Frontiers in Psychology, 9*, 2088. https://doi.org/10.3389/fpsyg.2018.02088

Teng, F., Gao, W., Huang, X., & Poon, K.-T. (2019). Body surveillance predicts men's and women's perceived loneliness: A serial mediation model. Sex Roles: A Journal of Research, 81(1-2), 97–108. https://doi.org /10.1007/s11199-018-0977-6

Tharayil, D. P. (2012). Developing the university of the Philippines loneliness assessment scale: a cross-cultural measurement. *Social Indicators Research, 106*(2), 307–321. https://doi.org/10.1007/s11205-011-9805-x

Thome, J. L., & Espelage, D. L. (2007). Obligatory exercise and eating pathology in college

females: Replication and development of a structural model. *Eating Behaviors, 8*(3), 334–349. https://doi.org/10.1016/j.eatbeh.2006.11.009

Thompson, J. K., & Pasman, L. (1991). The Obligatory Exercise Questionnaire. *Behavior Therapist, 14*, 137.

Thompson, J. K., van den Berg, P., Roehrig, M., Guarda, A. S., & Heinberg, L. J. (2004). The Sociocultural Attitudes Towards Appearance Scale-3 (SATAQ-3): Development and validation. *The International Journal of Eating Disorders, 35*(3), 293–304. https://doi.org /10.1002/eat.10257

Tiggemann, M., & Lynch, J. E. (2001). Body image across the life span in adult women. *Developmental Psychology, 37*(2), 243–253. https://doi.org/10.1037/0012-1649.37.2.243

Tiggemann, M., & Zaccardo, M. (2015). "Exercise to be fit, not skinny": The effect of fitspiration imagery on women's body image. *Body Image, 15*, 61–67. https://doi.org/10.1016/j.bodyim.2015.06.003

Torres, H. L., & Gore-Felton, C. (2007). Compulsivity, substance use, and loneliness: The Loneliness and Sexual Risk Model (LSRM). *Sexual Addiction & Compulsivity, 14*(1), 63–75. https://doi.org/10.1080/10720160601150147

Tylka, T. L., & Sabik, N. J. (2010). Integrating social comparison theory and self-esteem within objectification theory to predict women's disordered eating. *Sex Roles: A Journal of Research, 63*(1-2), 18–31. https://doi.org /10.1007/s11199-010-9785-3

VanKim, N. A., & Nelson, T. F. (2013). Vigorous physical activity, mental health, perceived stress, and socializing among college students. *American Journal of Health Promotion, 28*(1), 7–15. https://doi.org/10.4278/ajhp.111101-QUAN-395

van Baarsen, B., Snijders, T. A. B., Smit, J. H., & van Duijn, M. A. J. (2001). Lonely but not

alone: Emotional isolation and social isolation as two distinct dimensions of loneliness in older people. *Educational and Psychological Measurement*, *61*(1), 119–135. https://doi.org/10.1177/00131640121971103

Ward, L. M. (2016). Media and sexualization: State of empirical research, 1995-2015. *The Journal of Sex Research, 53*(4-5), 560-577. doi:10.1080/00224499.2016.1142496

Woodward, K., McIlwain, D., & Mond, J. (2019). Feelings about the self and body in eating disturbances: The role of internalized shame, self-esteem, externalized self-perceptions, and body shame. *Self and Identity, 18*(2), 159–182. https://doi.org/10.1080/15298868.2017.1403373

Yang, C.-C. (2016). Instagram use, loneliness, and social comparison orientation: Interact and browse on social media, but don't compare. *Cyberpsychology, Behavior, and Social Networking*, *19*(12), 703–708. https://doi.org /10.1089/cyber.2016.0201

Figure 1

Proposed Moderated Mediator Models for Divergent Outcomes of Self-Objectification.

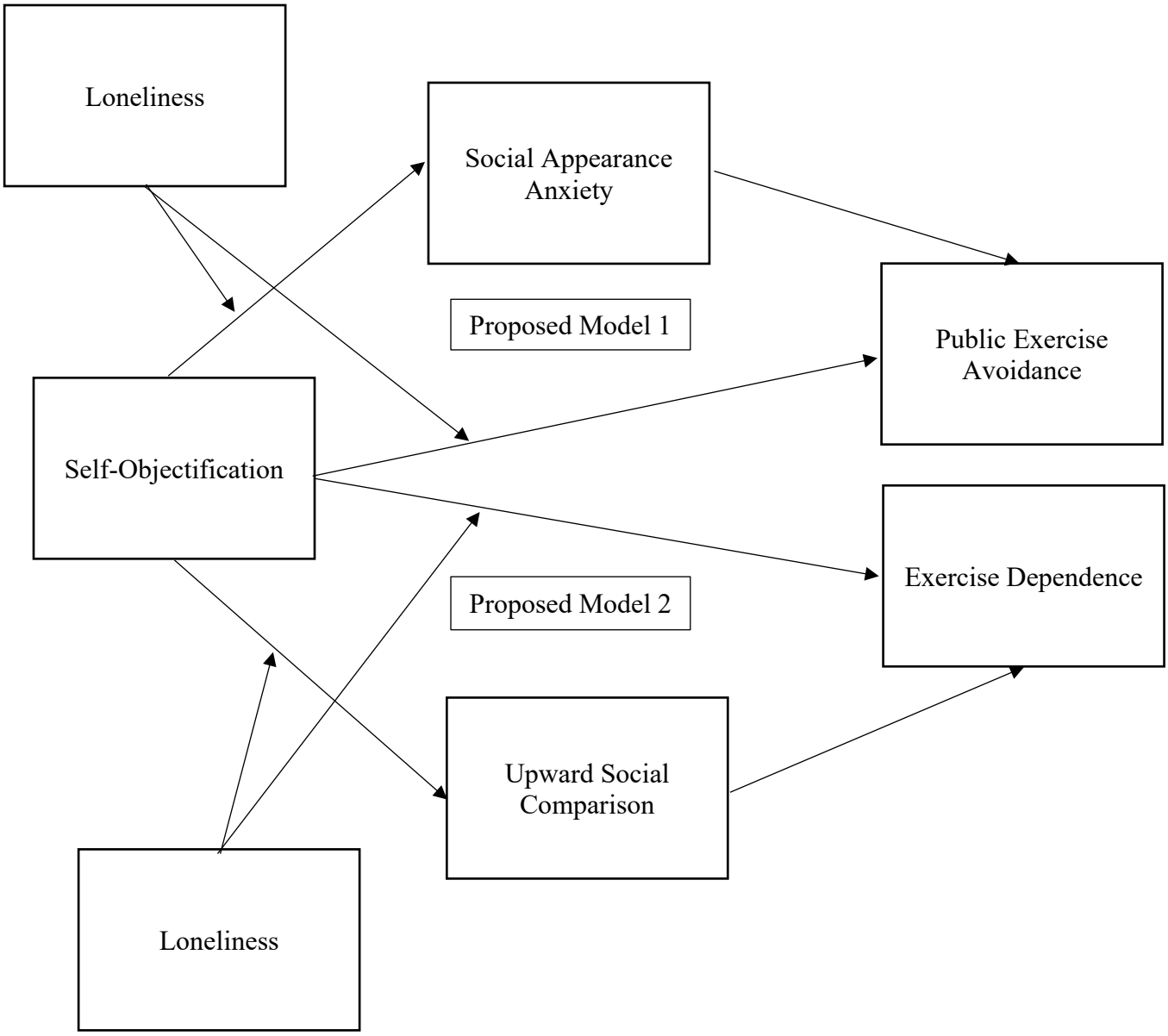


Figure 2

The Mediating Effect of Social Appearance Anxiety on Self-Objectification and Public Exercise Avoidance Controlling for Gender and BMI

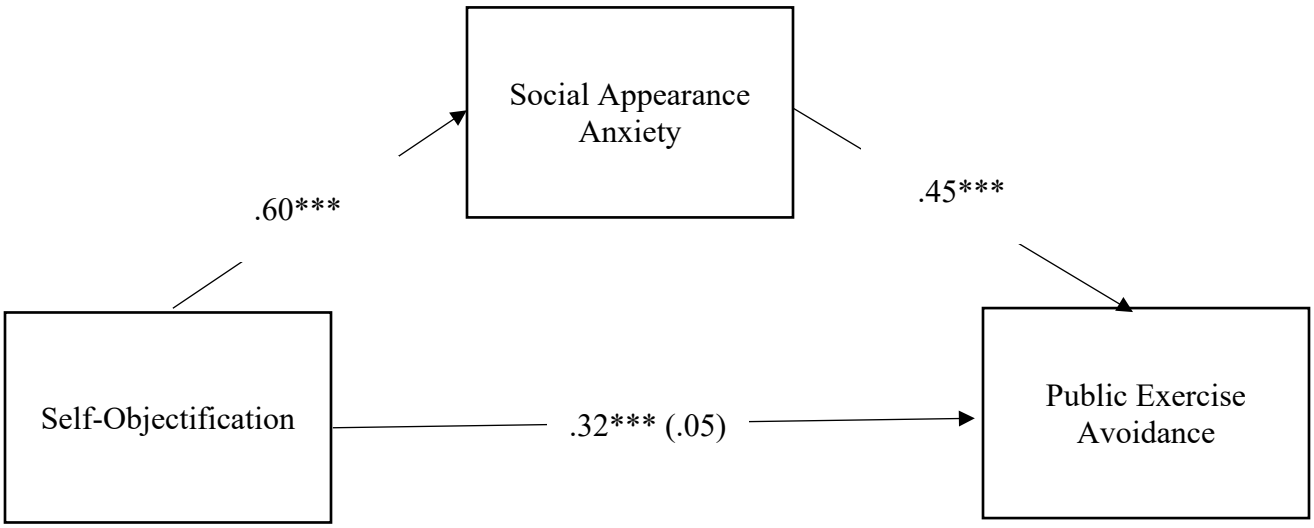


*Figure 2***.** Standardized coefficients for the relationship between self-objectification and public exercise avoidance as mediated by social appearance anxiety. The standardized coefficient between self-objectification and public exercise avoidance, controlling for social appearance anxiety, is in the parenthesis.

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

Figure 3

The Mediating Effect of Upward Appearance Comparison on Self-Objectification and Exercise Dependence Controlling for Gender and BMI

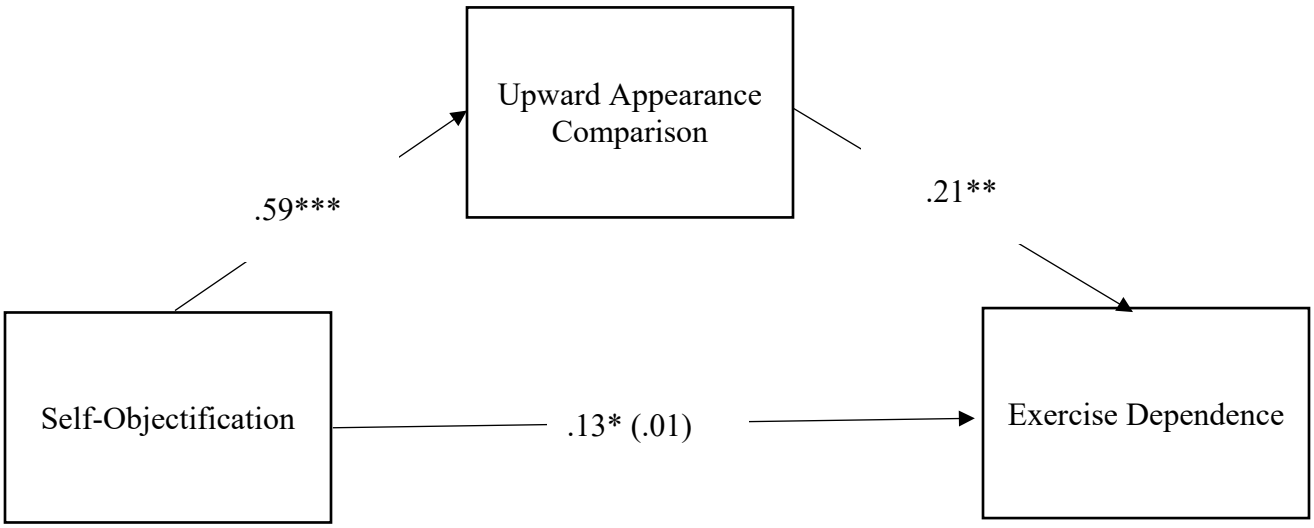


*Figure 3***.** Standardized coefficients for the relationship between self-objectification and exercise dependence as mediated by upward appearance comparison. The standardized coefficient between self-objectification and exercise dependence, controlling for upward appearance comparison, is in the parenthesis.

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

Figure 4

The Mediating Effect of Upward Appearance Comparison on Self-Objectification and Public Exercise Avoidance Controlling for Gender And BMI

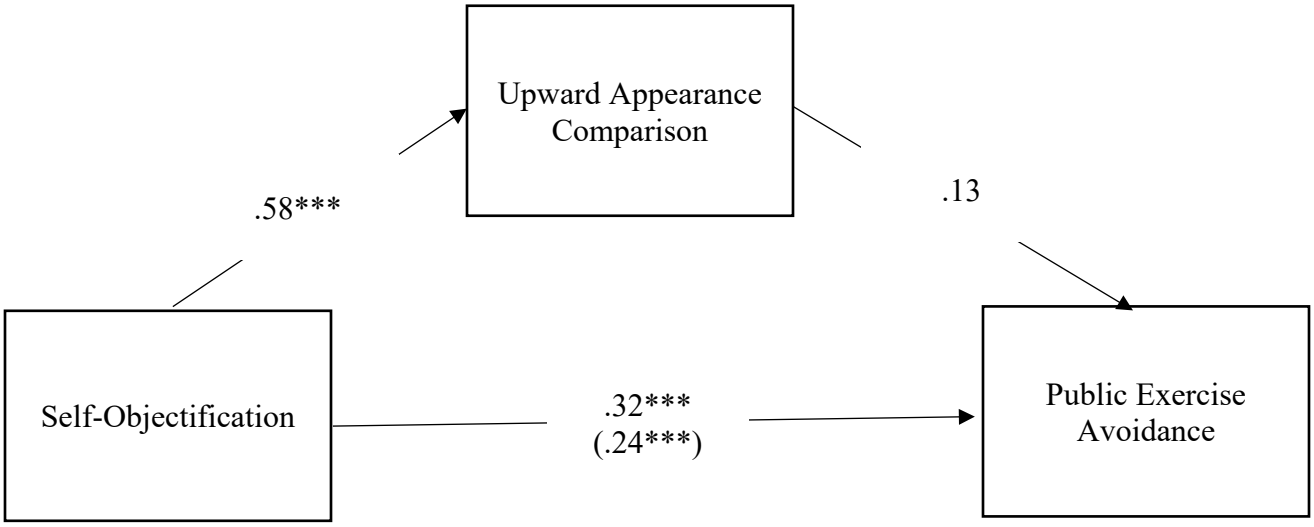


*Figure 4***.** Standardized coefficients for the relationship between self-objectification and public exercise avoidance as mediated by upward appearance comparison. The standardized coefficient between self-objectification and public exercise avoidance, controlling for upward appearance comparison, is in the parenthesis.

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

Figure 5

The Mediating Effect of Social Appearance Anxiety on Self-Objectification and Exercise Dependence Controlling for Gender and BMI

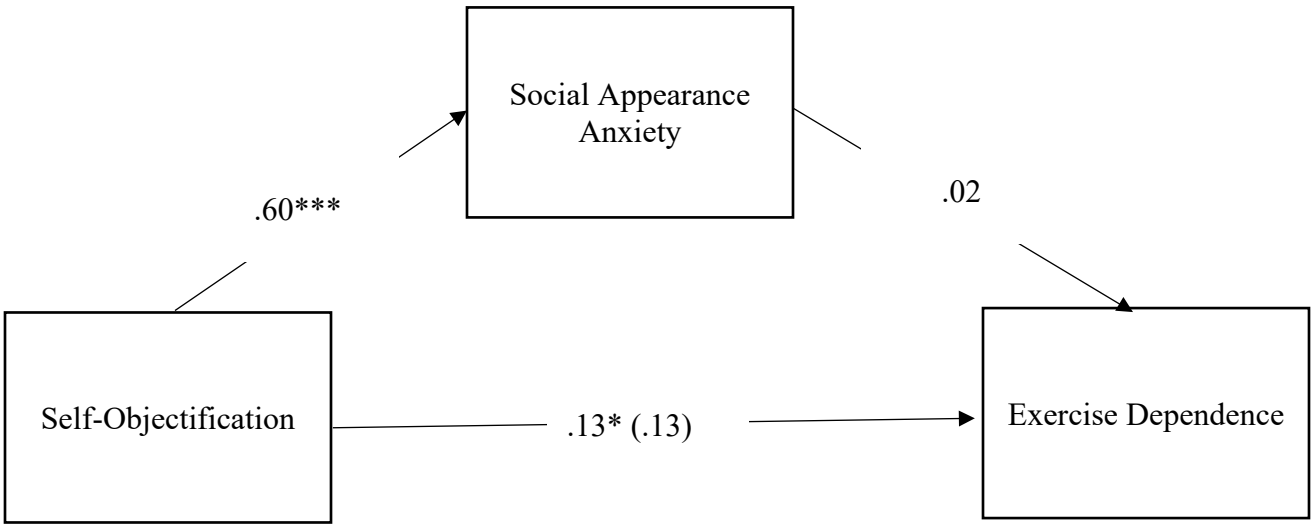
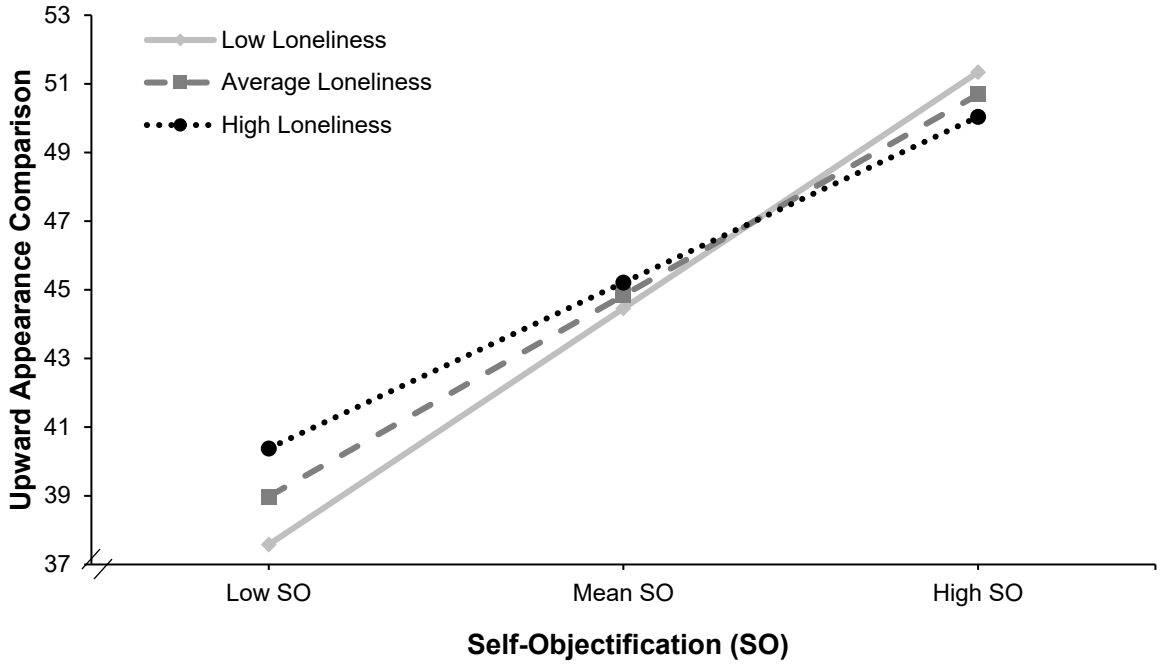


*Figure 5***.** Standardized coefficients for the relationship between self-objectification and exercise dependence as mediated by social appearance anxiety. The standardized coefficient between self-objectification and exercise dependence, controlling for social appearance anxiety, is in the parenthesis.

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

Figure 6

Simple slopes of loneliness moderating the effects of self-objectification on upward appearance comparison



Note: Conditional values for loneliness at -1 *SD* is -10.83 (low loneliness), mean is 0 (mean loneliness), and +1 *SD* is 10.83 (high loneliness).

Figure 7
Moderated Mediation Model 1.

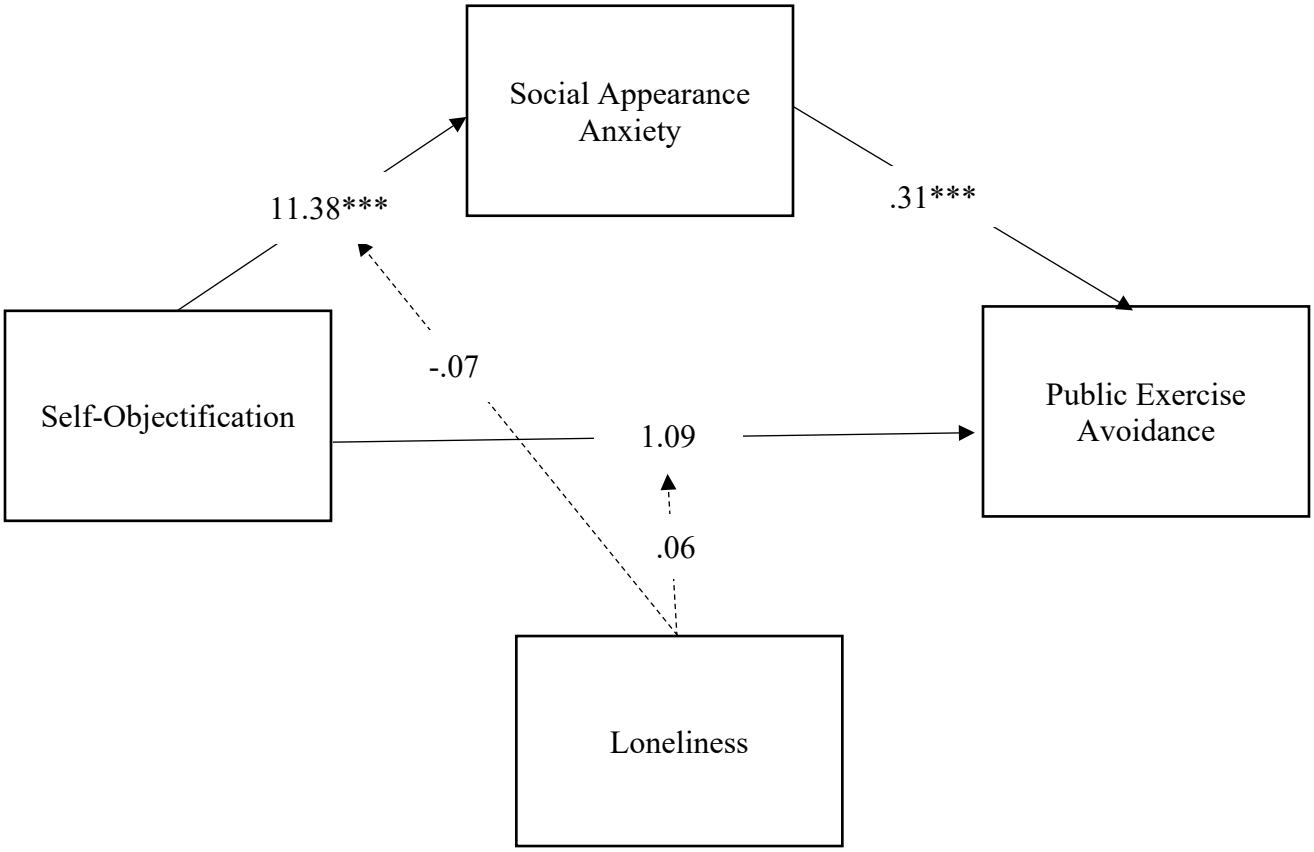


*Figure 7***.** Unstandardized coefficients for the relationship between self-objectification and public exercise avoidance mediated by social appearance anxiety and moderated by loneliness controlling for gender and BMI.
*$p < .05$, **$p < .01$, ***$p < .001$

Figure 8

Moderated Mediation Model 2.

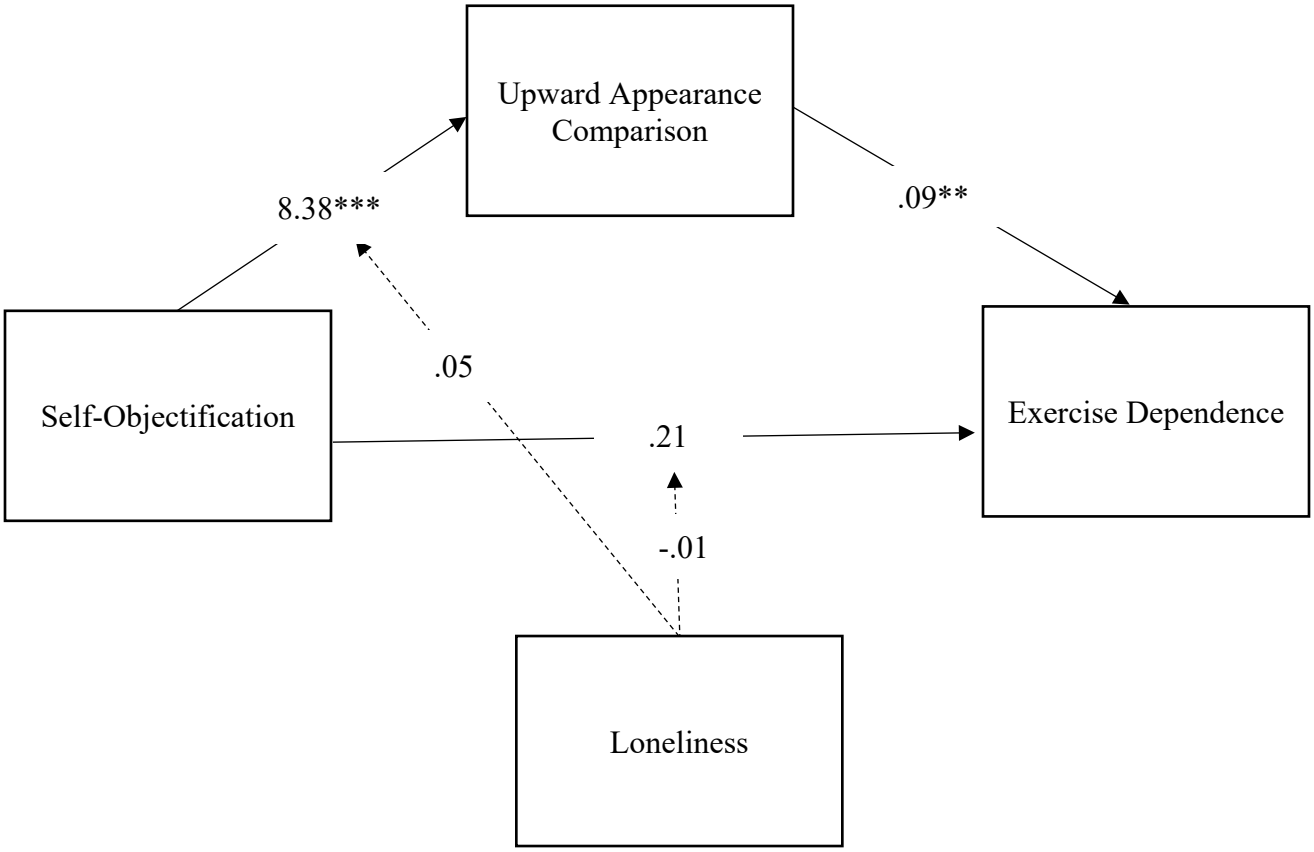


*Figure 8***.** Unstandardized coefficients for the relationship between self-objectification and exercise dependence mediated by upward appearance comparison and moderated by loneliness controlling for gender and BMI.

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

Table 1

Demographic Characteristics and Mean Scores of Study Variables

	Overall (n = 300)	Men (n = 72)	Women (n = 229)	χ^2 statistic
Mean age (in years)	19.79 (SD = 2.52)	20.57 (SD = 3.13)	19.54 (SD = 2.24)	
Race	229 White 4 Black/African American 2 American Indian/Alaskan Native 30 Asian 1 Pacific Islander/Native Hawaiian 9 Other 21 Multiracial 4 Prefer not to say	49 White 2 Black/African American 2 American Indian/Alaskan Native 13 Asian 1 Other 4 Multiracial 1 Prefer not to say	180 White 2 Black/African American 17 Asian 1 Pacific Islander/Native Hawaiian 8 Other 17 Multiracial 3 Prefer not to say	
Sexual Orientation	232 Heterosexual 7 Homosexual 45 Bisexual 2 Asexual 11 Pansexual 3 Other	63 Heterosexual 3 Homosexual 4 Bisexual 2 Pansexual	169 Heterosexual 4 Homosexual 41 Bisexual 2 Asexual 9 Pansexual 3 Other	
BMI	23.39 (SD = 4.96)	23.29 (SD = 4.67)	23.43 (SD = 5.05)	χ^2 (208, N = 300) = 260.89**
Mean self-objectification (SOBBS)	2.91 (SD =.70)	2.87 (SD = .72)	2.92 (SD = .69)	χ^2 (47, N = 300) = 44.05
Mean Loneliness (UCLA-3)	46.06 (SD = 10.83)	47.03 (SD = 10.93)	45.75 (SD = 10.80)	χ^2 (46, N = 300) = 54.63
Social Appearance Anxiety (SAAS)	45.25 (SD = 16.00)	39.90 (SD = 14.67)	46.93 (SD = 16.06)	χ^2 (62, N = 300) = 83.21*
Upward Appearance Comparison (UPACS - M)	44.52 (SD = 10.43)	38.39 (SD = 10.98)	46.46 (SD = 9.48)	χ^2 (44, N = 300) = 105.32***
Public Exercise Avoidance (GA – M)	31.75 (SD = 13.90)	24.26 (SD = 11.34)	34.11 (SD = 13.81)	χ^2 (48, N = 300) = 55.94

Exercise Dependence (CES)[a]	16.57 (*SD* = 4.45)	17.94 (*SD* = 4.30)	16.10 (*SD* = 4.42)	χ^2 (22, *N* = 274) = 23.78

Note: [a]Overall *n* for Exercise Dependence was 274 (men = 69, women = 205) because CES was not administered to participants who did not participate in structured physical activity over the past 3 years.

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

Table 2

Reassignment of "Other" Category Response by Primary Exercise Motivation

Written "Other" Response	New Category
"For fun"	Psychological well-being
"Enjoyment"	Psychological well-being
"Exercising clears my head and is beneficial to both my physical and mental health"	Psychological well-being
"I needed a PAC credit"	Skills
"Sports"	Skills

Table 3

Bivariate Correlations Between Study Variables

	n	*M*	*SD*	1.	2.	3.	4.	5.	6.	7.
1. BMI	300	23.39	4.96	1.00						
2. Self-Objectification	300	2.91	.70	.09	1.00					
3. Loneliness	300	46.06	10.83	.13*	.31*	1.00				
4. Social Appearance Anxiety	300	45.25	16.00	.29**	.62**	.49**	1.00			
5. Upward Appearance Comparison	300	44.52	10.43	.03	.59**	.20**	.56*	1.00		
6. Public Exercise Avoidance	300	31.75	13.90	.23**	.34**	.37**	.55**	.36**	1.00	
7. Exercise Dependence	274	16.57	4.45	-.11	.13*	-.04	.03	.13*	-.27**	1.00

*$p < .05$ (2-tailed), **$p < .01$ (2-tailed)

Table 4

ANCOVA Results and Descriptive Statistics for Self-Objectification by Exercise Participation with Gender and BMI as Covariates

Exercise Participation		Self-objectification			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	3.12	.62	3.10	.08
Currently exercising	228	2.84	.71	2.85	.05

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	.02	1	.02	.04	.00
BMI	.49	1	.49	1.03	.00
Exercise Participation	3.40	1	3.40	7.11**	.02
Error	141.65	296	.48		

Note: R^2 Squared = .03, Adj. R^2 = .02, adjustments based on gender mean = .76, BMI = 23.39

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

Table 5

ANCOVA Results and Descriptive Statistics for Loneliness by Exercise Participation with Gender and BMI as Covariates

Exercise Participation		Loneliness			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	51.38	10.84	51.25	1.25
Currently exercising	228	44.38	10.29	44.42	.69

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	233.67	1	233.67	2.17	.01
BMI	219.43	1	219.43	2.03	.01
Exercise Participation	2420.88	1	2420.88	22.44***	.07
Error	31936.27	296	107.89		

Note: R^2 Squared = .09, Adj. R^2 = .08, adjustments based on gender mean = .76, BMI = 23.39

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

Table 6

ANCOVA Results and Descriptive Statistics for Social Appearance Anxiety by Exercise Participation with Gender and BMI as Covariates

Exercise Participation		Social Appearance Anxiety			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	53.54	16.58	51.67	1.76
Currently exercising	228	42.63	14.92	43.22	.98

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	1917.43	1	1917.43	8.89**	.03
BMI	4301.88	1	4301.88	19.94***	.06
Exercise Participation	3704.22	1	3704.22	17.17***	.06
Error	63873.55	296	215.79		

Note: R^2 Squared = .17, Adj. R^2 = .16, adjustments based on gender mean = .76, BMI = 23.39

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

Table 7

ANCOVA Results and Descriptive Statistics for Upward Appearance Comparison by Exercise Participation with Gender and BMI as Covariates

Exercise Participation		Upward Appearance Comparison			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	46.06	10.39	45.29	1.19
Currently exercising	228	44.04	10.42	44.28	.66
Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	3408.39	1	3408.39	34.90***	.11
BMI	11.47	1	11.47	.12	.00
Exercise Participation	53.64	1	53.64	.55	.00
Error	28905.77	296	97.66		

Note: R^2 Squared = .11, Adj. R^2 = .10, adjustments based on gender mean = .76, BMI = 23.39

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

Table 8

ANCOVA Results and Descriptive Statistics for Public Exercise Avoidance by Exercise Participation with Gender and BMI as Covariates

Measure		Public Exercise Avoidance			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	40.53	13.67	38.96	1.48
Currently exercising	228	28.97	12.80	29.47	.82
Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	4082.49	1	4082.49	26.93***	.08
BMI	1553.48	1	1553.48	10.25**	.03
Exercise Participation	4669.34	1	4669.34	30.81***	.09
Error	44867.39	296	151.58		

Note: R^2 Squared = .22, Adj. R^2 = .22, adjustments based on gender mean = .76, BMI = 23.39

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

Table 9

ANCOVA Results and Descriptive Statistics for Exercise Dependence by Exercise Participation with Gender and BMI as Covariates

Measure		Exercise Dependence			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	46	14.37	4.02	14.64	.65
Currently exercising	228	17.01	4.41	16.96	.29

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	144.17	1	144.17	7.80**	.03
BMI	17.49	1	17.49	.947	.00
Exercise Participation	193.41	1	193.41	10.47**	.04
Error	4988.65	270	18.48		

Note: R^2 Squared = .08, Adj. R^2 = .07, adjustments based on gender mean = .75, BMI = 23.36

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

Table 10

ANCOVA Results and Descriptive Statistics for Self-Objectification by Exercise Location with Gender and BMI as Covariates

Exercise Location		Self-objectification			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	3.12	.62	3.10	.08
Gym	136	2.88	.74	2.89	.06
Outdoors	56	2.85	.67	2.85	.09
Home	32	2.68	.67	2.68	.12

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	.07	1	.07	.16	.00
BMI	.60	1	.60	1.25	.00
Exercise location	4.37	3	1.46	3.04*	.03
Error	138.98	290	.48		

Note: R^2 Squared = .04, Adj. R^2 = .02, adjustments based on gender mean = .76, BMI = 23.35

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

Table 11

Pairwise Comparisons and Mean Differences in Self-Objectification by Exercise Location Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Gym	.21*	.10	.001	.41
Not currently exercising vs. Outdoors	.25*	.13	.002	.49
Not currently exercising vs. Home	.42**	.15	.13	.71
Gym vs. Outdoors	.04	.11	-.17	.26
Gym vs. Home	.21	.14	-.05	.48
Outdoors vs. Home	.17	.15	-.13	.47

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

Table 12

ANCOVA Results and Descriptive Statistics for Loneliness by Exercise Location with Gender and BMI as Covariates

Exercise Location		Loneliness			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	51.38	10.84	51.22	1.26
Gym	136	44.57	10.21	44.65	.91
Outdoors	56	44.30	10.71	44.26	1.40
Home	32	43.63	10.70	43.68	1.85

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	203.52	1	203.52	1.85	.01
BMI	223.56	1	223.56	2.04	.01
Exercise location	2418.38	3	806.13	7.34***	.07
Error	31852.85	290	109.84		

Note: R^2 Squared = .09, Adj. R^2 = .07, adjustments based on gender mean = .76, BMI = 23.35

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

Table 13

Pairwise Comparisons and Mean Differences in Loneliness by Exercise Location Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Gym	6.56*	1.57	3.47	9.66
Not currently exercising vs. Outdoors	6.96*	1.89	3.24	10.68
Not currently exercising vs. Home	7.54*	2.24	3.12	11.95
Gym vs. Outdoors	.39	1.67	-2.89	3.67
Gym vs. Home	.97	2.06	-3.09	5.03
Outdoors vs. Home	.58	2.32	-3.99	5.15

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

Table 14

ANCOVA Results and Descriptive Statistics for Social Appearance Anxiety by Exercise Location with Gender and BMI as Covariates

Exercise Location	Social Appearance Anxiety				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	53.54	16.58	51.60	1.78
Gym	136	42.79	14.74	43.70	1.28
Outdoors	56	42.36	15.73	42.68	1.98
Home	32	42.22	15.47	42.21	2.62

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	2039.34	1	2039.34	9.31**	.03
BMI	4355.35	1	4355.35	19.89***	.06
Exercise location	3718.38	3	1239.46	5.66**	.06
Error	63503.73	290	218.98		

Note: R^2 Squared = .17, Adj. R^2 = .16, adjustments based on gender mean = .76, BMI = 23.35

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

Table 15

Pairwise Comparisons and Mean Differences in Social Appearance Anxiety by Exercise Location Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Gym	7.90***	2.22	3.52	12.27
Not currently exercising vs. Outdoors	8.96**	2.67	3.71	14.2
Not currently exercising vs. Home	9.39**	3.17	3.16	15.62
Gym vs. Outdoors	1.07	2.35	-3.57	5.70
Gym vs. Home	1.50	2.91	-4.24	7.23
Outdoors vs. Home	.43	3.28	-6.02	6.89

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

Table 16

ANCOVA Results and Descriptive Statistics for Upward Appearance Comparison by Exercise Location with Gender and BMI as Covariates

Exercise Location	Upward Appearance Comparison				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	46.06	10.39	45.24	1.18
Gym	136	44.97	10.37	45.32	.85
Outdoors	56	44.38	8.65	44.64	1.31
Home	32	39.66	12.81	39.52	1.73

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	3671.49	1	3671.49	38.45***	.12
BMI	27.95	1	27.95	.29	.00
Exercise location	927.11	3	309.04	3.23*	.03
Error	27689.03	290	95.48		

Note: R^2 Squared = .14, Adj. R^2 = .13, adjustments based on gender mean = .76, BMI = 23.35

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

Table 17

Pairwise Comparisons and Mean Differences in Upward Appearance Comparison by Exercise Location Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Gym	-.08	1.47	-2.97	2.81
Not currently exercising vs. Outdoors	.60	1.76	-2.87	4.07
Not currently exercising vs. Home	5.73**	2.09	1.61	9.84
Gym vs. Outdoors	.68	1.55	-2.38	3.74
Gym vs. Home	5.81**	1.92	2.02	9.59
Outdoors vs. Home	5.13*	2.17	.86	9.39

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

Table 18

ANCOVA Results and Descriptive Statistics for Public Exercise Avoidance by Exercise Location with Gender and BMI as Covariates

Exercise Location	Public Exercise Avoidance				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	40.53	13.67	39.00	1.47
Gym	136	26.88	11.97	27.57	1.06
Outdoors	56	31.93	13.28	32.25	1.63
Home	32	33.25	14.25	33.15	2.16

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	3961.20	1	3961.20	26.53***	.08
BMI	1369.60	1	1369.60	9.17**	.03
Exercise location	5885.75	3	1961.92	13.14***	.12
Error	43294.03	290	149.29		

Note: R^2 Squared = .25, Adj. R^2 = .23, adjustments based on gender mean = .76, BMI = 23.35

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

Table 19

Pairwise Comparisons and Mean Differences in Public Exercise Avoidance by Exercise Location Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Gym	11.43***	1.84	7.82	15.04
Not currently exercising vs. Outdoors	6.76**	2.20	2.42	11.09
Not currently exercising vs. Home	5.85*	2.61	.71	11.00
Gym vs. Outdoors	-4.68*	1.94	-8.50	-.85
Gym vs. Home	-5.58*	2.41	-10.31	-.84
Outdoors vs. Home	-.90	2.71	-6.23	4.43

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

Table 20

ANCOVA Results and Descriptive Statistics for Exercise Dependence by Exercise Location with Gender and BMI as Covariates

Exercise Location		Exercise Dependence			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	46	14.37	4.02	14.60	.64
Gym	136	17.58	4.46	17.51	.37
Outdoors	56	15.91	4.09	15.88	.57
Home	32	16.03	4.12	16.07	.75

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	112.13	1	112.13	6.25*	.02
BMI	12.13	1	12.13	.68	.00
Exercise location	312.71	3	104.24	5.81***	.06
Error	4735.69	264	17.94		

Note: R^2 Squared = .10, Adj. R^2 = .08, adjustments based on gender mean = .75, BMI = 23.31

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

Table 21

Pairwise Comparisons and Mean Differences in Exercise Dependence by Exercise Location Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Gym	-2.91***	.75	-4.38	-1.44
Not currently exercising vs. Outdoors	-1.28	.86	-2.97	.41
Not currently exercising vs. Home	-1.47	.99	-3.42	.47
Gym vs. Outdoors	1.63*	.67	.30	2.96
Gym vs. Home	1.44	.83	-.21	3.08
Outdoors vs. Home	-.19	.94	-2.04	1.66

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

Table 22

ANCOVA Results and Descriptive Statistics for Self-Objectification by Exercise Partner with Gender and BMI as Covariates

Exercise Partner	Self-Objectification				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	3.12	.62	3.10	.08
Self	139	2.94	.67	2.95	.06
Significant other	13	2.30	.81	2.30	.19
Friend/s	53	2.79	.76	2.79	.09
Group	23	2.69	.64	2.68	.14
Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	.13	1	.13	.27	.00
BMI	.54	1	.54	1.16	.00
Exercise partner	9.35	4	2.34	5.04**	.06
Error	135.70	293	.46		

Note: R^2 Squared = .07, Adj. R^2 = .05, adjustments based on gender mean = .76, BMI = 23.39

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

Table 23

Pairwise Comparisons and Mean Differences in Self-Objectification by Exercise Partner Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Self	.15	.10	-.05	.35
Not currently exercising vs. Significant other	.79***	.21	.39	1.20
Not currently exercising vs. Friend/s	.31*	.13	.06	.55
Not currently exercising vs. Group	.42*	.16	.10	.74
Self vs. Significant other	.64**	.20	.25	1.03
Self vs. Friend/s	.15	.11	-.06	.37
Self vs. Group	.27	.15	-.04	.57
Significant other vs. Friend/s	-.49*	.21	-.91	-.07
Significant other vs. Group	-.37	.24	-.84	.09
Friend/s vs. Group	.12	.17	-.22	.45

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

Table 24

ANCOVA Results and Descriptive Statistics for Loneliness by Exercise Partner with Gender and BMI as Covariates

Exercise Partner	Loneliness				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	51.38	10.84	51.21	1.25
Self	139	45.56	10.57	45.65	.89
Significant other	13	40.38	9.90	41.04	2.89
Friend/s	53	42.79	9.82	42.66	1.42
Group	23	43.17	9.24	43.07	2.16

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	195.19	1	195.19	1.82	.01
BMI	253.09	1	253.09	2.36	.01
Exercise partner	2982.99	4	745.75	6.96***	.09
Error	31374.16	293	107.08		

Note: R^2 Squared = .11, Adj. R^2 = .09, adjustments based on gender mean = .76, BMI = 23.39

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

Table 25

Pairwise Comparisons and Mean Differences in Loneliness by Exercise Partner Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Self	5.56***	1.55	2.51	8.61
Not currently exercising vs. Significant other	10.17**	3.15	3.97	16.37
Not currently exercising vs. Friend/s	8.55***	1.90	4.82	12.28
Not currently exercising vs. Group	8.14**	2.48	3.26	13.03
Self vs. Significant other	4.61	3.02	-1.32	10.55
Self vs. Friend/s	2.99	1.68	-.31	6.28
Self vs. Group	2.58	2.34	-2.02	7.19
Significant other vs. Friend/s	-1.63	3.23	-7.98	4.72
Significant other vs. Group	-2.03	3.61	-9.14	5.08
Friend/s vs. Group	-.40	2.59	-5.50	4.69

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

Table 26

ANCOVA Results and Descriptive Statistics for Social Appearance Anxiety by Exercise Partner with Gender and BMI as Covariates

Exercise Partner	Social Appearance Anxiety				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	53.54	16.58	51.61	1.77
Self	139	43.67	15.19	44.63	1.26
Significant other	13	38.69	15.58	39.11	4.10
Friend/s	53	41.42	14.83	41.76	2.02
Group	23	41.35	13.25	40.58	3.06

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	2054.88	1	2054.88	9.54**	.03
BMI	4443.51	1	4443.51	20.63***	.07
Exercise partner	4466.36	4	1116.59	5.18***	.07
Error	63111.41	293	215.40		

Note: R^2 Squared = .18, Adj. R^2 = .16, adjustments based on gender mean = .76, BMI = 23.39

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

Table 27

Pairwise Comparisons and Mean Differences in Social Appearance Anxiety by Exercise Partner Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Self	6.99**	2.20	2.67	11.31
Not currently exercising vs. Significant other	12.51**	4.47	3.71	21.30
Not currently exercising vs. Friend/s	9.86***	2.69	4.56	15.15
Not currently exercising vs. Group	11.03**	3.52	4.10	17.96
Self vs. Significant other	5.52	4.28	-2.91	13.94
Self vs. Friend/s	2.87	2.38	-1.81	7.54
Self vs. Group	4.04	3.32	-2.49	10.58
Significant other vs. Friend/s	-2.65	4.58	-11.65	6.36
Significant other vs. Group	-1.47	5.12	-11.55	8.60
Friend/s vs. Group	1.17	3.67	-6.05	8.40

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

Table 28

ANCOVA Results and Descriptive Statistics for Upward Appearance Comparison by Exercise Partner with Gender and BMI as Covariates

Exercise Partner	Upward Appearance Comparison				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	46.06	10.39	45.28	1.19
Self	139	44.45	10.24	44.81	.85
Significant other	13	44.62	9.91	43.40	2.77
Friend/s	53	42.81	11.10	43.30	1.36
Group	23	44.04	10.69	43.83	2.07

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	3400.35	1	3400.35	34.59***	.11
BMI	16.19	1	16.19	.17	.00
Exercise partner	157.97	4	39.49	.40	.01
Error	28801.43	293	98.30		

Note: R^2 Squared = .12, Adj. R^2 = .10, adjustments based on gender mean = .76, BMI = 23.39

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

Table 29

Pairwise Comparisons and Mean Differences in Upward Appearance Comparison by Exercise Partner Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Self	.46	1.48	-2.46	3.38
Not currently exercising vs. Significant other	1.88	3.02	-4.07	7.82
Not currently exercising vs. Friend/s	1.97	1.82	-1.60	5.55
Not currently exercising vs. Group	1.45	2.38	-3.23	6.13
Self vs. Significant other	1.41	2.89	-4.28	7.10
Self vs. Friend/s	1.51	1.61	-1.65	4.67
Self vs. Group	.99	2.24	-3.43	5.40
Significant other vs. Friend/s	.10	3.09	-5.99	6.18
Significant other vs. Group	-.43	3.46	-7.23	6.38
Friend/s vs. Group	-.52	2.48	-5.40	4.36

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

Table 30

ANCOVA Results and Descriptive Statistics for Public Exercise Avoidance by Exercise Partner with Gender and BMI as Covariates

Exercise Partner	Public Exercise Avoidance				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	40.53	13.67	38.95	1.48
Self	139	28.18	12.85	28.95	1.06
Significant other	13	32.92	13.83	32.36	3.44
Friend/s	53	30.60	12.72	31.11	1.70
Group	23	27.78	12.10	27.22	2.57

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	3993.69	1	3993.69	26.32***	.08
BMI	1568.69	1	1568.69	10.34**	.03
Exercise partner	5075.50	4	1268.88	8.36***	.10
Error	44461.23	293	151.75		

Note: R^2 Squared = .23, Adj. R^2 = .21, adjustments based on gender mean = .76, BMI = 23.39

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

Table 31

Pairwise Comparisons and Mean Differences in Public Exercise Avoidance by Exercise Partner Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Self	10.00***	1.84	6.37	13.63
Not currently exercising vs. Significant other	6.59	3.75	-.79	13.97
Not currently exercising vs. Friend/s	7.84**	2.26	3.33	12.28
Not currently exercising vs. Group	11.73***	2.96	5.92	17.55
Self vs. Significant other	-3.41	3.59	-10.48	3.66
Self vs. Friend/s	-2.16	1.99	-6.09	1.76
Self vs. Group	1.73	2.79	-3.75	7.22
Significant other vs. Friend/s	1.25	3.84	-6.31	8.81
Significant other vs. Group	5.15	4.30	-3.31	13.60
Friend/s vs. Group	3.90	3.08	-2.17	9.96

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

Table 32

ANCOVA Results and Descriptive Statistics for Exercise Dependence by Exercise Partner with Gender and BMI as Covariates

Exercise Partner		Exercise Dependence			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	46	14.37	4.02	14.65	.65
Self	139	17.11	4.39	17.01	.37
Significant other	13	16.62	4.13	16.82	1.20
Friend/s	53	16.19	4.00	16.11	.59
Group	23	18.52	5.35	18.63	.89

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	152.82	1	152.82	8.35**	.03
BMI	19.85	1	19.85	1.09	.00
Exercise partner	296.29	4	74.07	4.05**	.06
Error	4885.77	267	18.30		

Note: R^2 Squared = .10, Adj. R^2 = .08, adjustments based on gender mean = .75 BMI = 23.36

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

Table 33

Pairwise Comparisons and Mean Differences in Exercise Dependence by Exercise Partner Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Self	-2.36**	.75	-3.84	-.88
Not currently exercising vs. Significant other	-2.17	1.37	-4.86	.52
Not currently exercising vs. Friend/s	-1.46	.88	-3.18	.27
Not currently exercising vs. Group	-3.98***	1.10	-6.14	-1.82
Self vs. Significant other	.19	1.25	-2.27	2.65
Self vs. Friend/s	.90	.69	-.46	2.27
Self vs. Group	-1.62	.97	-3.52	.29
Significant other vs. Friend/s	.71	1.34	-1.91	3.34
Significant other vs. Group	-1.81	1.49	-4.75	1.13
Friend/s vs. Group	-2.52*	1.07	-4.63	-.41

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

Table 34

ANCOVA Results and Descriptive Statistics for Self-Objectification by Exercise Frequency with Gender and BMI as Covariates

Exercise Frequency	*Self-Objectification*				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	3.12	.62	3.10	.08
Few times a month or less	42	2.73	.79	2.74	.11
1 – 2 times a week	77	2.87	.66	2.87	.08
3 – 5 times a week	89	2.83	.73	2.84	.07
6 – 7 times a week	20	3.00	.65	3.01	.16
Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	.02	1	.02	.04	.00
BMI	.53	1	.53	1.10	.00
Exercise frequency	4.46	4	1.11	2.32	.03
Error	140.59	293	.48		

Note: R^2 Squared = .04, Adj. R^2 = .02, adjustments based on gender mean = .76, BMI = 23.39

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

Table 35

Pairwise Comparisons and Mean Differences in Self-Objectification by Exercise Frequency Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Few times a month or less	.36**	.14	.09	.63
Not currently exercising vs. 1 – 2 times a week	.23*	.12	.01	.46
Not currently exercising vs. 3 – 5 times a week	.26**	.11	.04	.48
Not currently exercising vs. 6 – 7 times a week	.09	.18	-.26	.44
Few times a month or less vs. 1 – 2 times a week	-.13	.13	-.39	.13
Few times a month or less vs. 3 – 5 times a week	-.10	.13	-.36	.16
Few times a month or less vs. 6 – 7 times a week	-.27	.19	-.64	.11
1 – 2 times a week vs. 3 – 5 times a week	.03	.11	-.18	.24
1 – 2 times a week vs. 6 – 7 times a week	-.14	.17	-.48	.20
3 – 5 times a week vs. 6 – 7 times a week	-.17	.17	-.51	.17

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

Table 36

ANCOVA Results and Descriptive Statistics for Loneliness by Exercise Frequency with Gender and BMI as Covariates

Exercise Frequency		Loneliness			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	51.38	10.84	51.28	1.25
Few times a month or less	42	45.43	9.87	45.59	1.60
1 – 2 times a week	77	45.05	9.93	45.13	1.18
3 – 5 times a week	89	44.16	10.53	44.03	1.11
6 – 7 times a week	20	40.60	11.32	40.83	2.33

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	257.55	1	257.55	2.39	.01
BMI	190.59	1	190.59	1.77	.01
Exercise frequency	2787.39	4	696.85	6.47***	.08
Error	31569.75	293	107.75		

Note: R^2 Squared = .10, Adj. R^2 = .08, adjustments based on gender mean = .76, BMI = 23.39

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

Table 37

Pairwise Comparisons and Mean Differences in Loneliness by Exercise Frequency Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Few times a month or less	5.69**	2.04	1.68	9.70
Not currently exercising vs. 1 – 2 times a week	6.15***	1.72	2.76	9.54
Not currently exercising vs. 3 – 5 times a week	7.25***	1.69	3.92	10.57
Not currently exercising vs. 6 – 7 times a week	10.45***	2.66	5.22	15.69
Few times a month or less vs. 1 – 2 times a week	.46	1.99	-3.46	4.38
Few times a month or less vs. 3 – 5 times a week	1.56	1.95	-2.28	5.40
Few times a month or less vs. 6 – 7 times a week	4.76	2.82	-.79	10.32
1 – 2 times a week vs. 3 – 5 times a week	1.10	1.62	-2.10	4.30
1 – 2 times a week vs. 6 – 7 times a week	4.31	2.61	-.83	9.44
3 – 5 times a week vs. 6 – 7 times a week	3.21	2.57	-1.86	8.27

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

Table 38

ANCOVA Results and Descriptive Statistics for Social Appearance Anxiety by Exercise Frequency with Gender and BMI as Covariates

Exercise Frequency		Social Appearance Anxiety			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	53.54	16.58	51.69	1.77
Few times a month or less	42	43.26	14.89	43.61	2.28
1 – 2 times a week	77	43.82	15.95	43.89	1.68
3 – 5 times a week	89	41.96	14.20	42.95	1.58
6 – 7 times a week	20	39.70	14.53	40.93	3.31

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	1842.53	1	1842.53	8.47**	.03
BMI	4194.33	1	4194.33	19.29***	.06
Exercise frequency	3856.07	4	964.02	4.43**	.06
Error	63721.70	293	217.48		

Note: R^2 Squared = .17, Adj. R^2 = .15, adjustments based on gender mean = .76, BMI = 23.39

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

Table 39

Pairwise Comparisons and Mean Differences in Social Appearance Anxiety by Exercise Frequency Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Few times a month or less	8.08**	2.90	2.38	13.78
Not currently exercising vs. 1 – 2 times a week	7.80**	2.45	2.98	12.61
Not currently exercising vs. 3 – 5 times a week	8.74***	2.40	4.01	13.46
Not currently exercising vs. 6 – 7 times a week	10.76**	3.78	3.33	18.19
Few times a month or less vs. 1 – 2 times a week	-.29	2.83	-5.86	5.28
Few times a month or less vs. 3 – 5 times a week	.65	2.77	-4.80	6.11
Few times a month or less vs. 6 – 7 times a week	2.68	4.01	-5.22	10.57
1 – 2 times a week vs. 3 – 5 times a week	.94	2.31	-3.60	5.49
1 – 2 times a week vs. 6 – 7 times a week	2.97	3.71	-4.33	10.26
3 – 5 times a week vs. 6 – 7 times a week	2.02	3.66	-5.18	9.22

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

Table 40

ANCOVA Results and Descriptive Statistics for Upward Appearance Comparison by Exercise Frequency with Gender and BMI as Covariates

Exercise Frequency		Upward Appearance Comparison			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	46.06	10.39	45.26	1.19
Few times a month or less	42	43.62	9.65	43.44	1.52
1 – 2 times a week	77	43.28	10.07	43.13	1.13
3 – 5 times a week	89	44.12	10.67	44.94	1.06
6 – 7 times a week	20	47.45	12.19	47.61	2.21

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	3505.46	1	3505.46	36.02***	.11
BMI	19.73	1	19.73	.20	.00
Exercise frequency	442.98	4	110.75	1.14	.02
Error	28516.42	293	97.33		

Note: R^2 Squared = .12, Adj. R^2 = .11, adjustments based on gender mean = .76, BMI = 23.39

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

Table 41

Pairwise Comparisons and Mean Differences in Upward Appearance Comparison by Exercise Frequency Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Few times a month or less	1.81	1.94	-2.00	5.63
Not currently exercising vs. 1 – 2 times a week	2.13	1.64	-1.10	5.35
Not currently exercising vs. 3 – 5 times a week	.32	1.61	-2.85	3.48
Not currently exercising vs. 6 – 7 times a week	-2.36	2.53	-7.33	2.62
Few times a month or less vs. 1 – 2 times a week	.32	1.89	-3.41	4.04
Few times a month or less vs. 3 – 5 times a week	-1.50	1.85	-5.15	2.15
Few times a month or less vs. 6 – 7 times a week	-4.17	2.68	-9.45	1.11
1 – 2 times a week vs. 3 – 5 times a week	-1.81	1.54	-4.85	1.23
1 – 2 times a week vs. 6 – 7 times a week	-4.48	2.48	-9.36	.40
3 – 5 times a week vs. 6 – 7 times a week	-2.67	2.45	-7.49	2.14

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

Table 42

ANCOVA Results and Descriptive Statistics for Public Exercise Avoidance by Exercise Frequency with Gender and BMI as Covariates

Exercise Frequency		Public Exercise Avoidance			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	40.53	13.67	39.04	1.46
Few times a month or less	42	31.60	13.28	31.67	1.87
1 – 2 times a week	77	32.55	11.24	32.50	1.38
3 – 5 times a week	89	25.66	12.71	26.70	1.30
6 – 7 times a week	20	24.45	13.50	25.21	2.72

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	3502.91	1	3502.91	23.91***	.08
BMI	1411.18	1	1411.18	9.63**	.03
Exercise frequency	6605.58	4	1651.39	11.27***	.13
Error	42931.16	293	146.52		

Note: R^2 Squared = .26, Adj. R^2 = .24, adjustments based on gender mean = .76, BMI = 23.39

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

Table 43

Pairwise Comparisons and Mean Differences in Public Exercise Avoidance by Exercise Frequency Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Few times a month or less	7.37**	2.38	2.69	12.05
Not currently exercising vs. 1 – 2 times a week	6.54**	2.01	2.59	10.50
Not currently exercising vs. 3 – 5 times a week	12.35***	1.97	8.47	16.23
Not currently exercising vs. 6 – 7 times a week	13.83***	3.10	7.73	19.94
Few times a month or less vs. 1 – 2 times a week	-.83	2.32	-5.40	3.75
Few times a month or less vs. 3 – 5 times a week	4.98*	2.28	.50	9.46
Few times a month or less vs. 6 – 7 times a week	6.46	3.29	-.01	12.94
1 – 2 times a week vs. 3 – 5 times a week	5.80**	1.89	2.07	9.53
1 – 2 times a week vs. 6 – 7 times a week	7.29*	3.04	1.30	13.28
3 – 5 times a week vs. 6 – 7 times a week	1.49	3.00	-4.42	7.40

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

Table 44

ANCOVA Results and Descriptive Statistics for Exercise Dependence by Exercise Frequency with Gender and BMI as Covariates

Exercise Frequency		Exercise Dependence			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	14.37	4.02	14.56	.58
Few times a month or less	42	14.52	3.57	14.56	.59
1 – 2 times a week	77	15.91	3.84	15.95	.44
3 – 5 times a week	89	17.79	3.78	17.65	.41
6 – 7 times a week	20	23.00	4.57	22.96	.86

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	107.08	1	107.08	7.31**	.03
BMI	6.30	1	6.30	.43	.00
Exercise frequency	1270.06	4	317.51	21.67***	.25
Error	3912.01	267	14.65		

Note: R^2 Squared = .28, Adj. R^2 = .26, adjustments based on gender mean = .75, BMI = 23.36

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

Table 45

Pairwise Comparisons and Mean Differences in Exercise Dependence by Exercise Frequency Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Few times a month or less	.01	.83	-1.63	1.64
Not currently exercising vs. 1 – 2 times a week	-1.38	.73	-2.81	.05
Not currently exercising vs. 3 – 5 times a week	-3.08***	.72	-4.49	-1.67
Not currently exercising vs. 6 – 7 times a week	-8.39***	1.05	-10.45	-6.34
Few times a month or less vs. 1 – 2 times a week	-1.39	.74	-2.84	.06
Few times a month or less vs. 3 – 5 times a week	-3.09***	.72	-4.50	-1.67
Few times a month or less vs. 6 – 7 times a week	-8.40***	1.04	-10.45	-6.35
1 – 2 times a week vs. 3 – 5 times a week	-1.70**	.60	-2.88	-.52
1 – 2 times a week vs. 6 – 7 times a week	-7.01***	.96	-8.90	-5.11
3 – 5 times a week vs. 6 – 7 times a week	-5.31***	.95	-7.18	-3.44

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

Table 46

ANCOVA Results and Descriptive Statistics for Self-Objectification by Exercise Duration with Gender and BMI as Covariates

Exercise Duration		Self-Objectification			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	3.12	.62	3.10	.08
Less than 30 mins	25	2.82	.64	2.81	.14
30 mins to 1 hour	102	2.88	.74	2.89	.07
1 hour – 1.5 hours	76	2.83	.70	2.84	.08
Over 1.5 hours	25	2.73	.71	2.73	.14

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	.01	1	.01	.03	.00
BMI	.53	1	.53	1.09	.00
Exercise duration	3.97	4	.99	2.06	.03
Error	141.08	293	.48		

Note: R^2 Squared = .04, Adj. R^2 = .02, adjustments based on gender mean = .76, BMI = 23.39

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

Table 47

Pairwise Comparisons and Mean Differences in Self-Objectification by Exercise Duration Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. less than 30 mins	.29	.16	-.03	.61
Not currently exercising vs. 30 mins to 1 hour	.21	.11	.00	.43
Not currently exercising vs. 1 hour – 1.5 hours	.26*	.19	.03	.50
Not currently exercising vs. over 1.5 hours	.37*	.16	.05	.69
less than 30 mins vs. 30 mins to 1 hour	-.08	.16	-.39	.23
less than 30 mins vs. 1 hour – 1.5 hours	-.03	.16	-.35	.29
less than 30 mins vs. over 1.5 hours	.08	.20	-.31	.47
30 mins to 1 hour vs. 1 hour – 1.5 hours	.05	.11	-.16	.26
30 mins to 1 hour vs. vs. over 1.5 hours	.16	.16	-.15	.47
1 hour – 1.5 hours vs. over 1.5 hours	.11	.16	-.21	.43

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

Table 48

ANCOVA Results and Descriptive Statistics for Loneliness by Exercise Duration with Gender and BMI as Covariates

Exercise Duration		Loneliness			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	51.38	10.84	51.25	1.25
Less than 30 mins	25	42.96	11.51	42.99	2.09
30 mins to 1 hour	102	45.02	11.07	45.15	1.03
1 hour – 1.5 hours	76	43.97	9.00	43.94	1.22
Over 1.5 hours	25	44.44	9.84	44.36	2.09

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	239.18	1	239.18	2.20	.01
BMI	225.11	1	225.11	2.07	.01
Exercise duration	2543.09	4	635.77	5.86***	.07
Error	31814.06	293	108.58		

Note: R^2 Squared = .09, Adj. R^2 = .07, adjustments based on gender mean = .76, BMI = 23.39

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

Table 49

Pairwise Comparisons and Mean Differences in Loneliness by Exercise Duration Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. less than 30 mins	8.26**	2.42	3.49	13.02
Not currently exercising vs. 30 mins to 1 hour	6.10***	1.63	2.89	9.32
Not currently exercising vs. 1 hour – 1.5 hours	7.31***	1.78	3.81	10.81
Not currently exercising vs. over 1.5 hours	6.89**	2.44	2.10	11.69
less than 30 mins vs. 30 mins to 1 hour	-2.15	2.33	-6.75	2.44
less than 30 mins vs. 1 hour – 1.5 hours	-.95	2.43	-5.73	3.84
less than 30 mins vs. over 1.5 hours	-1.37	2.95	-7.18	4.45
30 mins to 1 hour vs. 1 hour – 1.5 hours	1.21	1.59	-1.93	4.34
30 mins to 1 hour vs. vs. over 1.5 hours	.79	2.33	-3.79	5.37
1 hour – 1.5 hours vs. over 1.5 hours	-.42	2.41	-5.16	4.33

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

Table 50

ANCOVA Results and Descriptive Statistics for Social Appearance Anxiety by Exercise Duration with Gender and BMI as Covariates

Exercise Duration	Social Appearance Anxiety				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	53.54	16.58	51.66	1.77
Less than 30 mins	25	43.92	16.02	42.84	2.96
30 mins to 1 hour	102	43.48	15.48	43.81	1.46
1 hour – 1.5 hours	76	41.66	14.14	43.27	1.72
Over 1.5 hours	25	40.80	14.25	41.05	2.95

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	1857.44	1	1857.44	8.54**	.03
BMI	4317.20	1	4317.20	19.85***	.06
Exercise duration	3862.02	4	965.50	4.44**	.06
Error	63715.76	293	217.46		

Note: R^2 Squared = .17, Adj. R^2 = .15, adjustments based on gender mean = .76, BMI = 23.39

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

Table 51

Pairwise Comparisons and Mean Differences in Social Appearance Anxiety by Exercise Duration Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. less than 30 mins	8.82*	3.43	2.07	15.57
Not currently exercising vs. 30 mins to 1 hour	7.85**	2.31	3.30	12.39
Not currently exercising vs. 1 hour – 1.5 hours	8.39**	2.52	3.44	13.34
Not currently exercising vs. over 1.5 hours	10.62**	3.45	3.83	17.40
less than 30 mins vs. 30 mins to 1 hour	-.97	3.30	-7.47	5.53
less than 30 mins vs. 1 hour – 1.5 hours	-.43	3.44	-7.20	6.35
less than 30 mins vs. over 1.5 hours	1.80	4.18	-6.43	10.02
30 mins to 1 hour vs. 1 hour – 1.5 hours	.55	2.25	-3.89	4.98
30 mins to 1 hour vs. vs. over 1.5 hours	2.77	3.29	-3.71	9.25
1 hour – 1.5 hours vs. over 1.5 hours	2.22	3.41	-4.49	8.93

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

Table 52

ANCOVA Results and Descriptive Statistics Upward Appearance Comparison by Exercise Duration with Gender and BMI as Covariates

Exercise Duration	Upward Appearance Comparison				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	46.06	10.39	45.25	1.19
Less than 30 mins	25	43.80	10.65	43.11	1.99
30 mins to 1 hour	102	44.18	10.51	44.09	.98
1 hour – 1.5 hours	76	44.20	9.71	45.20	1.16
Over 1.5 hours	25	43.20	12.42	43.53	1.98

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	3496.86	1	3496.86	35.59***	.11
BMI	20.08	1	20.08	.20	.00
Exercise duration	166.89	4	41.72	.43	.01
Error	28792.52	293	98.27		

Note: R^2 Squared = .12, Adj. R^2 = .10, adjustments based on gender mean = .76, BMI = 23.39

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

Table 53

Pairwise Comparisons and Mean Differences in Upward Appearance Comparison by Exercise Duration Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. less than 30 mins	2.15	2.30	-2.39	6.68
Not currently exercising vs. 30 mins to 1 hour	1.17	1.55	-1.89	4.22
Not currently exercising vs. 1 hour – 1.5 hours	.06	1.69	-3.27	3.38
Not currently exercising vs. over 1.5 hours	1.73	2.32	-2.83	6.29
less than 30 mins vs. 30 mins to 1 hour	-.98	2.22	-5.35	3.39
less than 30 mins vs. 1 hour – 1.5 hours	-2.09	2.31	-6.64	2.46
less than 30 mins vs. over 1.5 hours	-.42	2.81	-5.95	5.11
30 mins to 1 hour vs. 1 hour – 1.5 hours	-1.11	1.52	-4.09	1.87
30 mins to 1 hour vs. vs. over 1.5 hours	.56	2.21	-3.80	4.92
1 hour – 1.5 hours vs. over 1.5 hours	1.67	2.29	-2.84	6.18

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

Table 54

ANCOVA Results and Descriptive Statistics Public Exercise Avoidance by Exercise Duration with Gender and BMI as Covariates

Exercise Duration		Public Exercise Avoidance			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	40.53	13.67	39.06	1.48
Less than 30 mins	25	34.28	15.30	33.29	2.46
30 mins to 1 hour	102	30.20	12.65	30.31	1.22
1 hour – 1.5 hours	76	25.89	11.65	27.35	1.43
Over 1.5 hours	25	28.04	12.30	28.37	2.45

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	3528.77	1	3528.77	23.46***	.07
BMI	1340.22	1	1340.22	8.91**	.03
Exercise duration	5455.62	4	1363.91	9.07***	.11
Error	44081.11	293	150.45		

Note: R^2 Squared = .24, Adj. R^2 = .22, adjustments based on gender mean = .76, BMI = 23.39

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

Table 55

Pairwise Comparisons and Mean Differences in Public Exercise Avoidance by Exercise Duration Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. less than 30 mins	5.77*	2.85	.15	11.38
Not currently exercising vs. 30 mins to 1 hour	8.74***	1.92	4.96	12.53
Not currently exercising vs. 1 hour – 1.5 hours	11.70***	2.09	7.59	15.82
Not currently exercising vs. over 1.5 hours	10.68***	2.87	5.04	16.33
less than 30 mins vs. 30 mins to 1 hour	2.98	2.75	-2.43	8.38
less than 30 mins vs. 1 hour – 1.5 hours	5.94*	2.86	.30	11.57
less than 30 mins vs. over 1.5 hours	4.92	3.48	-1.93	11.76
30 mins to 1 hour vs. 1 hour – 1.5 hours	2.96	1.87	-.73	6.65
30 mins to 1 hour vs. vs. over 1.5 hours	1.94	2.74	-3.45	7.33
1 hour – 1.5 hours vs. over 1.5 hours	-1.02	2.84	-6.60	4.56

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

Table 56

ANCOVA Results and Descriptive Statistics Exercise Dependence by Exercise Duration with Gender and BMI as Covariates

Exercise Duration	Exercise Dependence				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	72	14.37	4.02	14.60	.63
Less than 30 mins	25	15.76	4.32	15.93	.83
30 mins to 1 hour	102	15.91	3.87	15.93	.41
1 hour – 1.5 hours	76	17.88	4.35	17.68	.48
Over 1.5 hours	25	20.08	4.96	20.04	.83

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	101.63	1	101.63	5.93*	.02
BMI	14.21	1	14.21	.83	.00
Exercise duration	602.44	4	150.61	8.78***	.12
Error	4579.62	267	17.15		

Note: R^2 Squared = .15, Adj. R^2 = .14, adjustments based on gender mean = .75, BMI = 23.36

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

Table 57

Pairwise Comparisons and Mean Differences in Exercise Dependence by Exercise Duration Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. less than 30 mins	-1.33	1.03	-3.36	.71
Not currently exercising vs. 30 mins to 1 hour	-1.32	.75	-2.81	.16
Not currently exercising vs. 1 hour – 1.5 hours	-3.08***	.81	-4.66	-1.49
Not currently exercising vs. over 1.5 hours	-5.44***	1.04	-7.49	-3.39
less than 30 mins vs. 30 mins to 1 hour	.00	.93	-1.82	1.83
less than 30 mins vs. 1 hour – 1.5 hours	-1.75	.97	-3.66	.15
less than 30 mins vs. over 1.5 hours	-4.11**	1.17	-6.42	-1.80
30 mins to 1 hour vs. 1 hour – 1.5 hours	-1.75**	.63	-3.00	-.51
30 mins to 1 hour vs. vs. over 1.5 hours	-4.12***	.93	-5.94	-2.29
1 hour – 1.5 hours vs. over 1.5 hours	-2.36*	.96	-4.25	-.48

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

Table 58

ANCOVA Results and Descriptive Statistics Self-Objectification by Exercise Motivation with Gender and BMI as Covariates

Exercise Motivation	Self-Objectification				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	27	3.25	.68	3.25	.12
Appearance	94	3.23	.63	3.22	.07
Psychological	46	2.66	.65	2.66	.10
Physical	91	2.63	.64	2.63	.07
Skills	33	2.94	.61	2.94	.11

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	2.42E-6	1	2.42E-6	.00	.00
BMI	.50	1	.50	1.21	.00
Exercise motivation	21.89	4	5.47	13.30***	.16
Error	116.80	284	.41		

Note: R^2 Squared = .17, Adj. R^2 = .15, adjustments based on gender mean = .76, BMI = 23.42

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

Table 59

Pairwise Comparisons and Mean Differences in Self-Objectification by Exercise Motivation Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Appearance	.02	.14	-.25	.30
Not currently exercising vs. Psychological	.59***	.16	.28	.89
Not currently exercising vs. Physical	.61***	.14	.34	.89
Not currently exercising vs. Skills	.31	.17	-.02	.64
Appearance vs. Psychological	.57***	.12	.34	.79
Appearance vs. Physical	.59***	.10	.40	.78
Appearance vs. Skills	.28*	.13	.03	.54
Psychological vs. Physical	.03	.12	-.20	.26
Psychological vs. Skills	-.28	.15	-.57	.01
Physical vs. Skills	-.31*	.13	-.56	-.05

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

Table 60

ANCOVA Results and Descriptive Statistics Loneliness by Exercise Motivation with Gender and BMI as Covariates

Exercise Motivation		Loneliness			
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	27	50.85	10.23	50.90	2.05
Appearance	94	46.86	10.72	46.64	1.10
Psychological	46	43.28	11.01	43.38	1.57
Physical	91	44.64	10.71	44.77	1.12
Skills	33	47.94	10.30	48.02	1.85

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	35.01	1	35.01	.31	.00
BMI	606.44	1	606.44	5.39*	.02
Exercise motivation	1268.16	4	317.04	2.82*	.04
Error	31956.38	284	112.52		

Note: R^2 Squared = .06, Adj. R^2 = .04, adjustments based on gender mean = .76, BMI = 23.42

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

Table 61

Pairwise Comparisons and Mean Differences in Loneliness by Exercise Motivation Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Appearance	4.26	2.32	-.32	8.83
Not currently exercising vs. Psychological	7.52**	2.57	2.46	12.58
Not currently exercising vs. Physical	6.14**	2.35	1.52	10.75
Not currently exercising vs. Skills	2.88	2.76	-2.56	8.32
Appearance vs. Psychological	3.26	1.92	-.51	7.03
Appearance vs. Physical	1.88	1.57	-1.22	4.98
Appearance vs. Skills	-1.38	2.15	-5.61	2.86
Psychological vs. Physical	-1.38	1.93	-5.19	2.42
Psychological vs. Skills	-4.64	2.43	-9.41	.14
Physical vs. Skills	-3.25	2.16	-7.50	.99

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

Table 62

ANCOVA Results and Descriptive Statistics Social Appearance Anxiety by Exercise Motivation with Gender and BMI as Covariates

Exercise Motivation	Social Appearance Anxiety				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	27	55.19	18.25	54.28	2.82
Appearance	94	49.13	14.39	48.46	1.51
Psychological	46	42.54	15.56	42.13	2.16
Physical	91	40.33	15.30	41.31	1.54
Skills	33	45.39	15.69	45.93	2.55

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	1825.42	1	1825.42	8.55**	.03
BMI	5352.76	1	5352.76	25.06***	.08
Exercise motivation	4954.90	4	1238.73	5.80***	.08
Error	60656.57	284	213.58		

Note: R^2 Squared = .18, Adj. R^2 = .17, adjustments based on gender mean = .76, BMI = 23.42

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

Table 63

Pairwise Comparisons and Mean Differences in Social Appearance Anxiety by Exercise Motivation Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Appearance	5.82	3.20	-.48	12.12
Not currently exercising vs. Psychological	12.15**	3.54	5.17	19.12
Not currently exercising vs. Physical	12.97***	3.23	6.61	19.33
Not currently exercising vs. Skills	8.34*	3.81	.85	15.84
Appearance vs. Psychological	6.33*	2.64	1.13	11.52
Appearance vs. Physical	7.15**	2.17	2.88	11.41
Appearance vs. Skills	2.52	2.97	-3.31	8.36
Psychological vs. Physical	.82	2.67	-4.43	6.06
Psychological vs. Skills	-3.81	3.34	-10.39	2.78
Physical vs. Skills	-4.62	2.97	-10.47	1.23

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

Table 64

ANCOVA Results and Descriptive Statistics Upward Appearance Comparison by Exercise Motivation with Gender and BMI as Covariates

Exercise Motivation	Upward Appearance Comparison				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	27	46.22	12.26	45.32	1.80
Appearance	94	48.98	7.28	48.97	.97
Psychological	46	43.87	10.48	43.26	1.38
Physical	91	40.52	10.76	41.01	.99
Skills	33	43.06	9.94	43.31	1.63

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	2638.42	1	2638.42	30.32***	.10
BMI	1.12	1	1.12	.01	.00
Exercise motivation	3062.20	4	765.55	8.80***	.11
Error	24715.53	284	87.03		

Note: R^2 Squared = .20, Adj. R^2 = .18, adjustments based on gender mean = .76, BMI = 23.42

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

Table 65

Pairwise Comparisons and Mean Differences in Upward Appearance Comparison by Exercise Motivation Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Appearance	-3.65	2.04	-7.67	.38
Not currently exercising vs. Psychological	2.06	2.26	-2.39	6.52
Not currently exercising vs. Physical	4.31*	2.06	.25	8.37
Not currently exercising vs. Skills	2.01	2.43	-2.77	6.80
Appearance vs. Psychological	5.71**	1.69	2.39	9.02
Appearance vs. Physical	7.95***	1.38	5.23	10.68
Appearance vs. Skills	5.66**	1.89	1.93	9.38
Psychological vs. Physical	2.25	1.70	-1.10	5.59
Psychological vs. Skills	-.05	2.13	-4.25	4.15
Physical vs. Skills	-2.30	1.90	-6.03	1.44

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

Table 66

ANCOVA Results and Descriptive Statistics Public Exercise Avoidance by Exercise Motivation with Gender and BMI as Covariates

Exercise Motivation	Public Exercise Avoidance				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising	27	37.07	16.86	35.78	2.47
Appearance	94	34.94	13.01	34.47	1.32
Psychological	46	30.67	13.22	29.94	1.89
Physical	91	28.14	13.40	29.18	1.35
Skills	33	30.36	13.62	30.92	2.22

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	4546.76	1	4546.76	27.93***	.09
BMI	2392.25	1	2392.25	14.70***	.05
Exercise motivation	1876.50	4	469.13	2.88*	.04
Error	46227.68	284	162.77		

Note: R^2 Squared = .18, Adj. R^2 = .16, adjustments based on gender mean = .76, BMI = 23.42

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

Table 67

Pairwise Comparisons and Mean Differences in Public Exercise Avoidance by Exercise Motivation Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Not currently exercising vs. Appearance	1.31	2.80	-4.19	6.82
Not currently exercising vs. Psychological	5.85	3.09	-.24	11.94
Not currently exercising vs. Physical	6.60*	2.82	1.05	12.15
Not currently exercising vs. Skills	4.87	3.32	-1.68	11.41
Appearance vs. Psychological	4.54	2.30	.00	9.07
Appearance vs. Physical	5.29**	1.89	1.56	9.02
Appearance vs. Skills	3.55	2.59	-1.54	8.65
Psychological vs. Physical	.76	2.33	-3.82	5.33
Psychological vs. Skills	-.98	2.92	-6.73	4.76
Physical vs. Skills	-1.74	2.59	-6.84	3.37

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

Table 68

ANCOVA Results and Descriptive Statistics Exercise Dependence by Exercise Motivation with Gender and BMI as Covariates

Exercise Motivation	Exercise Dependence				
	n	*M*	*SD*	M_{adj}	*SE*
Not currently exercising[a]	-	-	-	-	-
Appearance	94	16.28	4.44	16.37	.45
Psychological	46	16.24	4.71	16.41	.65
Physical	91	16.34	4.12	16.18	.46
Skills	33	17.79	4.92	17.72	.76

Source	*SS*	*df*	*MS*	*F*	ηp^2
Gender	167.95	1	167.95	8.80**	.03
BMI	45.95	1	45.95	2.41	.01
Exercise motivation	59.83	3	19.94	1.05	.01
Error	4922.34	258	19.08		

Note: [a]One participant in this category and was therefore omitted from analysis

R^2 Squared = .05, Adj. R^2 = .04, adjustments based on gender mean = .75, BMI = 23.40

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

Table 69

Pairwise Comparisons and Mean Differences in Exercise Dependence by Exercise Motivation Controlling for Gender and BMI

Comparison	Mean Difference	SE	LSD Adjusted 95% CI	
			LB	UB
Appearance vs. Psychological	-.04	.79	-1.60	1.51
Appearance vs. Physical	.19	.65	-1.09	1.47
Appearance vs. Skills	-1.34	.89	-3.09	.40
Psychological vs. Physical	.23	.80	-1.34	1.80
Psychological vs. Skills	-1.30	1.00	-3.27	.67
Physical vs. Skills	-1.54	.89	-3.28	.21

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

Table 70

Results for Mediation Analysis of Social Appearance Anxiety on Self-Objectification and Public Exercise Avoidance Controlling for Gender and BMI

Predictors	Model 1 Public Exercise Avoidance				Model 2 Social Appearance Anxiety				Model 3 Public Exercise Avoidance			
	b	*SE*	*β*	*t*	*b*	*SE*	*β*	*t*	*b*	*SE*	*β*	*t*
Self-Objectification	6.28	1.01	.32	6.22***	13.65	.97	.60	14.06***	.99	1.21	.05	.81
Gender[a]	9.46	1.65	.29	5.75***	6.26	1.58	.23	3.96***	7.04	1.57	.22	4.48***
BMI	.55	.14	.20	3.86***	.75	.14	.17	5.47***	.26	.14	.09	1.86
Social Appearance Anxiety									.39	.06	.45	6.90***
R^2	.24				.47				.35			
F	$F(3, 296) = 31.38$***				$F(3, 296) = 87.69$***				$F(4, 295) = 39.15$***			

Note: Each column represents a separate regression model that predicts the criterion at the top of the column. [a]0 = man and 1 = woman
*$p < .05$, **$p < .01$, ***$p < .001$

Table 71

Results for Mediation Analysis of Upward Appearance Comparison on Self-Objectification and Exercise Dependence Controlling for Gender and BMI

Predictors	Model 1 Exercise Dependence				Model 2 Upward Appearance Comparison				Model 3 Exercise Dependence			
	b	*SE*	*β*	*t*	*b*	*SE*	*β*	*t*	*b*	*SE*	*β*	*t*
Self-Objectification	.86	.38	.13	2.27*	8.68	.67	.59	13.00***	.08	.48	.01	.16
Gender[a]	-1.81	.60	-.18	-3.00**	8.01	1.06	.34	7.54***	-2.54	.66	-.25	3.86***
BMI	-.10	.05	-.12	-1.95	-.07	.09	-.03	-.74	-.10	.05	-.11	-1.85
Upward Appearance Comparison									.09	.03	.21	2.64**
R^2	.06				.45				.08			
F	$F(3, 270) = 5.85$***				$F(3, 270) = 74.32$***				$F(4, 269) = 6.23$***			

Note: Each column represents a separate regression model that predicts the criterion at the top of the column. [a]0 = man and 1 = woman
*$p < .05$, **$p < .01$, ***$p < .001$

Table 72

Results for Mediation Analysis of Upward Appearance Comparison on Self-Objectification and Public Exercise Avoidance Controlling for Gender and BMI

Predictors	Model 1				Model 2				Model 3			
	Public Exercise Avoidance				Upward Appearance Comparison				Public Exercise Avoidance			
	b	*SE*	*β*	*t*	*b*	*SE*	*β*	*t*	*b*	*SE*	*β*	*t*
Self-Objectification	6.28	1.01	.31	6.22***	8.67	.65	.58	13.38***	4.75	1.27	.24	3.73***
Gender[a]	9.46	1.65	.29	5.75***	7.65	1.06	.31	7.24***	8.11	1.76	.25	4.57***
BMI	.55	.14	.20	3.86***	-.05	.09	-.02	-.57	.56	.14	.20	3.94***
Upward Appearance Comparison									.18	.09	.13	1.96
R^2	.24				.45				.25			
F	$F(3, 296) = 31.38$***				$F(3, 296) = 79.28$***				$F(4, 295) = 24.73$***			

Note: Each column represents a separate regression model that predicts the criterion at the top of the column. [a]0 = man and 1 = woman
*$p < .05$, **$p < .01$, ***$p < .001$

Table 73

Results for Mediation Analysis of Social Appearance Anxiety on Self-Objectification and Exercise Dependence Controlling for Gender and BMI

Predictors	Model 1 Exercise Dependence				Model 2 Social Appearance Anxiety				Model 3 Exercise Dependence			
	b	*SE*	*β*	*t*	*b*	*SE*	*β*	*t*	*b*	*SE*	*β*	*t*
Self-Objectification	.86	.38	.13	2.27*	13.32	1.00	.60	13.26***	.81	.49	.13	1.65
Gender[a]	-1.81	.60	-.18	-3.00**	6.00	1.60	.17	3.76***	-1.84	.62	-.18	3.86**
BMI	-.10	.05	-.12	-1.95	.73	.14	.23	5.20***	-.11	.06	-.12	-2.97
Social Appearance Anxiety									.00	.02	.02	.19
R^2	.06				.46				.06			
F	$F(3, 270) = 5.85$***				$F(3, 270) = 76.19$***				$F(4, 269) = 4.38$**			

Note: Each column represents a separate regression model that predicts the criterion at the top of the column. [a]0 = man and 1 = woman
*$p < .05$, **$p < .01$, ***$p < .001$

Table 74

Model Summary of Loneliness Moderating the Effects of Self-Objectification on Social Appearance Anxiety

Predictor	*b*	*SE*	*t*	95% CI
1. Constant	24.99	3.18	7.85***	18.72, 31.25
2. Self-Objectification	11.38	.93	12.21***	9.55, 13.22
3. Loneliness	.47	.06	7.80***	.35, .59
4. Self-Objectification x Loneliness	-.07	.08	-.85	-.23, .09
5. Gender	6.89	1.45	4.75***	4.04, 9.74
6. BMI	.65	.13	5.14***	.40, .90

$R^2 = .56$, $F(5, 294) = 75.82$, $p < .001$, $\Delta R^2 = .00$, $F(1, 294) = .73$, $p = .39$

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

Table 75

Model Summary of Loneliness Moderating the Effects of Self-Objectification on Upward Appearance Comparison

Predictor	*b*	*SE*	*t*	95% CI
1. Constant	40.15	2.32	17.34***	35.60, 44.71
2. Self-Objectification	8.37	.68	12.35***	7.04
3. Loneliness	.03	.04	.79	-.05, .12
4. Self-Objectification x Loneliness	-.14	.06	-2.28*	-.25, -.02
5. Gender	7.52	1.05	7.13***	5.44, 9.59
6. BMI	-.04	.09	-.48	-.22, .14

$R^2 = .46$, $F(5, 294) = 49.42$, $p < .001$, $\Delta R^2 = .01$, $F(1, 294) = 5.20$, $p = .02$

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

Table 76

Model Summary of Loneliness Moderating the Effects of Self-Objectification on Public Exercise Avoidance

Predictor	*b*	*SE*	*t*	95 % CI
1. Constant	13.27	3.46	3.83***	6.46, 20.08
2. Self-Objectification	4.58	1.01	4.52***	2.59, 6.57
3. Loneliness	.37	.07	5.68***	.24, .50
4. Self-Objectification x Loneliness	.04	.09	.42	-.14, .21
5. Gender	10.09	1.58	6.40***	6.99, 13.18
6. BMI	.46	.14	3.34***	.19, .73

$R^2 = .32$, $F(5, 294) = 27.20$, $p < .001$, $\Delta R^2 = .00$, $F(1, 294) = .18$, $p = .67$

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

Table 77

Model Summary of Loneliness Moderating the Effects of Self-Objectification on Exercise Dependence

Predictor	*b*	*SE*	*t*	95% CI
1. Constant	20.16	1.36	14.88***	17.49, 22.83
2. Self-Objectification	1.00	.40	2.52*	.22, 1.78
3. Loneliness	-.04	.03	-1.40	-.09, .01
4. Self-Objectification x Loneliness	-.02	.04	-.50	-.09, .05
5. Gender	-1.90	.61	-3.13**	-3.10, -.71
6. BMI	-.09	.05	-1.69	-.20, .02

$R^2 = .07$, $F(5, 268) = 3.94$, $p < .001$, $\Delta R^2 = .00$, $F(1, 268) = .25$, $p = .62$

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

Table 78

Results for Moderated Mediation Analysis of Proposed Model 1

Predictors	Model 1 Social Appearance Anxiety			Model 2 Public Exercise Avoidance		
	b	*SE*	*t*	*b*	*SE*	*t*
Self-Objectification	11.38	.93	12.21***	1.09	1.19	.91
Gender[a]	6.89	1.45	4.75***	7.97	1.57	5.07***
BMI	.65	.13	5.14***	.26	.14	1.88
Loneliness	.47	.06	7.80***	.23	.07	3.29**
Loneliness x Self-Objectification	-.07	.08	-.85	.06	.09	.69
Social Appearance Anxiety				.31	.06	5.04***
ΔR^2		.00			.00	
ΔR^2 *F*		$F(1, 294) = .73$			$F(1, 293) = .48$	
R^2		.56			.37	
F		$F(5,294) = 75.82$***			$F(6,293) = 28.78$***	

Conditional Direct Effect of Self-Objectification on Public Exercise Avoidance

Loneliness	*Effect*	*SE*	*t*	95% *CI*
Low	.45	1.49	.30	-2.48, 3.37
Mean	1.09	1.19	.91	-1.27, 3.44
High	1.72	1.53	1.12	-1.30, 4.74

Conditional Indirect Effects of Self-Objectification on Public Exercise Avoidance

Loneliness	*Effect*	*SE*	*95% CI*
Low	3.73	.93	1.89, 5.55
Mean	3.49	.82	1.86, 5.12
High	3.26	.87	1.66, 5.07

Note: Each column represents a separate regression model that predicts the criterion at the top of the column. [a]0 = man and 1 = woman. Conditional values for loneliness at -1 *SD* is -10.83 (low loneliness), mean is 0 (mean loneliness), and +1 *SD* is 10.83 (high loneliness)

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

Table 79

Results for Moderated Mediation Analysis of Proposed Model 2

Predictors	Model 1 Upward Appearance Comparison			Model 2 Exercise Dependence		
	b	*SE*	*t*	*b*	*SE*	*t*
Self-Objectification	8.38	2.37	16.94***	.21	.49	.44
Gender[a]	7.92	1.06	7.44***	-2.64	.66	-4.01***
BMI	-.06	.09	-.65	-.09	.05	-1.60
Loneliness	.06	.04	1.00	-.04	.03	-1.58
Loneliness x Self-Objectification	-.12	.06	-1.88	-.01	.04	-.19
Upward Appearance Comparison				.09	.03	2.70**
ΔR^2		.01			.00	
ΔR^2 *F*		$F(1, 268) = 3.55$			$F(1, 267) = .04$	
R^2		.46			.09	
F		$F(5, 268) = 46.00$***			$F(6, 267) = 4.58$***	

Conditional Direct Effect of Self-Objectification on Exercise Dependence

Loneliness	*Effect*	*SE*	*t*	95% *CI*
Low	.29	.62	.46	-.94, 1.52
Mean	.21	.49	.44	-.74, 1.17
High	.14	.62	.23	-1.07, 1.35

Conditional Indirect Effects of Self-Objectification on Exercise Dependence

Loneliness	*Effect*	*SE*	*95% CI*
Low	.90	.35	.23, 1.63
Mean	.78	.30	.20, 1.38
High	.66	.28	.17, 1.26

Note: Each column represents a separate regression model that predicts the criterion at the top of the column. [a]0 = man and 1 = woman. Conditional values for loneliness at -1 *SD* is -10.83 (low loneliness), mean is 0 (mean loneliness), and +1 *SD* is 10.83 (high loneliness)

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

Table 80

Results for Forward Selection Regression for Public Exercise Avoidance

Model	*b*	*SE*	*β*	*t*	95% CI		*F*	R^2	*Adj* R^2	*SE*
Step 1										
Exercise Frequency	-4.15	.60	-.38	-6.90***	-5.34	-2.97	$F(1, 286) = 47.56$***	.14	.14	12.94
Step 2										
Exercise Frequency	-3.80	.58	-.35	-6.51***	-4.95	-2.65	$F(2, 285) = 37.66$***	.21	.20	12.45
Gender [a]	8.56	1.75	.26	4.89***	5.12	12.01				
Step 3										
Exercise Frequency	-2.87	.64	-.26	-4.49***	-4.13	-1.61	$F(3, 284) = 29.57$***	.24	.23	12.24
Gender [a]	8.44	1.72	.26	4.90***	5.05	11.82				
Exercise Location: Gym	-5.32	1.62	-.19	-3.29**	-8.51	-2.14				
Step 4										
Exercise Frequency	-2.66	.63	-.24	-4.23***	-3.90	-1.42	$F(4, 283) = 26.20$***	.27	.26	12.00
Gender [a]	8.35	1.69	.25	4.95***	5.03	11.67				
Exercise Location: Gym	-6.38	1.62	-.23	-3.95***	-9.56	-3.20				
Exercise Motivation: Appearance	5.44	1.54	.18	3.53***	2.41	8.47				
Step 5										
Exercise Frequency	-2.47	.63	-.23	-3.94***	-3.71	-1.23	$F(5, 282) = 22.82$***	.29	.28	11.88
Gender [a]	8.44	1.67	.26	5.06***	5.16	11.73				
Exercise Location: Gym	-5.88	1.61	-.21	-3.65***	-9.05	-2.71				
Exercise Motivation: Appearance	4.95	1.53	.17	3.23**	1.93	7.97				
BMI	.39	.15	.14	2.66**	0.10	0.67				
Step 6										

Exercise Frequency	-1.54	.57	-.14	-2.69**	-2.67	-0.41	$F(6, 281) = 35.67$***	.43	.42	10.62
Gender [a]	6.30	1.52	.19	4.16***	3.32	9.28				
Exercise Location: Gym	-5.59	1.44	-.20	-3.88***	-8.43	-2.76				
Exercise Motivation: Appearance	3.26	1.39	.11	2.35***	0.53	5.99				
BMI	.10	.14	.04	0.77	-0.16	0.37				
Social Appearance Anxiety	.36	.04	.42	8.45***	0.28	0.45				
Step 7										
Exercise Frequency	-1.30	0.58	-0.12	-2.27*	-2.44	-0.17	$F(7, 280) = 31.93$***	.44	.43	10.53
Gender [a]	6.86	1.52	0.21	4.51***	3.87	9.85				
Exercise Location: Gym	-5.60	1.43	-0.20	-3.92***	-8.41	-2.78				
Exercise Motivation: Appearance	3.39	1.38	0.11	2.46*	0.68	6.09				
BMI	0.12	0.13	0.04	0.86	-0.15	0.38				
Social Appearance Anxiety	0.31	0.05	0.36	6.31***	0.21	0.40				
Loneliness	0.17	0.07	0.13	2.41*	0.03	0.30				

Note: [a]0 = man and 1 = woman.
*$p < .05$, **$p < .01$, ***$p < .001$

Table 81

Results for Forward Selection Regression for Exercise Dependence

Model	*b*	*SE*	*β*	*t*	95% CI		*F*	R^2	*Adj* R^2	*SE*
Step 1										
Exercise Frequency	1.64	0.21	0.45	8.00***	1.23	2.04	$F(1, 260) = 64.06$***	.20	.20	3.94
Step 2										
Exercise Frequency	1.70	0.21	0.46	8.29***	1.29	2.10	$F(2, 259) = 35.04$***	.21	.21	3.91
Exercise Location: Outdoors	-1.34	0.60	-0.13	-2.24*	-2.52	-0.16				
Step 3										
Exercise Frequency	1.65	0.20	0.45	8.10***	1.25	2.06	$F(3, 258) = 25.36$***	.23	.22	3.88
Exercise Location: Outdoors	-1.34	0.59	-0.13	-2.26*	-2.51	-0.17				
Gender[a]	-1.25	0.56	-0.12	-2.22*	-2.35	-0.14				
Step 4										
Exercise Frequency	1.69	0.20	0.46	8.30***	1.29	2.09	$F(4, 257) = 20.29$****	.24	.223	3.86
Exercise Location: Outdoors	-1.35	0.59	-0.13	-2.29*	-2.51	-0.19				
Gender[a]	-1.33	0.56	-0.13	-2.37*	-2.43	-0.23				
Exercise Partner: Friend	-1.24	0.61	-0.11	-2.04*	-2.43	-0.04				
Step 5										
Exercise Frequency	1.76	0.21	0.48	8.58***	1.35	2.16	$F(5, 256) = 17.33$***	.25	.24	3.83
Exercise Location: Outdoors	-1.62	0.60	-0.15	-2.69**	-2.80	-0.43				
Gender[a]	-1.29	0.56	-0.13	-2.32*	-2.38	-0.20				
Exercise Partner: Friend	-1.30	0.60	-0.12	-2.15*	-2.49	-0.11				
Exercise Location: Home	-1.57	0.75	-0.12	-2.10*	-3.04	-0.10				
Step 6										

Exercise Frequency	1.71	0.20	0.46	8.48***	1.31	2.11	$F(6, 255) = 16.65$***	.28	.27	3.77
Exercise Location: Outdoors	-1.55	0.59	-0.14	-2.62**	-2.71	-0.38				
Gender[a]	-1.90	0.58	-0.19	-3.28**	-3.04	-0.76				
Exercise Partner: Friend	-1.14	0.60	-0.10	-1.92	-2.32	0.03				
Exercise Location: Home	-1.07	0.75	-0.08	-1.43	-2.55	0.41				
Upward Appearance Comparison	0.08	0.03	0.18	3.19***	0.03	0.13				

Note: [a]0 = man and 1 = woman.
*$p < .05$, **$p < .01$, ***$p < .001$

Appendix A

The following section asks about your exercise habits and motivations.

Did you **voluntarily** exercise or engage in a structured/semi-structured physical activity between January 2019 to present?

Exercise or physical activity **can include** weightlifting, running, playing sports, swimming, hiking, walking for exercise, yoga, martial arts, dancing, etc.
This does **not include** physical activity that is done for school or work (e.g., required Phys Ed classes, lifting boxes, field work, etc.).

- o Yes (1)
- o No (0)

Currently, where do you typically go to exercise/engage in physical activity?

- o I do not exercise currently (0)
- o At a gym/fitness center/health club (1)
- o In the outdoors (e.g., outdoor basketball/tennis courts, hiking trails, etc.) (2)
- o At home (3)
- o At a studio (e.g., yoga, dance, martial arts etc.) (4)
- o Other: (5) _____

Currently, who do you typically exercise with?

- o By myself (1)
- o With my significant other (2)
- o With my friend/s (3)
- o With a group or class (4)
- o Other: (5) _____

Currently, how often do you typically exercise/engage in physical activity?

- o Once a month or less (1)
- o A few times a month (2)
- o 1 - 2 times a week (3)
- o 3 - 5 times a week (4)
- o 6 - 7 times a week (5)

Currently, how long is the typical duration of your exercise/physical activity session?

- o Less than 15 mins (1)
- o 15 to 30 mins (2)
- o 30 mins to 1 hour (3)
- o 1 hour to 1.5 hours (4)
- o More than 1.5 hours (5)

What would you say is your **primary reason** for exercising/engaging in physical activity?

- o I want to improve my appearance (1)
- o I want to improve my psychological health (2)
- o I want to improve my physical health (3)

- o I want to improve my skills (e.g., in sports, lifting technique, martial arts) (4)
- o Other: (5) _____