No Pain, No Gains: Conformity to Masculine Norms, Body Dissatisfaction, and Exercise Dependence

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Abstract

Although exercise can facilitate physical and mental health, excessive exercise can be deleterious to men's health. While there is a wealth of research on the link between body image concerns and excessive exercise among women, this relationship remains understudied among men. In addition, gender role socialization's role in excessive exercise remains overlooked. Therefore, the present study examined how body dissatisfaction (i.e., muscle and body fat dissatisfaction) may mediate the effect of conformity to specific masculine norms on self-reported exercise dependence (i.e., uncontrollable excessive exercise behavior that manifests in physiological and psychological symptoms) using a sample of 632 U.S. community men who were primarily white and heterosexual. Results indicated that muscle dissatisfaction, but not body fat dissatisfaction, mediated the effects of the norms of Winning, Violence, and Playboy on exercise dependence. Winning, Emotional Control, Risk-Taking, and Power Over Women also evidenced direct effects on exercise dependence. Implications for practice and the importance of testing the generalizability of this model across social locations are discussed.

Keywords: masculinity; gender norms; exercise dependence; body image; muscularity

Public Significance Statement: This study suggests that rigid adherence to masculine norms may result in dissatisfaction with muscularity and this dissatisfaction fuels unhealthy exercise. This finding implies that clinicians could discuss flexibility around masculine norms and find more moderate expressions of masculine norms with men who have muscularity concerns. If exercise dependence is a concern for clients, clinicians may need to consult with relevant literature and experts on exercise dependence and/or substance dependence.

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Although exercise can facilitate physical and mental health, excessive exercise can be deleterious to men's health (e.g., injuries, psychological problems, interference with personal relationships; Ogden, Veale, & Summers, 1997; Parent, 2013). In fact, it is estimated that 12% of men engage in excessive exercise, which can include maladaptive muscularity-related and leanness-related behaviors such as weight training and cardio workouts (Cunningham, Pearman, & Brewerton, 2016). While there is a wealth of research on the link between body image concerns and problematic exercise behaviors among women (e.g., Holland & Tiggemann, 2017), this relationship remains understudied in men (Strother, Lemberg, Stanford, & Turberville, 2012). In addition, little research exists on masculinity's role in influencing problematic exercise, despite its demonstrated link with body image concerns in men (e.g., Holmqvist Gattario et al., 2015). Therefore, the present study sought to examine the links between conformity to masculine norms, body dissatisfaction, and exercise dependence symptoms in a community sample of men by testing four competing structural mediation models.

Men and Body Image

Some men experience eating disorders and muscle dysmorphia, conditions that have traditionally been understudied (Strother et al., 2012). Given the body image and eating disorder literature's historical focus on women, it is unsurprising that early research on men assumed that those experiencing body image concerns were typically concerned with body fat (e.g., Yager, Kurtzman, Landsverk, & Wiesmeier, 1988). However, the literature published over the last 20 years has acknowledged men's body image issues as both being present and qualitatively different from women's (e.g., Cho & Lee, 2013; McCreary & Sasse, 2000). Men's body image

concerns often involve muscularity (Parent, 2013). Whereas sexual minority men tend to endorse a stronger desire to be thin than heterosexual men (e.g., Kaminski, Chapman, Haynes, & Own, 2005), sexual minority men report similar levels of muscularity concerns (e.g., Smith et al., 2011) as heterosexual men.

Masculine Norms, Body Image, and Exercise

One possible reason for men's desire to be more muscular may stem from masculine norms. Masculine norms are socially endorsed standards that influence men to behave in a socially acceptable manner (Mahalik et al., 2003). These norms are introduced to boys at a young age and are consequently internalized. However, men vary in the degree to which they adopt and conform to these masculine norms. Conformity to masculine norms can have positive and negative effects (Mahalik et al., 2003). Conformity has been linked to personal courage, resilience, and autonomy (Hammer & Good, 2010). However, conformity has also been linked to problematic health behaviors (Mahalik, Lagan, & Morrison, 2006), relationship dissatisfaction (Burn & Ward, 2005), and worse mental health (Wong, Ringo Ho, Wang, & Miller, 2016).

Recent evidence suggests that masculine norms may also be linked to muscularity concerns in men (e.g., Griffiths, Murray, & Touyz, 2014). A potential explanation could be that masculine norms are displayed in conjunction with ideals of muscularity (Franko et al., 2015). That is, society portrays masculine men as muscular and muscular men as masculine. Thus, men who adopt societal norms for men's behavior may adopt rules for men's appearance. In addition, leanness has also become an important component of the ideal body for men (Franko et al., 2015). Hence, drive for leanness and fitness, as well as body fat dissatisfaction, have been linked to conformity to masculine norms in recent years as well (Franko et al., 2015; Griffiths et al., 2014; Holmqvist Gattario et al., 2015).

Given the pressures to be muscular and lean, it is unsurprising that steroid use has increased dramatically in recent decades (Kanayama, Hudson, & Pope, 2010). Steroid use is an extreme example of a muscularity-related behavior (McCreary & Sasse, 2000). However, men also engage in less drastic muscularity-related behaviors that are considered subclinical. Such behaviors include excessive weight training, overconsumption of protein, and unsafe supplement use (McCreary & Sasse, 2000; Murray, Rieger, Touyz, & Garcia, 2010; Parent, 2013). Similarly, there are leanness- or fitness-related behaviors that are considered maladaptive (e.g., excessive exercise, fasting, restrictive dieting; Anderson & Bulik, 2004; Mussap, 2008; Tod, Edwards, & Hall, 2013).

Because conformity to masculine norms may exacerbate body image concerns, and body image concerns may drive maladaptive muscularity- and leanness-related behaviors, conformity to masculine norms may therefore be linked to such maladaptive behaviors. Unfortunately, little research has investigated these links. Studies generally measure drive for muscularity as an aggregate of muscularity attitudes (i.e., similar to muscle dissatisfaction) and muscularity-related behaviors (e.g., Steinfeldt,Gilchrist, Halterman, Gomory, & Steinfeldt, 2011). In addition, the muscularity-related behaviors subscale of the Drive for Muscularity Scale (McCreary & Sasse, 2000) contains both negative and neutral behaviors in its items. While this may capture an overall picture of a person's muscularity-related activities, the subscale may have limited clinical utility because of its lack of targeted focus on negative behaviors. Furthermore, little research has investigated conformity to masculine norms' relation to leanness- or fitness-related behaviors. Thus, it is unknown whether conformity is linked with both maladaptive muscularity- and leanness-related behaviors.

Addressing Research Gaps with Exercise Dependence

One way to investigate this potential connection is by studying exercise dependence. Exercise dependence is defined as "a 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." (Hausenblas & Downs, 2002a, p. 90). Some researchers (e.g., De Coverley Veale, 1987; Hausenblas & Downs, 2002b) suggest that, like dependence on substances, excessive exercise can develop into a dependence on the activity. The exercise dependence literature draws on criteria for previous *DSM* iterations of substance use disorders (De Coverley Veale, 1987; Hausenblas & Downs, 2002b).

Exercise dependence can be used as a proxy for maladaptive muscularity- and leanness-related behaviors in men (Murray & Lavender, 2018). Tod and Edward's (2015) meta-analysis demonstrated that exercise dependence is associated with drive for muscularity, which contains both muscularity attitudes (i.e., muscle dissatisfaction) and muscularity-related behaviors (Chittester & Hausenblas, 2009; Hale, Roth, DeLong, & Briggs, 2010). Similarly, exercise dependence has been linked to more general body dissatisfaction in both men and women (Hausenblas & Fallon, 2002). Because the items in measures of exercise dependence, such as the Exercise Dependence Scale-Revised (EDS-R; Downs, Hausenblas, & Nigg, 2004), do not name specific types of exercise (e.g., running, weightlifting, biking), participants can interpret items about exercise as pertaining to either muscularity- or leanness-related activities, depending on the types of exercises that person engages in. Therefore, exercise dependence is a promising construct that can account for symptoms related to both muscularity- and leanness-related behaviors.

Another gap in the literature pertains to conformity to masculine norms' connection to

body image and subsequent symptoms in men. Although some research has suggested that overall conformity to masculine norms is associated with body image concerns (Franko et al., 2015; Griffiths et al., 2014), bifactor analysis evidence has demonstrated that the Conformity to Masculine Norms Inventory-46 (CMNI-46; Parent & Moradi, 2009) does not measure overall conformity to masculine norms in a reliable manner. Rather, conformity to specific masculine norms (e.g., self-reliance) is the appropriate level of analysis (Hammer, Heath, & Vogel, 2018). Because few studies (e.g., Holmqvist Gattario et al., 2015) have investigated which specific masculine norms may be linked to body image concerns, more work at this level of specificity is needed. In addition, most studies have surveyed only college men, resulting in a lack of data regarding which masculine norms may predict body image concerns and related outcomes among men from the general population.

Theoretical Rationale for the Present Study

One major gap in the literature is that, to the knowledge of the authors, no studies have investigated any body image variable as a mediator of the relationship between conformity to masculine norms and body image-related outcomes. This is surprising, given conformity to masculine norms' demonstrated relationship with body image concerns (e.g., Holmqvist Gattario et al., 2015) and the assumption that body image concerns lead to behaviors aimed at modifying one's body. This assumption is based on a prominent model in the body image and eating disorder literature on women. The tripartite influence model (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999) has received a great deal of attention and empirical support in this field (e.g. Keery, van den Berg, & Thompson, 2004; Yamamiya, Shroff, & Thompson, 2008). In it, society, comprised of peers, family, and the media, send messages to women about what ideal women look like (Thompson et al., 1999). Women then internalize these messages and become

dissatisfied with their bodies when they feel their bodies do not align with these ideal bodies. This dissatisfaction then leads to behaviors designed to develop these ideal bodies (i.e., restrictive dieting and bulimic symptoms). Recently, this model has been modified and applied to men (Tylka, 2011). This revised model includes pressures from partners as an additional societal influence and includes muscle and body fat dissatisfaction, which lead to muscle-related behaviors and eating pathology, respectively. This refined model, although relatively recent, has seen promising results (Tylka & Andorka, 2012) and thus serves as a basis for the model proposed in the current study.

The authors of the current study propose that men receive messages from society about how they should behave and appear. Society portrays men as appearing muscular and lean and behaving in ways that are traditionally considered masculine. Men internalize these messages and conform to these masculine norms in order to be accepted by society. Because these norms are intertwined with images of the ideal body for a man, conformity to them can lead to appraisals of one's own body. In this act of assessment, men examine their muscularity and body fat composition. If men are dissatisfied with either of these components, they engage in behaviors to alleviate their concerns and reach a closer approximation of the ideal body. One set of behaviors men engage in is exercise, as exercise is a socially acceptable method for facilitating attainment of the ideal body. Although many men will engage in healthy exercise, some will over-exercise, putting their health at risk. These men who engage in maladaptive exercise develop exercise dependence either because they continue to have desires to alleviate their body image concerns or simply because they have become physically and psychologically dependent on exercise. In summary, in addition to demonstrated empirical links among the constructs (see above), there are theoretical reasons to anticipate that conformity to masculine

norms may have a direct link with exercise dependence, and an indirect link with it via increased muscle and body fat dissatisfaction.

The Present Study

The current study examined conformity to masculine norms' relationship with body dissatisfaction (i.e., muscle and body fat dissatisfaction) and exercise dependence. We tested four competing mediation models (see Figure 1) that differed with regard to: (a) full versus partial mediation and (b) the inclusion of muscle dissatisfaction as a single mediator versus muscle and body fat dissatisfaction as dual mediators.

The muscle/fat mediation model posits that conformity to masculine norms' relationship with exercise dependence is fully mediated by a combination of muscle and body fat dissatisfaction. For example, a man who endorses attitudes of sexual promiscuity (i.e., Playboy) will be likely to exercise in order to attract potential partners, but only if he is dissatisfied with his muscularity and body fat composition. This model assumes that the man's endorsement of sexual promiscuity is what leads to dissatisfaction with his muscularity and body fat which then lead to maladaptive exercise behaviors. The muscle/fat partial mediation model posits that conformity to masculine norms not only exerts influence via muscle and body fat dissatisfaction, but also has a direct link with exercise dependence. Continuing the previous example, a man who desires to have multiple casual partners (i.e., Playboy) may engage in unhealthy exercising both because exercise is seen as way to achieve this goal and reduce feelings of inadequacy with his muscularity and body fat.

The muscle mediation model and muscle partial mediation model parallel the former models with one exception: body fat dissatisfaction is dropped from these models such that muscle dissatisfaction becomes the sole mediator. Given that men are more likely to endorse

muscle dissatisfaction than body fat dissatisfaction (Frederick et al., 2007) and masculinity has a stronger mental association with muscularity (e.g., Grogan & Richards, 2002), we tested these two muscle mediation models as parsimonious alternatives.

Given that a key contribution of this study was examining the unique effects of specific masculine norms in a general population of men, it is important to articulate a theoretical rationale for why each of the nine norms captured by the CMNI-46 could be expected to account for unique variance in body dissatisfaction and exercise dependence within these four models.

Winning. Holmqvist Gattario et al. (2015) suggest that Winning may predict body image concerns and subsequent behaviors because it involves setting high standards for one's self, which is a component of perfectionism (e.g., Frost, Marten, Lahart, & Rosenblate, 1990; Hewitt & Flett, 1991), a construct that has been linked to body image concerns (Grammas & Schwartz, 2009). Smolak and Murnen (2008) suggest that men's desires to be lean and muscular are related to success, as achieving the ideal body for men could reflect success.

Emotional Control. Emotional Control has been linked to drive for muscularity (Steinfeldt et al., 2011). Men who suppress their emotions and are dissatisfied with their bodies may engage in unhealthy behaviors (e.g., over-exercising) in an attempt to cope with their negative attitudes and feelings about their bodies.

Risk-Taking. Risk-Taking has been linked to drive for muscularity drive for leanness (e.g., De Jesus et al., 2015). Men who are more prone to performing risky behaviors may be more likely to put their health at risk, in this case by over-exercising.

Violence. Holmqvist Gattario and colleagues (2015) reason that men who are more willing to be violent may feel the need to become more muscular and lean in order to obtain a body that can intimidate others and increase the chances of success in physical altercations.

Subsequently, these men may commit to exercising to reach these goals and decrease their body image concerns.

Power Over Women. Power Over Women has been linked to drive for muscularity (e.g., Steinfeldt et al., 2011) One possible reason for this relationship is that men who desire control and dominance over women may want to achieve muscularity in order to intimidate women into submission (De Jesus et al., 2015), which could put pressure on oneself to achieve a certain body type through unhealthy exercise behaviors.

Playboy. As noted in the example above, men who wish to have a high number of casual sexual partners may see maintaining a muscular and lean body as a prerequisite to achieve this goal (Holmqvist Gattario et al., 2015). Thus, they engage in maladaptive exercise behaviors to relieve their feelings of dissatisfaction and reach their goal of having sexual encounters with multiple partners.

Self-Reliance. Self-Reliance has been linked to drive for leanness (e.g., De Jesus et al., 2015). It is possible that men who are less likely to ask others for assistance in dealing with their body image concerns may discover avenues of dealing with these concerns themselves, one of these avenues being exercise.

Primacy of Work. De Jesus and colleagues (2015) reason that "men's sense of success and discipline are required in order to achieve one's desired levels of thinness" (p. 141). Extrapolating from this, a sense of success and discipline may be needed in order to achieve a muscular and lean body. Thus, men who become dissatisfied with their bodies and subsequently become exercise dependent may do so because of the importance they place on discipline.

Heterosexual Self-Presentation. Heterosexual Self-Presentation has been linked to drive for muscularity (e.g., De Jesus et al., 2015). One explanation for this is that men who,

regardless of sexual orientation, associate being gay with weakness may feel the need to become more muscular in order to preserve an image of straightness (De Jesus et al., 2015). Hence, they may over-exercise to better achieve this image of straightness.

Method

Participants and Procedures

Participants were 632 (616 cisgender men, 11 transgender men, 5 preferred not to answer) adults ranging age from 18 to 59 (M = 28.31, SD = 7.00). Approximately 78.5% of the sample identified as White, 6.0% as Asian/Pacific Islander, 9.2% as Multiracial, 3.0% as Hispanic or Latino, 1.1% as Black or African American, 1.1% as Other, 0.2% as Native American, 0.2% as Arab, 0.8% preferred not to answer. Regarding U.S. residence region, approximately 2.1% reported living in New England, 10.4% in Middle Atlantic, 14.4% in East North Central, 7.3% in West North Central, 13.0% in South Atlantic, 5.4% in East South Central, 4.9% in West South Central, 6.2% in Mountain, 15.2% in Pacific, 1.1% in a U.S. territory, and 17.2% reported currently residing abroad. Regarding sexual orientation, approximately 84.7% identified as straight/heterosexual, 5.9% as gay, 5.7% as bisexual, 2.1% as pansexual, 0.3% as asexual, 0.6% as other, and 0.8% preferred not to answer.

To facilitate a wider response range on the measured variables, participants were recruited from multiple sources. The first source was ResearchMatch (RM), a national health volunteer registry created by several academic institutions and supported by the U.S. National Institutes of Health as part of the Clinical Translational Science Award (CTSA) program. The second source was a collection of online forums related to exercise (e.g., reddit.com/r/weightlifting, reddit.com/r/running). The University of Kentucky Office of Research Integrity approved the study. Participants were contacted via the registry (for RM) or

via a post in the forum (for online forums) regarding the study, advertised as a survey about how men's beliefs influence their thoughts and behaviors around exercise. Interested participants were directed to an online survey that began with an informed consent page, continued with the survey items, and ended with a debriefing page. Participants had the option of entering a drawing for a $25 Amazon.com gift card.

Measures

Conformity to Masculine Norms. The Conformity to Masculine Role Norms Inventory-46 (CMNI-46; Parent & Moradi, 2009) derives from the original 94-item CMNI (Mahalik et al., 2003). Nine subscales are included in the 46-item measure, including Winning (6 items; e.g., "In general, I will do anything to win."), Emotional Control (6 items; e.g., "I never share my feelings."), Playboy (4 items; e.g., "If I could, I would frequently change sexual partners."), Violence (6 items; e.g., "I am willing to get into a physical fight if necessary."), Self-Reliance (5 items; e.g., "I hate asking for help."), Risk-Taking (5 items; e.g., "I enjoy taking risks."), Power Over Women (4 items; e.g., "In general, I control the women in my life."), Primacy of Work (4 items; e.g., "My work is the most important part of my life."), and Heterosexual Self-Presentation (6 items; e.g., "I would be furious if someone thought I was gay."). Each subscale has demonstrated strong correlations with its respective subscale from the 96-item version of the scale ($.89 < r\text{'s} < .98$; Parent & Moradi, 2009). Hammer, Heath, and Vogel (2018) provided evidence that the nine factors should be modeled using a correlated factors model. Items are scored on a four-point Likert scale, ranging from 1 (*strongly disagree*) to 4 (*strongly agree*), with higher scores indicating greater conformity to that masculine norm. The subscales have demonstrated good internal consistency ($.77 < \alpha\text{'s} < .91$; Parent & Moradi, 2009). The internal consistency of these subscales in the current sample ranged from .81 to .92. Regarding

convergent evidence of validity, moderate to strong correlations with parallel subscales from other masculinity instruments, such as the Brannon Masculinity Scale (Brannon & Juni, 1984), Male Role Norms Inventory (Levant et al., 1992), and Gender-Based Attitudes toward Marital Roles scale (Hoffman & Kloska, 1995; Parent & Moradi, 2011).

Body Dissatisfaction. The Male Body Attitudes Scale (MBAS; Tylka, Bergeron, & Schwartz, 2005) uses a 1 (*never*) to 6 (*always*) Likert scale, with higher scores indicating greater body dissatisfaction. The MBAS consists of three subscales: Body Fat Dissatisfaction (8 items; e.g., "I think my body should be leaner."), Muscle Dissatisfaction (10 items, e.g., "I think I have too little muscle on my body."), and Height dissatisfaction. Given that exercise does not influence height, the first two subscales were used in the present study. The Body Fat Dissatisfaction (.93 < α's < .94; present study α = .91) and Muscle Dissatisfaction (.89 < α's < .90; present study α = .92) subscales have demonstrated internal consistency (Tylka et al., 2005). These subscales have demonstrated convergent evidence of validity: the Muscle Dissatisfaction subscale correlated with internalization of male appearance ideals, appearance comparisons, and perceived pressures to be muscular. The Body Fat Dissatisfaction subscale correlated with internalization of male appearance ideals, appearance comparisons, and perceived pressures to be thin (Tylka et al., 2005).

Exercise Dependence. Exercise dependence was assessed with the Exercise Dependence Scale-Revised (EDS-R; Downs et al., 2004). The EDS-R was developed based on the criteria for substance dependence in the *DSM-IV*. Seven subscales are included in the 21-item instrument, including Tolerance (3 items; e.g., "I continually increase my exercise intensity to achieve the desired effects/benefits."), Withdrawal (3 items; e.g., "I exercise to avoid feeling irritable."), Intention Effects (3 items; e.g., "I exercise longer than I intend."), Lack of Control (3 items; e.g.,

"I am unable to reduce how long I exercise."), Time (3 items; e.g., "I spend a lot of time exercising."), Reduction in Other Activities (3 items; e.g., "I think about exercise when I should be concentrating on school/work."), and Continuance (3 items; e.g., "I exercise despite recurring physical problems."). It uses a 6-point Likert scale from 1 (*never*) to 6 (*always*), with higher scores indicating more exercise dependence symptoms. The subscales have demonstrated internal consistency ($.67 < \alpha\text{'s} < .93$; Downs et al., 2004). The internal consistency of these subscales in the current sample ranged from .74 to .95. Known-group evidence of validity has been demonstrated by the total EDS-R scores discriminating bodybuilders and powerlifters from fitness lifters (Hale, Roth, DeLong, & Briggs, 2010) and those identified as risk for exercise dependence from those identified nondependent-symptomatic and nondependent-asymptomatic at moderate to strenuous levels of exercise frequency (Downs et al., 2004). The EDS-R has demonstrated convergent evidence of validity, with significant correlations with weightlifting frequency and duration, muscle-oriented behaviors, muscle-oriented eating behaviors, and attitudes toward muscularity (Chittester & Hausenblas, 2009).

Analysis Plan and Data Cleaning

The initial dataset contained 641 individuals. Cases with incorrect responses to both instructed response items ($n = 2$) or who did not identify as man ($n = 7$) were deleted. The final sample ($N = 632$) was used for all analyses and reliability estimates. No variables exceeded cutoffs of 3 and 10 for high univariate skewness and kurtosis values, respectively (Weston & Gore, 2006). We used the MLR estimator in M*plus* version 6.11 (Muthén & Muthén, 1998-2012) to estimate the model χ^2 and associated fit indices that use it to protect against deviations from multivariate normality. Missing data ranged from a low of 0.2% for many items to a high of 0.5% for one of the CMNI items. Covariance coverage ranged from .992 to 1.000. We used Full

Information Maximum Likelihood (FIML) estimation in M*plus* for all model analyses to handle missing data.

We used a two-step modeling approach (Anderson & Gerbing, 1988), which involves testing measurement models using confirmatory factor analysis and—only if those models fit adequately—then testing latent structural regression models that build on those measurement models. Four total structural models were tested: Muscle/Fat Mediation, Muscle/Fat Partial Mediation, Muscle Mediation, and Muscle Partial Mediation. The two muscle/fat models share the same measurement model, as do the two muscle models.

To model the latent variables, we used the items for each construct as manifest indicators. Pilot measurement model testing confirmed that it was appropriate to model the exercise dependence latent factor as a second order factor, given strong intercorrelations (Mean r = .56) among the seven first-order factors/subscales. Because the muscle/fat mediation and muscle mediation models don't utilize the same manifest variables, direct comparison of model fit indices was not possible. Thus, these models' comparative ability to account for variance in the exercise dependence latent variable was used as the selection criterion. If the muscle fat (partial) mediation models did not account for significant additional variance in this outcome variable, then the more parsimonious muscle (partial) mediation models would be retained for further consideration. Both partial and full mediation versions of each model were examined, and the versions of the retained model were compared using a scaled χ^2 difference test ($\Delta\chi^2$). A significant $\Delta\chi^2$ result would indicate that the more complex Partial Mediation version provides a better fit to the data and should be retained for indirect effects testing using the bootstrapping procedure outlined by Shrout and Bolger (2002). One thousand bootstrap draws of the data were used by M*plus* to obtain bias-corrected bootstrap confidence intervals for indirect effects for

those CMNI factors that demonstrated a significant association with muscle dissatisfaction—a prerequisite for finding an indirect effect from a CMNI factor to the exercise dependence factor.

The scaled chi-square statistic (scaled χ^2), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and standardized root mean square residual (SRMR) were used to assess the goodness of fit for each model. The following fit criteria were used: RMSEA ≤ .06, CFI ≥ .95, TLI ≥ .95, and SRMR ≤ .08 for good fit and RMSEA ≤ .10, CFI ≥ .90, TLI ≥ .90, and SRMR ≤ .10 for acceptable fit (Hu and Bentler, 1999; Weston & Gore, 2006). Soper's (2013) sample size calculator for structural equation models was used (effect size = .20, power = .80, alpha = .05, number of latent variables = 19, number of observed variables = 85) to calculate the minimum sample size needed for adequate power in the current study. The present sample (N = 632) exceeds the sample required (N = 562) by the most complex model—the muscle/fat partial mediation model. The means, standard deviations, and intercorrelations for the latent variables can be found in Table 1.

Results

The muscle/fat mediation measurement model, χ^2 (3412) = 6457.31, $p < .001$; RMSEA = .038 [90% CI of .036, .039], CFI = .905, TLI = .900, SRMR = .052, and the muscle mediation measurement model, χ^2 (2787) = 5360.05, $p < .001$; RMSEA = .038 [90% CI of .037, .040], CFI = .908, TLI = .904, SRMR = .052, both demonstrated acceptable fit to the data.

The muscle/fat mediation structural model did not demonstrate acceptable fit, χ^2 (3422) = 6624.66, $p < .001$; RMSEA = .038 [90% CI of .037, .040], CFI = .900, TLI = .895, SRMR = .076, nor did the muscle/fat partial mediation structural model, χ^2 (3413) = 6536.32, $p < .001$; RMSEA = .038 [90% CI of .037, .039], CFI = .902, TLI = .898, SRMR = .060. In contrast, the muscle mediation structural model, χ^2 (2796) = 5448.17, $p < .001$; RMSEA = .039 [90% CI of

.037, .040], CFI = .906, TLI = .901, SRMR = .072, and the muscle partial mediation structural model, χ^2 (2787) = 5360.05, $p < .001$; RMSEA = .038 [90% CI of .037, .040], CFI = .908, TLI = .904, SRMR = .052, both demonstrated acceptable fit to the data. Importantly, the muscle/fat partial mediation structural model failed to account for substantial additional variance in the exercise dependence latent variable (r^2 =. 253) beyond the variance accounted for by the single partial mediation structural model (r^2 =. 248), suggesting the more parsimonious muscle partial mediation model should be retained. Furthermore, the added complexity of the muscle partial mediation model sufficiently increased model fit ($\Delta\chi^2 = 88.12$, $p < .001$) to warrant retention over the simpler muscle mediation model.

In summary, results support the retention of the muscle partial mediation model (see Figure 2 for standardized path estimates) for further interpretation. Of the three tested indirect effects for this model, all were significant (i.e., did not include zero in the 95% confidence interval). Thus, Winning (β = .025, *B* = .026, 95% CI [.003, .048], *SE* = .014), Violence (β = .041, *B* = .034, 95% CI [.016, .058], *SE* = .012), and Playboy (β = .041, *B* = .030, 95% CI [.015, .053], *SE* = .011) had indirect links with exercise dependence symptoms via Muscle Dissatisfaction. Muscle Dissatisfaction, Winning, Emotional Control, Risk-Taking, and Power Over Women had direct links with exercise dependence symptoms.

Discussion

The current study examined conformity to masculine norms' links with exercise dependence via body dissatisfaction. This study addressed several important gaps in the male body image literature by (a) examining conformity to specific masculine norms rather than degree of general conformity, (b) attending to the dual pathways of muscle and body fat dissatisfaction, (c) accounting for measurement error by use of structural equation modeling, (d)

exploring potential mediators of conformity to masculine norms' links with exercise dependence symptoms, and (e) moving beyond college samples by surveying men in the general U.S. population. In general, results supported the notion that conformity to specific masculine norms may uniquely predict negative body image which then predicts maladaptive exercise.

More specifically, results supported the retention of the muscle partial mediation model over the muscle/fat partial mediation model, suggesting that muscle dissatisfaction may be the primary body image variable that increases the risk of maladaptive exercise in men. This aligns with Tylka's (2011) hypothesis that body fat dissatisfaction increases risk for disordered eating, but not muscle enhancement behaviors. This finding also converges with those of Griffiths and colleagues (2014) who found a near zero relationship between overall conformity to masculine norms and body fat dissatisfaction.

Results supported the retention of the muscle partial mediation model over the muscle mediation model as well, suggesting that conformity to masculine norms is associated with increased risk for exercise dependence even after accounting for its effect on dissatisfaction with muscularity. Specifically, conformity to the norms of Violence and Playboy was indirectly associated with exercise dependence symptoms via muscle dissatisfaction. The significance of Violence partially aligns with the findings of Holmqvist Gattario et al. (2015) who suggested that a willingness to be violent may drive the desire to achieve a more muscular build that can intimidate others and aid in aggressive acts. Although Holmqvist Gattario and colleagues (2015) only found Violence's association with body image in UK men, the results of the current study suggest that this relationship may also be present in men living in the US. Playboy's relationships with muscle dissatisfaction and exercise dependence also align with previous studies demonstrating its link to drive for muscularity (e.g., De Jesus et al., 2015). As postulated

by Holmqvist Gattario and colleagues (2015), the desire to have multiple partners could incite feelings of inadequacy about one's body when a man perceives that a more muscular build is desired by potential mates. The findings of the current study expand on this by suggesting that this connection may eventually result in exercise dependence.

Conformity to the norm Winning predicted exercise dependence directly as well as indirectly via muscle dissatisfaction. Following Holmqvist Gattario and colleagues' (2015) suggestion, those who feel a strong need to always win are perfectionists, a personality trait linked with body image concerns (Grammas & Schwartz, 2009). Likewise, the desire to win at all costs may necessarily set a high bar for one's physical form, a bar that may leave men perennially dissatisfied with their current physique. This dissatisfaction, as well as the general desire to succeed in all venues, may push some men to build their physical prowess even if it means unhealthy levels of exercise. The existence of the direct effect suggests the presence of an unmeasured additional mediator, such as self-perceived importance of achieving success in sports (Holmqvist Gattario et al., 2015).

Interestingly, muscle dissatisfaction was unable to explain the associations found between conformity to the norms of Emotional Control, Risk-Taking, and Power Over Women and exercise dependence. Rather endorsement of these three norms were directly linked with maladaptive exercise. Although emotionally stoic men may be no more likely to be dissatisfied with their muscles than men who freely share their feelings, it makes sense that stoic men would be willing to continually increase the intensity of their exercise, exercise to avoid difficult feelings, and endure the discomfort associated with intense exercise, all hallmarks of exercise dependence. Likewise, given the risks involved in maladaptive exercise, it is not surprising that men comfortable with risk taking are more likely to take risks with their exercise regimen. Men

who desire authority over women may exercise in an unhealthy manner in an attempt to build more muscle mass which they believe will symbolize strength and superiority. However, because of the sexist beliefs these men hold, they may refuse to acknowledge any feelings of inferiority, inhibiting them from believing (or admitting) that their muscular builds are inadequate. If true, one would assume these men score high on measures of narcissism. Indeed, one study found a link between drive for muscularity and vanity, a component of narcissism (Morrison, Morrison, Hopkins, & Rowan, 2004). Future exercise dependence studies could measure narcissism and test this assumption directly.

The lack of unique associations between the endogenous variables and the norms of Self-Reliance, Primacy of Work, and Heterosexual Self-Presentation is somewhat inconsistent with previous studies. A link between Self-Reliance and drive for muscularity as well as one between Primacy of Work and drive for muscularity have only been found in non-U.S. samples (Holmqvist Gattario et al., 2015) or U.S. college football players (Steinfeldt et al., 2011). It is possible that something unique to these populations exists that creates this link which may not hold in a representative sample of U.S. men. Previous studies have found a link between Heterosexual Self-Presentation and drive for muscularity (e.g., Holmqvist Gattario et al., 2015), though their samples consisted of men who were, on average, younger than the men in the present sample. Thus, it is possible that Heterosexual Self-Presentation may uniquely predict muscle dissatisfaction and exercise dependence, but only in younger men who may feel more pressure to perform in a heteronormative fashion.

Addressing Current Limitations through Future Research

Limitations of the current study provide several avenues for future research. First, the cross-sectional design precludes causal inference and the demonstrated effects should be

interpreted as providing suggestions about associations. Future investigations should employ longitudinal and experimental designs to provide more robust support for the current findings. Second, exclusively self-report data were captured for the present study, increasing the likelihood that monomethod bias may have affected the results (e.g., hesitation to report the full extent of their degree of conformity, dissatisfaction, or symptoms of exercise dependence).

Third, compared to the national population of men, this sample was overrepresented by younger White heterosexual cisgender men residing in the U.S. (Although the sample here is older than those in previous studies, the age of the participants still ranged from 18 to 59, underrepresenting men in late adulthood.) Also, the sample was recruited from ResearchMatch.org and reddit.com which may not accurately represent men in the general population. People on ResearchMatch.org are more likely to have comorbid physical health conditions (Harris et al., 2012). Reddit.com users tend to be younger, White, more liberal, and are more likely to have received higher education (Pew Research Center, 2016). As a result, the generalizability of the findings to other populations is unknown, and future studies should test the proposed models with other populations of interest. When comparing this sample's scores (see Table 1) on study variables to the scores from male body image/exercise studies, we found that our scores were generally similar (see Supplemental Material for a tabular summary). Most of these studies, ours included, were comprised primarily with men with conformity, dissatisfaction, and dependence scores that fell below the midpoint of the respective scales. This suggests that our results may not generalize to samples of men characterized by strong conformity, high dissatisfaction, and severe exercise dependence, highlighting the importance of future research in this area.

In particular, researchers should test these mediation models using samples exclusively

comprised of gay men, with particular attention to gay subcultures that may influence results. For example, some gay men identify as “twinks” and strive for a lean and/or thin body ideal (Gough & Flanders, 2009), potentially making body fat dissatisfaction a more salient mediator than muscle dissatisfaction. On the other hand, “bears” may evidence a stronger predictive relationship between conformity to masculine norms and muscle dissatisfaction because they tend to endorse more features associated with hegemonic masculinity and strive for a muscular, but not lean, body ideal (Gough & Flanders, 2009; Ravenhill & de Visser, 2017).

Fourth, this study did not measure mediators (e.g., importance of achieving success in sports) beyond muscle and body fat dissatisfaction, which may help explain some of the direct effects we found. Future investigations would benefit from the inclusion of such variables to capture a more comprehensive picture of the etiology of negative body image and related behaviors in men. Although body fat dissatisfaction was measured in the current study, this variable is distinct from related variables such as drive for leanness (Tylka, 2011). While we make the assumption that conformity to masculine norms’ relationship with exercise dependence is mediated by dissatisfaction with muscles but not dissatisfaction with leanness, the Body Fat Dissatisfaction subscale (Tylka et al., 2005) is proposed to measure dissatisfaction with one’s body fat composition, not necessarily leanness. As such, it is possible that body fat dissatisfaction may have no connection to conformity to masculine norms, but drive for leanness may. This could explain why previous studies have found connections between conformity to masculine norms and drive for leanness and one study found no such connections between body fat dissatisfaction and conformity to masculine norms. Prospective studies should consider measuring both variables in tandem to investigate this possibility.

Implications for Practice

Our results hold implications for clinical practice. First, clinicians could consider incorporating discussions of masculinity into therapy with men who experience muscle dissatisfaction or exercise dependence. Such discussions could revolve around how these clients value living up to traditional masculine norms and the potential benefits and drawbacks that may result from adherence to these norms (Mahalik, Good, & Englar-Carlson, 2003; Mahalik, Talmadge, Locke, & Scott, 2005). In addition, Mahalik and colleagues (2003) advise focusing on specific aspects of a client's masculinity rather than masculinity as a whole because masculinity's meaning varies between individuals. Indeed, this recommendation is critical in working with men who have muscle dissatisfaction, as this study suggests only a select few masculine norms fit the mediation pattern hypothesized earlier. Exercise dependence may not always be driven by muscle dissatisfaction, but can be directly tied to pressures connected to performing masculinity. Furthermore, many of these masculine norms in and of themselves may not be harmful to men (e.g., self-reliance), but the rigid adherence to these norms is (Mahalik et al., 2005). Thus, clinicians are advised to explore with their clients the possibility of increasing flexibility around norms that may be exacerbating their muscle dissatisfaction or maladaptive exercise. One such way is finding more moderate expressions of the rigid masculine norms (e.g., McDermott et al., 2019) that predicted muscle dissatisfaction and exercise dependence in this study. For example, men who feel they must engage in violence as a way to intimidate others could be encouraged to reconceptualize the use of force in a more contextual way. Violence may be adaptive in contexts that require providing safety for loved ones but less adaptive in contexts where other forms of strength may suffice for proving one's competence.

However, steps should be taken beyond intervening with beliefs around masculinity. Specifically, interventions for body image concerns may be necessary. Parent (2013)

recommends assessing the degree to which muscularity and body image is tied to a client's identity. The dyad can then explore maladaptive beliefs about body image and exercise. It is important note, however, that a clinician should be careful not to pressure clients to stop excessively exercising. Instead, Parent (2013) recommends clinicians to communicate to clients that they seek to ensure that the client sees optimal performance from his exercise. It may also be pertinent to acknowledge the difficulties of having body image issues as a man. Because body image concerns have traditionally been stereotyped as a women's issue, men may feel less masculine for having such concerns, even if their body image centers on muscularity. This feeling of being less masculine may result in men feeling shame, withdrawing from therapy, or not seeking psychological help. As such, clinicians should discuss with clients the gendered nature of body image concerns and help alter their perceptions of the normativity of body image concerns among men (American Psychological Association, 2018)

Clinicians may also need to deliver interventions to decrease exercise dependence. Because exercise dependence is not widely known and is not included in any iteration of the DSM, clinicians may have difficulty recognizing it. Thus, clinicians should familiarize themselves with the proposed criteria of exercise dependence (see Adams, 2009). When clinicians assess that a client may be engaging in maladaptive exercise, they could educate clients about what healthy exercise looks like and how it differs from the client's current behaviors. Similarly, as most steroid users are weightlifters (Kanayama et al., 2010), screening for steroids and educating clients about the consequences of them is recommended. Parent (2013) recommends that clinicians become knowledgeable about steroids through consultation of literature and with experts in order to avoid knowledgeable clients from disengaging from therapy. Because of the addicting nature of exercise dependence, alternative behaviors to

maladaptive exercise may need to be collaboratively created with the client. Adams (2009) suggests that even moderating current exercise patterns could reduce dependence concerns.

Since little research exists for the treatment of exercise dependence, Adams (2009) suggests adapting treatment protocols for substance abuse to exercise dependence. In particular, he recommends motivational interviewing and cognitive behavioral therapy because of empirical support for their use in substance abuse populations. Consultation with specialists could be difficult as well because of the scarcity of empirical support for treatments of exercise dependence. Therefore, Adams suggests consulting with substance abuse specialists because of the similar mechanisms of substance dependence and exercise dependence. Each of the interventions described could have the potential to decrease negative attitudes towards one's muscles and negative behaviors aimed at alleviating these concerns (e.g., excessive exercise).

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Table 1
Means, Standard Deviations, and Intercorrelations among Measures (N = 632)

Study Variables	*M*	*SD*	Range	1	2	3	4	5	6	7	8	9	10	11	12
1. Winning	1.50	.58	0–3	-											
2. Emotional Control	1.47	.67	0–3	.17	-										
3. Risk-Taking	1.31	.53	0–3	.22	.01	-									
4. Violence	1.73	.62	0–3	.29	.18	.23	-								
5. Power Over Women	.55	.53	0–2.75	.31	.16	.17	.38	-							
6. Playboy	1.34	.73	0–3	.20	.05	.23	.14	.22	-						
7. Self-Reliance	1.31	.59	0–3	.25	.49	.03	.08	.19	.10	-					
8. Primacy of Work	1.08	.64	0–3	.24	.13	.01	-.09	.08	.13	.08	-				
9. Heterosexual Self-Presentation	.91	.67	0–3	.33	.21	-.05	.26	.57	-.02	.23	.06	-			
10. Muscle Dissatisfaction	3.45	1.17	1–6	.19	.05	.06	.21	.10	.21	.11	.02	.07	-		
11. Body Fat Dissatisfaction	3.51	1.23	1–6	.07	.03	-.04	.13	-.02	.12	.14	-.06	-.03	.41	-	
12. Exercise Dependence	2.86	.99	1–6	.37	.18	.23	.26	.24	.11	.12	.11	.13	.30	.07	-

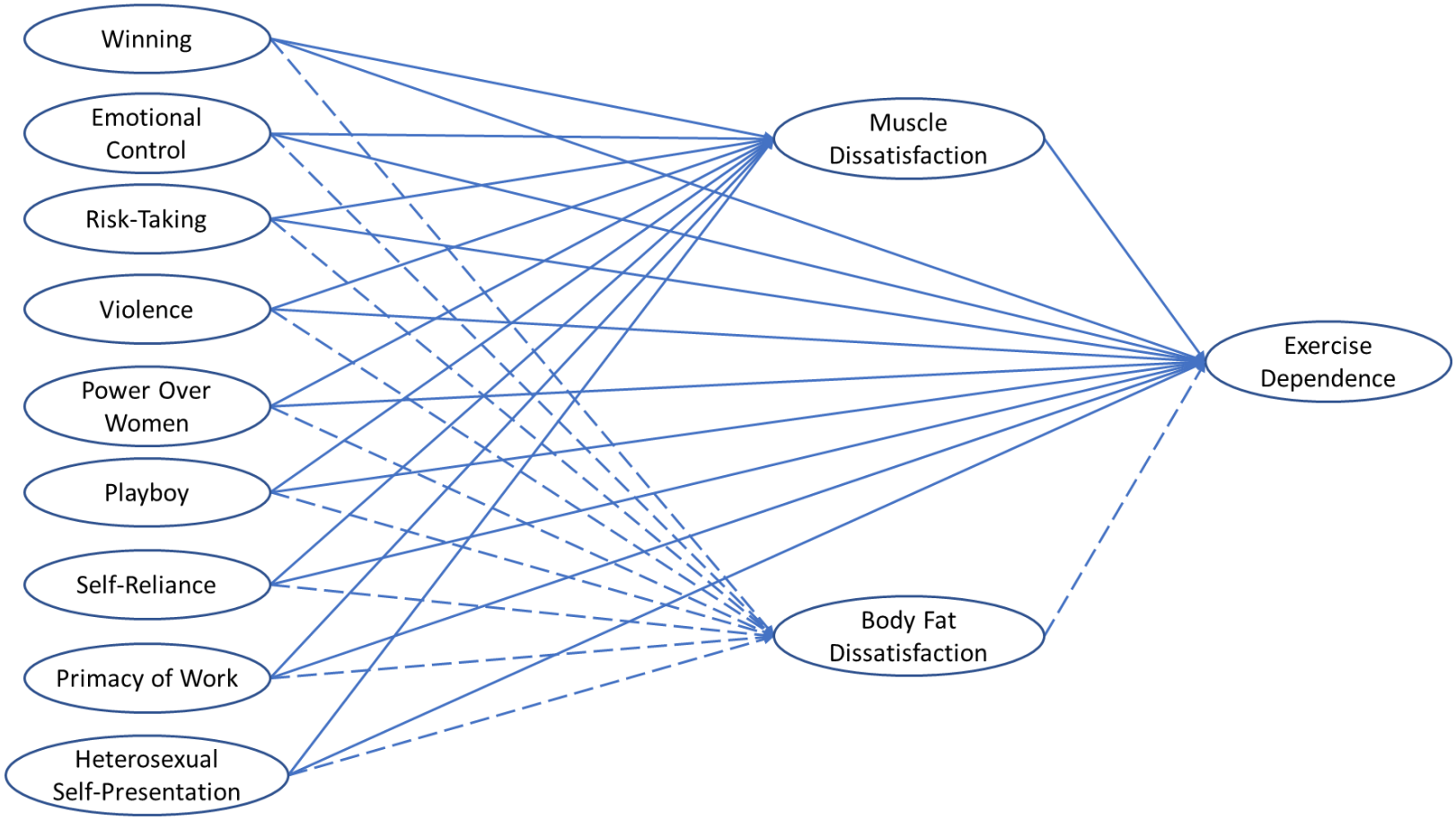

Figure 1. The hypothesized models. Lines and signs indicate the presence of the hypothesized positive paths. The muscle partial mediation model specifies links between the variables as indicated by the solid lines. The muscle/fat partial mediation model specifies links between the variables as indicated by both the solid and dashed lines. In contrast to their partial model counterparts, the muscle mediation model and muscle/fat mediation model do not specify direct links between the nine masculine norms and exercise dependence.

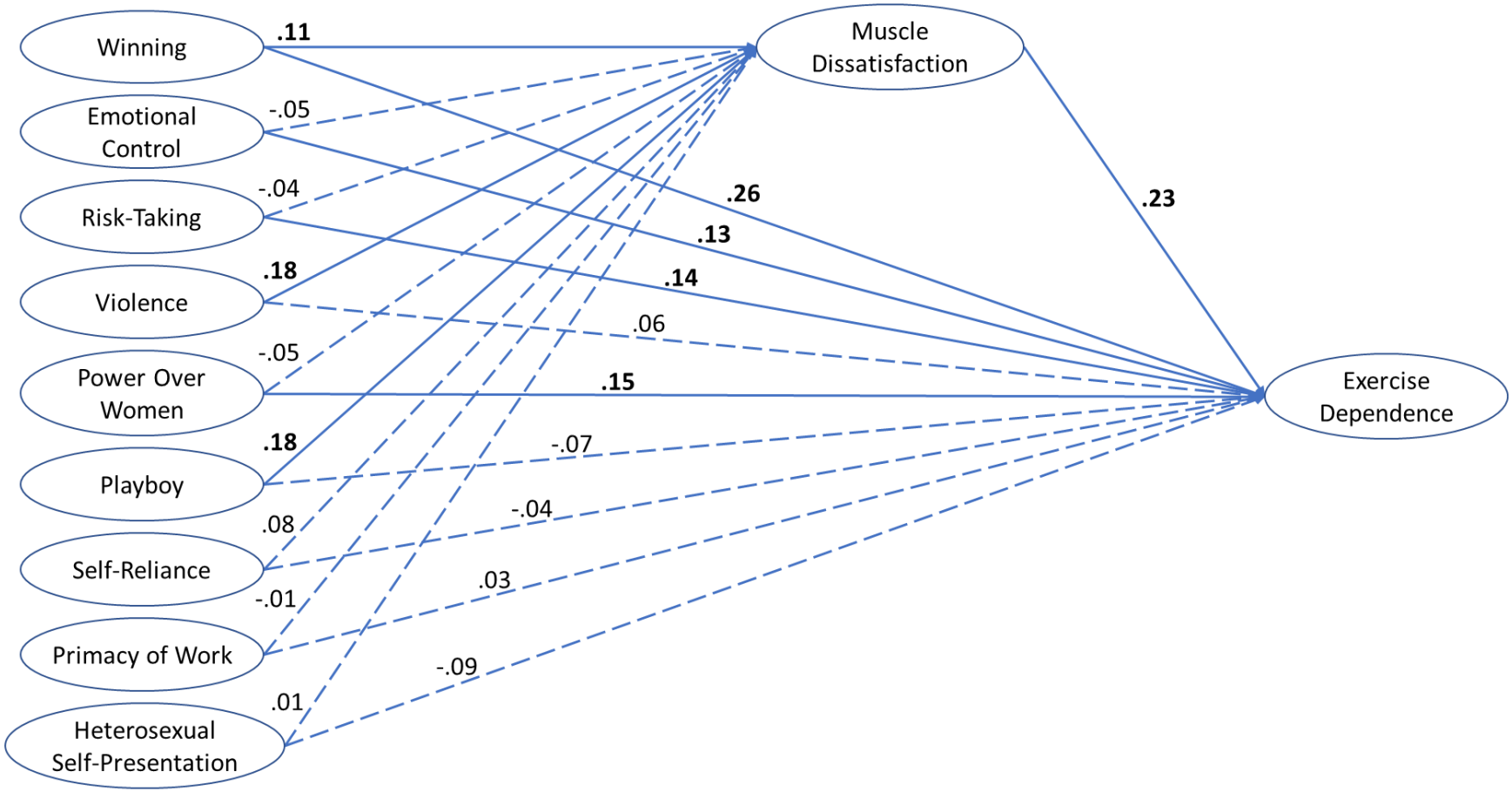

Figure 2. The muscle partial mediation model. Parameter estimates represent standardized regression coefficients. Bold coefficients and full lines indicate significant paths at $p < .05$, whereas dashed lines represent non-significant paths.