4-3-2019

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Available at: https://doi.org/10.1080/19419899.2019.1574879

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Appearance and Performance Enhancing Drug Usage, Sexuality, and Psychological Well-Being in Gay and Heterosexual Men

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The current study examined the relationship between appearance and performance enhancing drug use and the men’s sexual orientation to body image and psychological well-being in a sample of 537 heterosexual men and 146 gay men. Using objectification theory as a framework, we proposed that gay men who used appearance and performance enhancing drugs (APEDs) would report the most distress across our measures of body image, internalization, and psychological well-being. Although our results did not support our hypothesized interaction between APED use and sexual orientation, we did find significant main effects as expected. Solely considering APED use, men who used both leanness and muscle-building products reported higher levels of body shame than did those who did not use either product. Furthermore, our findings are consistent with other research that has found direct relationships between the internalization of an athletic ideal and a predilection to use legal and illicit muscle enhancing supplements. Contrary to expectations, APED use was not significantly related to the men’s psychological well-being. As expected, gay men reported higher levels of internalization and more body image concerns, compared to the heterosexual men, which may contribute to lower satisfaction with life and higher neuroticism.

Keywords: APEDs, sexual orientation, body image, objectification
**Introduction**

Body image concerns generally result from the level of discrepancy individuals perceive between their actual bodies and societal ideals (Cash & Smolak, 2011; Mayo & George, 2014); higher levels of perceived discrepancy often are related to more psychological concerns and distress (Cash & Smolak, 2011; Tiggemann, 2011). Although initial studies regarding body image concerns focused primarily on women’s experiences (e.g., Cash & Deagle, 1997; Thompson & Heinberg, 1999), researchers have acknowledged that men also have such concerns, and have started to examine their relationship with men’s psychological health and physical well-being (e.g., Brewster, Sandil, DeBlarere, Breslow, & Eklund, 2016; Engeln, Sladek, & Waldron, 2013; Griffiths et al., 2016; Murray, Griffiths, Mond, Kean, & Blashill, 2016).

For men, regardless of sexual orientation, societal pressures about appearance and body often manifest in a desire to be taller and more muscular (Ridgeway & Tylka, 2005; Tiggemann, Martins, & Kirkbride, 2007). Thus, muscularity and leanness often become central to men’s body image, their conception of masculinity, and even their overall identity (Murray & Touyz, 2012). When men perceive themselves as falling short of these socially-constructed masculine body ideals, they may experience shame and dissatisfaction in relation to their bodies (Daniel & Bridges, 2010; Wasylkiw, Currie, Meuse, & Pardoe, 2010) and choose to engage in behaviours that they believe may bring them closer to these ideals, such as weight training and the use of muscle building supplements (e.g., creatine, anabolic-androgenic steroids; Parent & Moradi, 2011). Such body image concerns and body-changing behaviours, in turn, may result in the development of eating disorders and general psychological distress such as depression (e.g., Cafri et al., 2005a; Olivardia, Pope, Borowiecki, & Cohane, 2004). The risks for gay men may
be even higher given that the pressures within the gay community regarding body size and shape, particularly for a lean physique, are even stronger and more pervasive than the messages about the body that exist for heterosexual men (Fussner & Smith, 2015; Foster-Gimbel & Engeln, 2016; Frederick & Essayli, 2016).

**Theoretical framework**

Objectification theory was developed to explain how women’s socialization experiences, particularly being sexually objectified, could lead them to view themselves through the lens of how their bodies appear and to experience heightened levels of psychological distress (Fredrickson & Roberts, 1997; Smolak & Murnen, 2008). Objectification occurs when women are valued primarily as sexual objects and are immersed in environments that expose them to sociocultural pressures/ideals about physical appearance, such as the need to be thin and physically beautiful. As a result of repeated exposure to such objectification experiences, which represent a form of socialization, women are hypothesized to internalize the messages and ideals about appearance, body size and shape, femininity, and self-worth that are being transmitted. That is, they begin to develop schema representing what it means to be a woman and the importance of appearance, weight, body size and shape, and eating behaviours to their being considered feminine (Fredrickson & Roberts, 1997). As women internalize these societally-based ideals, and make comparisons against them, they may become more body focused and begin to self-objectify, perceiving themselves as objects to be viewed and evaluated, and engaging in behaviours such as body monitoring and body checking (Fredrickson & Roberts, 1997). As women compare themselves to such internalized appearance ideals (Festinger, 1954), they may experience heightened levels of bodily shame (i.e., a sense of something being fundamentally wrong with their bodies; Noll & Fredrickson, 1998) and body dissatisfaction (i.e., level of
happiness/satisfaction with their bodies; McFarland & Petrie, 2012) as well as increased levels of anxiety (Moradi, 2010). Over time, these objectifying experiences, and resultant body image concerns, are hypothesized to result in elevated levels of depression and/or engagement in a range of disordered eating behaviours (Fredrickson & Roberts, 1997; Noll & Fredrickson, 1998).

Objectification theory has been applied to men’s experiences, suggesting that they also are susceptible to sexually objectifying socialization experiences, psychological distress, and the engagement in pathogenic behaviours (Michaels, Parent, & Moradi, 2012; Parent & Moradi, 2011; Vandenbosch & Eggermont, 2013). Men, like women, also consume sexually objectifying media images that may become internalized (Daniels & Bridges, 2010; Vandenbosch & Eggermont, 2013). Through self-comparison processes that are similar to those engaged in by women, men may come to realize that their bodies and physiques fall short of their internalized ideals. Subsequently, they may become preoccupied with their body size and shape, be ashamed of their appearance, doubt themselves and their masculinity, and engage in behaviours to change their bodies to more closely approximate societal ideals (Duggan & McCreary, 2004; Grieve & Helmich, 2008; Parent & Moradi, 2011). For men, such behaviours generally are focused on developing their muscularity and achieving a leaner physique (e.g., Parent & Moradi, 2011). It is the extent to which men have internalized societal appearance ideals that predict their risk of body image concerns (e.g., shame, dissatisfaction) and their engagement in body-changing behaviours that often are maladaptive and unhealthy (e.g., taking anabolic steroids; Cafri, Yamamiya, Brannick, & Thompson, 2005; Karazsia, Crowther, & Galioto, 2013). For example, men, specifically those with muscle-focused preoccupations, have higher levels of related psychopathologies (i.e., depression, dissatisfaction with life; Hildebrandt, Langenbucher, Carr, & Sanjuan, 2007). Furthermore, men have a higher usage of legal and illicit substances, including
anabolic-androgenic steroids, despite an objective awareness that such behaviours could have detrimental effects on their sexual, physical and mental health (Cafri, Strauss, & Thompson, 2002; Cafri et al., 2005b; McCreary, Hildebrandt, Heinberg, Boroughs & Thompson, 2007; Pope et al., 2005).

**Appearance and performance enhancing drug usage**

Appearance and performance enhancing drugs (APEDs) is an inclusive term to describe substances that are used to enhance physical appearance, general health, or performance (Lieberman et al., 2014; McCreary et al., 2007). APEDs represent a broad class of substances, including legal over-the-counter dietary supplements and ergo/thermogenics (e.g., protein powders, vitamins, fat burners) and illegal anabolic-androgenic steroids (AAS) and ergo/thermogenics (e.g., thyroid hormones; Hildebrandt et al., 2007; McCreary et al., 2007; “Supplement Usage,” 2010). As APEDS are mostly self-prescribed, reliable information about safe usage and associated risks are not readily available (Cafri et al., 2005a). However, an overuse (or misuse) of APEDs (legal and illicit) can result in several adverse physiological side effects, including stroke, cancer, and increased morbidity (Lieberman et al., 2014).

In addition to the negative physical effects associated with using AAS and prohormones, which include acne and testicular atrophy, researchers have identified the influences of APEDs on psychological well-being, including depression (Cafri et al., 2005b), anxiety (Olivardia et al., 2004) and aggression (Hall, Hall, & Chapman, 2005). Illegal APED usage appears to be particularly harmful. For example, anabolic-androgenic steroid users, compared to non-users, generally report lower self-esteem as well as higher levels of depression and personality disorders or traits (e.g., mania; Bahrke, Yesalis, Kopstein & Stephens, 2000; Irving, et al., 2002; Pope & Katz, 1994). Further, Murray et al. (2016) reported distinctive dysfunctionality (e.g.,
muscle dysmorphia) in men whose primary reason for using anabolic-androgenic steroids was to cope with appearance-related issues. But even the use of legal APEDs (e.g., dietary supplements) can be problematic in terms of their potential effects on men’s psychological functioning. For example, researchers have found that usage and favourable attitudes towards legal APEDs (e.g., ephedra) are associated with increased use of illicit APEDs (e.g., AAS; Hildebrandt, Harty, & Langenbucher, 2012; Karazsia et al., 2013), though research linking legal APED broadly to men’s psychological distress and body image concerns has been lacking. Despite the negative side effects of APEDs, the indirect benefits (relief of body image concerns) may outweigh the consequences for many users, explaining their popularity and continued use (Bahrke, et al., 2000; Hildebrandt et al., 2007).

**Sexual orientation**

Gay and heterosexual men both endorse leanness and muscularity as societally-based, masculine appearance ideals (Smith, Hawkeswood, Bodell, & Joiner, 2011; Tiggeman et al., 2007). However, there appears to be differences between heterosexual and gay men regarding the extent to which they have internalized such ideals. Specifically, heterosexual men are more likely than gay men to associate physical attractiveness with having a muscular physique (because of its connection with masculinity; Calzo, Corliss, Blood, Field, & Austin, 2013; Pope, Phillips, & Olivardia, 2000), whereas gay, in comparison to heterosexual, men identify more strongly with a thin body ideal (Tiggeman et al., 2007). Within the mainstream gay community, however, the ideal body is considered to be thinner and leaner, both in terms of what gay men report wanting for themselves and what they find attractive in others (Murray & Touyz, 2012; Smith et al., 2011).
According to Lanzieri and Hildebrandt (2016), gay media intentionally generate and publish hypermasculine physiques to attract more male attention. Consistent with objectification theory, these hypermasculine media images (i.e., men who are lean and muscular), which communicate that a certain physique is valued and idealized, may be internalized and subsequently lead men to evaluate and objectify their own, and other gay men’s, bodies. Thus, men who are immersed within the mainstream gay community, with its heightened focus on having a lean/muscular body and on being attractive in terms of overall appearance (e.g., well-groomed, youthful), may internalize such societally-based ideals, engage in evaluative behaviours such as appearance checking and body monitoring, and become dissatisfied and ashamed with body size and shape (Cash & Smolak, 2011; Parent & Moradi, 2011; Schwartz & Andsager, 2011; Smith et al., 2011; Tiggeman et al., 2007). In fact, compared to heterosexual men, gay men have a greater tendency to self-objectify (Engeln-Maddox, Miller, & Doyle, 2011; Martins, Tiggemann, & Kirkbride et al., 2007; Michaels, et al., 2013) and be dissatisfied with their bodies, and are more likely to engage in pathogenic behaviours such as excessive and unhealthy exercise practices (e.g., Boroughs & Thompson, 2002; Cash & Smolak, 2011; Murray & Touyz, 2012; Schwartz & Andsager, 2011). Although few studies have examined directly the prevalence rates of APED use among gay and heterosexual men, research that has been done suggests gay adolescents and men are at a higher risk for anabolic steroid usage and attempts to gain weight (i.e., muscle mass) compared to their heterosexual counterparts (Blashill & Safren, 2014; Blashill, Calzo, Griffiths, & Murray, 2016; Brewster et al., 2016).

Purpose

There are few empirical studies that have examined APED usage and sexual orientation in relation to men’s body image concerns and psychological well-being within the framework of
objectification theory (e.g., Brewster et al., 2017; McCreary et al., 2007; Parent & Moradi, 2011). Further, although the use of legal and illegal APEDs is a relatively common health issue for men (Barhke et al., 2000; Hildebrandt, Varangis, & Lai, 2012; “Supplement Usage,” 2010), most studies have focused specifically on the prevalence and associated risks of men’s use of AAS (e.g., Barhke et al., 2000; Parent & Moradi, 2011; Pope et al., 2012). Research that examines the more common types of APEDs that men may use (e.g., protein powders) and makes a distinction between substances that help develop musculature and those that promote leanness has been lacking. Thus, from the framework of objectification theory (Fredrickson & Roberts, 1997), we examined the relationship of APED use (legal and illegal) and sexual orientation to men’s body image concerns (i.e., shame, satisfaction, drive for leanness, muscle dysmorphia), internalization of societal appearance ideals, and psychological well-being (i.e., depression, neuroticism, satisfaction with life). We included the body image measures (i.e., shame, satisfaction, drive for leanness, muscle dysmorphia) because objectification and the internalization of cultural ideals of attractiveness (i.e., lean and muscular) promotes body image concerns in men (e.g., Daniel & Bridges; Parent & Moradi, 2011). For example, previous research has found that body shame, and internalization were significantly associated with, or precipitated, a drive for muscularity (e.g., Parent & Moradi, 2011; Pope et al., 2000). Furthermore, we included psychological outcomes (i.e., depression, neuroticism, satisfaction with life) because past research has demonstrated significant negative associations between body images concerns (e.g., muscle dysmorphia) and neuroticism, satisfaction with life, and a broad range of negative thinking that increases one’s susceptibility to depression (e.g., Brannan & Petrie, 2008; McCreary & Sadava, 2001; McFarland & Kaminski, 2009). Within the context of our research question, we made the following hypotheses. First, we predicted that gay men who
used APEDs, more so than heterosexual men who used APEDs or gay and heterosexual men who did not use APEDs, would more dissatisfaction with their bodies (i.e., upper bodies, legs, faces), higher levels of body shame, stronger drive for leanness, stronger preoccupation with muscularity, more internalization of general sociocultural and athletic body ideals, higher levels of depression and neuroticism, and less satisfaction with life. In the absence of an interaction between sexual orientation and APED use, we predicted that gay vs. heterosexual men, regardless of APED use, and APED users vs. non-users, regardless of sexual orientation, would report more dissatisfaction with their bodies (i.e., upper bodies, legs, faces), higher levels of body shame, stronger drive for leanness, stronger preoccupation with muscularity, more internalization of general sociocultural and athletic body ideals, higher levels of depression and neuroticism, and less satisfaction with life.

Methods

Participants

The final sample for our study was comprised of 664 men; $M_{\text{age}} = 23.11$ years ($SD = 7.59$) and $M_{\text{BMI}} = 25.29$ kg/m$^2$ ($SD = 5.43$). Regarding sexual orientation, 78.8% ($n = 523$) identified as heterosexual and 21.2% ($n = 141$) as gay. In terms of race/ethnicity, the majority were White/NonHispanic (44.0%, $n = 292$), followed by 146 (22.0%) who were White/Hispanic/Latino. Most were single (81.8%, $n = 543$), though 106 (16.0%) indicated being either married or in a domestic partnership. In terms of education, the majority (68.7%, $n = 456$) were enrolled in college and reported household incomes less than $25,000 (43.2%, $n = 287$).

See Table 1 for the complete descriptive statistics of the participants.

Instruments

Demographics and muscle enhancing supplements
Our assessment of the men’s APED use was consistent with past studies (Dodge & Jaccard, 2006; Raudenbush & Meyer, 2003). For example, like Dodge and Jaccard (2006), we had the men respond ‘yes’ or ‘no’ to each question to define their use patterns. However, we also extended past APED research by assessing more than just anabolic steroid use. Specifically, we asked three questions to evaluate the men’s APED use. First, ‘Have you ever used creatine, protein supplements or similar nutritive products to increase strength and muscularity?’ Second, ‘Have you ever used anabolic steroids, like testosterone derivatives, or non-steroidal anabolics, like Human Growth Hormone (HGH), Insulin-like Growth Factor or Insulin for muscle building purposes?’ Third, ‘Have you ever used fat-burners, weight cutting drugs, and/or diet pills to lose weight and be leaner?’ At the survey’s end, the men provided their current age, current weight and height, race/ethnicity, educational level, relationship status, and annual household income.

Sexual orientation

We used the one-item Kinsey Sexual Orientation Scale (Kinsey, Pomery, & Martin, 1948). From seven response options, ranging from 0 (exclusively heterosexual), 1 (predominantly heterosexual, only incidentally homosexual), 2 (predominantly heterosexual, but more than incidentally homosexual), 3 (bisexual), 4 (predominantly homosexual, but more than incidentally heterosexual), 5 (predominantly homosexual, only incidentally heterosexual), to 6 (exclusively homosexual), the men selected the description that best defined how they currently viewed themselves. Consistent with how previous researchers have used the Kinsey scale to classify men’s sexual orientation (Tiggeman et al., 2007), the men who selected responses 4, 5, or 6 or who chose responses 0, 1, or 2 were classified as gay or heterosexual, respectively; the men who chose response 3 were excluded from this study (n = 23).

Body image
The 25-item Body Parts Satisfaction Scale for Males (BPSS-M; McFarland & Petrie, 2012) assesses men’s satisfaction with their upper body (17 items), legs (4 items), and face (4 items). Men rate their satisfaction with the leanness (e.g., ‘leanness of arms’) and muscularity (e.g., ‘muscularity of shoulders) of specific body parts and with aspects of their overall body (e.g., ‘overall body build’); each item is rated from 1 (extremely dissatisfied) to 6 (extremely satisfied). The total score for each factor is the mean of those items; higher scores indicate greater satisfaction. Among male undergraduates, McFarland and Petrie (2012) assessed the internal consistency reliability of each factor and provided extensive information on the factors’ construct and incremental validity. Cronbach’s alphas from this study were .78 (Face; 95% CI = .75 to .80), .91 (Legs; 95% CI = .90 to .92), and .96 (Body; 95% CI = .95 to .97).

The four-item Body Shame Scale (Andrews, 1995; Tripp & Petrie, 2001) assesses feelings of shame associated with one’s body. On items such as ‘I feel ashamed of my body or some part of it,’ the men responded from 1 (definitely disagree) to 5 (definitely agree). The total score is the mean of the four items; higher scores indicate more shame. Tripp and Petrie (2001) reported an acceptable Cronbach’s alpha for their sample and provided evidence for the scale’s validity, including significant relationships with measures of body dissatisfaction, body shape concerns, and disordered eating (e.g., bingeing). The Cronbach’s alpha from this study was .93 (95% CI = .92 to .94).

The six-item Drive for Leanness scale (Smolak & Murnen, 2008) assesses a desire for low body fat and a toned physique. On items such as ‘It is important to have well-defined abs’ the men responded from 1 (never) to 6 (always). The total score is the mean of the items; higher scores indicate a stronger drive. Smolak and Murnen (2008) reported an acceptable Cronbach’s alpha in a sample of men, and data regarding the scale’s validity and differentiation from
measures of drive for muscularity and drive for thinness. Alpha in the current study was .88 (95% CI = .86 to .89).

The 13-item Muscle Dysmorphic Disorder Inventory (MDDI; Hildebrandt, Langenbucher, & Schlundt, 2004) assesses preoccupation with muscularity along three dimensions: drive for size (5 items; desire for increased size and strength), appearance intolerance (4 items; negative beliefs about one’s body and resulting appearance anxiety), and functional impairment (4 items; negative emotions resulting from not being able to maintain exercise routine). Men responded to each item from 1 (never) to 5 (always). The total score for each dimension is the mean of the items; higher scores indicate higher levels in each area. Hildebrandt et al. (2004) reported acceptable Cronbach’s alphas for the three factors and provided extensive information on the scale’s validity. Alphas from the current study were .89 (Size; 95% CI = .87 to .90), .85 (Appearance; 95% CI = .82 to .86), and .88 (Functional; 95% CI = .86 to .89).

Internalization

Five items from the Internalization-General subscale and five items from the Athletic subscale of the Sociocultural Attitudes Toward Appearance Questionnaire – 3 (SATAQ-3; Thompson et al., 2004) assess identification with general sociocultural and athletic ideals of attractiveness. On items such as ‘I try to look like sport athletes,’ the men responded from 1 (strongly disagree) to 5 (strongly agree). The total score for each dimension is the mean of those items; higher scores indicate greater internalization. Karazsia and Crowther (2008) assessed the scales’ Cronbach’s alphas in their sample and reported significant correlations with measures of negative affect, drive for muscularity, and physical appearance comparisons. The alphas for the current study were .93 (General; 95% CI = .92 to .94) and .90 (Athletic; 95% CI = .88 to .91).
Psychological well-being

The nine-item Patient Health Questionnaire-9 (PHQ-9; Kroenke, Spitzer, & Williams, 2001) assesses current level of depressive symptomatology. On items such as ‘feeling down, depressed or hopeless’ the men indicated the extent to which they had been feeling that way during the last two weeks on a scale from 0 (not at all) to 3 (nearly every day). The total score is the sum of the nine items; higher scores indicate greater depressive symptomatology. Kroenke et al. reported acceptable Cronbach’s alphas and, across multiple samples, established the scale’s criterion-related and construct validity. Alpha from the current study was .90 (95% CI = .89 to .91).

The 12-item Neuroticism subscale from the NEO-Five Factor Inventory (NEO-FFI; Costa & McCrae, 1989) contrasts adjustment or emotional stability with maladjustment or neuroticism (emotional lability). On each item, the men responded from 1 (strongly disagree) to 5 (strongly agree). The total score is the sum of the items and can range from 12 (low neuroticism) to 60 (high neuroticism). Costa and McCrae (1992) assessed the Cronbach’s alpha in their study and reported data on the scale’s construct validity. Alpha for the current study was .87 (95% CI = .86 to .89).

The 5-item Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) assesses overall satisfaction with life. On items such as ‘I am satisfied with my life’ the men responded from 1 (strongly disagree) to 7 (strongly agree). The total score is the sum of the items and can range from 5 (low satisfaction) to 35 (high satisfaction). Diener et al. (1985) reported satisfactory Cronbach’s alpha with their initial sample and have provided extensive information about the scale’s validity. Alpha for the current study was .88 (95% CI = .86 to .89).

Procedure and data analysis
After receiving approval from the researchers’ university IRB, men were solicited from a university located in the south-central U.S. as well as from social media websites (e.g., Reddit Ask Men, Facebook) to participate in a study on body image and psychological health. The men accessed a secure website (i.e., Qualtrics) where they provided consent and then anonymously completed the previously described measures in about 30 minutes. University student participants received extra credit.

Initially, 1015 men entered the website and completed the consent form. Of these, 280 were deleted because they left five or more questionnaires completely blank; an additional five who completed all questionnaires were dropped because they failed the three instructional manipulation check items (e.g., “For this item, the correct response is BLUE”). We spaced these manipulation check items evenly throughout the survey and used them to verify that participants were reading the instructions associated with each item/measure and then responding as instructed. There were no missing data at the individual item response level for the remaining participants. Each measure’s distributional properties (e.g., skewness, kurtosis, outliers) were within normal ranges so we made no transformations to the data.

We then examined the men’s responses to the three APED questions to determine their frequency of use. Only 19 responded ‘yes’ to the question regarding anabolic steroid use, and just 24 men reported using only leanness products (i.e., responded affirmatively to the use of fat-burners, etc., but did not report using either creatine or anabolic steroids). Given these frequency of use patterns among the men, we made the following decisions regarding how to categorize the men in terms of their APED use: (a) we deleted the men who had used only leanness products ($n = 24$) because this grouping was too small for our analyses, particularly when crossed with the men’s sexual orientation; and (b) we deleted the men who used anabolic steroids for the same
reason. Based on the men’s responses to the three APED questions, we created three groups: (a) used neither leanness nor muscle-building supplements \((n = 306)\); (b) used only muscle building products \((n = 273)\); and (c) used both leanness and muscle building products \((n = 85)\). Thus, our independent variables were APED use (three levels of use – no use; used only muscle-building; and used both leanness and muscle-building) and sexual orientation (heterosexual vs. gay). Our dependent variables were organized into three sets of measures: (a) body image concerns (i.e., body satisfaction, body shame, drive for leanness, and three dimensions of muscle dysmorphia), (b) internalization (i.e., general and athletic), and (c) psychological well-being (i.e., neuroticism, depression and satisfaction with life).

As our primary hypothesis concerned the potential interaction of sexual orientation and APED use; thus we tested it first; next, we examined the main effects of APED use and sexual orientation. Initially, we tested each of the three sets of dependent variables via separate MANCOVAs, evaluating the APED use by sexual orientation interaction first and then the main effects of APED use and sexual orientation. As BMI correlated significantly with the actual measures in our study (e.g., body satisfaction, drive for leanness) and it varied across the men in our sample, we controlled its effects statistically by using it as a covariate. By using BMI as the covariate, we were able to isolate the relationship between APED use and sexual orientation and each of the three sets of dependent variables independent of the men’s body composition. For our post-hoc comparisons, we used descriptive discriminant analysis (DDA). According to Barton, Yeatts, Henson and Martin (2016), DDA creates a linear composite dependent variable (based on the observed dependent variables) that maximizes group differences within the IV without the Type I error inflation that is common with post-hoc ANOVAs. For our DDA post-hoc analyses, we examined the strength of the observed measured variables on each linear composite
dependent variable (i.e., structure coefficients), interpreting the coefficients in excess of .33 (Tabachnick & Fidell, 2013). Next, by comparing the group centroids, we determined the levels within each IV (e.g., gay vs. heterosexual) that differed significantly on each identified linear composite dependent variable. We set alpha at .01 for all analyses.

**Results**

Across all three MANCOVAs, the sexual orientation by APED use interactions were not significant ($ps > .40$). Given these nonsignificant results, we present in detail only the significant MANCOVA and DDA findings for the main effects of APED use and sexual orientation. Within each DDA, we examined the log determinants as well as Box’s M Test (Barton et al., 2016). Based on these results, we determined that the assumption of homogeneity of covariances was met for each analysis.

**Body image**

For the body image measures, BMI, Wilk's $\Lambda = .614$, $F (8, 650) = 51.16$, $p < .001$, partial $\eta^2 = .386$, APED use, Wilk's $\Lambda = .823$, $F (16, 1300) = 8.29$, $p < .001$, partial $\eta^2 = .093$, and sexual orientation, Wilk's $\Lambda = .896$, $F (8, 650) = 9.45$, $p < .001$, partial $\eta^2 = .104$, were significant.

**APED use**

The DDA revealed two significant functions -- Function 1, Wilk's $\Lambda = .758$, $\chi^2 (16) = 181.78$, $p < .001$, $R^2_c = .24$; and Function 2, Wilk's $\Lambda = .913$, $\chi^2 (7) = 59.50$, $p < .001$, $R^2_c = .09$ -- which indicated that the two body image composite variables discriminated among the APED groups. Examination of the structure coefficients revealed that drive for leanness, MD appearance intolerance, and MD drive for size contributed significantly to the group differences for Function 1. For Function 2, MD drive for size, MD functional impairment, body shame and dissatisfaction with body contributed significantly. See Table 2.
Using the group centroids for Function 1 (Did Not Use: $M = -.48$, 95% CI [-.59 to -.37]; Used Muscle Products: $M = .36$, 95% CI [.24 to .47]; Used Leanness/Muscle: $M = .59$, 95% CI [.38 to .80]), the one-way ANOVA with APED as the IV and the saved discriminate function scores as the DVs was significant, $F (2, 660) = 71.77$, $p < .001$, partial $\eta^2 = .176$ (Barton et al., 2016). The group centroids for Leanness/Muscle (Cohen’s $d = 0.90$) and Muscle (Cohen’s $d = 0.80$) products were significantly higher than Did Not Use. Men who reported using both leanness and muscle building products and those who used just muscle building products scored higher on this function, as represented by a greater drive for leanness and drive for size, and more intolerance about appearance.

Regarding the group centroids for Function 2 (Did Not Use: $M = .01$, 95% CI [-.08 to .11]; Used Muscle Products: $M = -.18$, 95% CI [-.28 to -.07]; Used Leanness/Muscle: $M = .52$, 95% CI [.34 to .70]), the one-way ANOVA was significant, $F (2, 660) = 15.26$, $p < .001$, partial $\eta^2 = .06$. All group centroids differed significantly from each other: Used Leanness/Muscle was higher than Did Not Use (Cohen’s $d = .46$) and Did Not Use was higher than Used Muscle (Cohen’s $d = .27$). Men who reported using both leanness and muscle building products scored highest on this function, particularly in terms of having more body shame and less satisfaction with their bodies, a lower drive to gain muscle, and more negative feelings when they could not exercise routinely.

**Sexual orientation**

The single function was significant, Wilk’s $\Lambda = .897$, $\chi^2 (8) = 71.42$, $p < .001$, $R^2_c = .10$, which indicated that the body image linear composite discriminated between the gay and heterosexual men. The structure coefficients revealed that drive for leanness, MD functional impairment, body
shame and body dissatisfaction contributed significantly to the group differences on this composite dependent variable. See Table 2.

Based on the group centroids (Heterosexual: $M = -.18$, 95% CI [-.26 to -.09]; Gay: $M = .65$, 95% CI [.49 to .82]), the one-way ANOVA was significant, $F (1, 661) = 76.23, p < .001$, partial $\eta^2 = .11$. The group centroid for gay men was significantly higher than that for the heterosexual men (Cohen’s $d = .79$), indicating that they had higher levels of functional impairment, more body shame, more body dissatisfaction, and a stronger drive to have a lean body.

**Internalization**

For the internalization measures BMI was not significant ($p = .166$), although the main effects for APED use, Wilk's $\Lambda = .915$, $F (4, 1312) = 14.90, p < .001$, partial $\eta^2 = .043$, and sexual orientation, Wilk's $\Lambda = .942$, $F (2, 656) = 20.31, p < .001$, partial $\eta^2 = .058$, were.

**APED use**

Only Function 1 was significant, Wilk's $\Lambda = .903$, $\chi^2 (4) = 67.64, p < .001$, $R^2_c = .10$, which indicated that the internalization linear composite discriminated among the APED groups. Examination of the structure coefficients revealed that both types of internalization contributed significantly, though internalization of athletic ideals was more salient. See Table 3.

Using the group centroids (Did Not Use: $M = -.33$, 95% CI [-.44 to -.22]; Used Muscle Products: $M = .22$, 95% CI [.10 to .34]; Used Leanness/Muscle: $M = .48$, 95% CI [.26 to .69]), the one-way ANOVA was significant, $F (2, 660) = 32.52, p < .001$, partial $\eta^2 = .09$. Used Leanness/Muscle products (Cohen’s $d = .79$) and used Muscle products (Cohen’s $d = .52$) were significantly higher than Did Not Use; the leanness/muscle and muscle only groups did not differ significantly. Men who reported using products to help them be lean and/or build muscle scored
highest on this dimension, strongly endorsing both athletic and general societal appearance ideals.

**Sexual orientation**

The single function was significant, Wilk's Λ = .941, χ² (2) = 39.91, p < .001, $R^2_c = .06$, which indicated that the internalization linear composite discriminated between the gay and heterosexual men. The structure coefficients revealed that both types of internalization, though primarily of general societal body/appearance ideals, contributed significantly to the group differences. See Table 3.

Based on the group centroids (Heterosexual: $M = -.13$, 95% CI [-.22 to -.04]; Gay: $M = .48$, 95% CI [.32 to .65]), the one-way ANOVA was significant, $F (1, 661) = 41.26$, $p < .001$, partial $\eta^2 = .06$. The group centroid for gay men was significantly higher than that for the heterosexual men (Cohen’s $d = .59$), indicating that they had stronger internalization of both athletic and general societal appearance ideals.

**Psychological Well-Being**

Neither BMI ($p = .025$) nor APED use ($p = .405$) were significant; sexual orientation, however, was, Wilk's Λ = .959, $F (3, 654) = 9.28$, $p < .001$, partial $\eta^2 = .041$.

**Sexual orientation**

The single function was significant, Wilk's Λ = .960, χ² (3) = 27.39, $p = .001$, $R^2_c = .04$, which indicated that the psychological well-being linear composite discriminated between the gay and heterosexual men. The structure coefficients revealed that higher levels of neuroticism and depression, and less satisfaction with life, contributed significantly to the group differences on the linear composite dependent variable. See Table 4.
Based on the group centroids (Heterosexual: $M = -.11$, 95% CI [-.19 to -.02]; Gay: $M = .40$, 95% CI [.23 to .56]), the one-way ANOVA was significant, $F(1, 660) = 27.85$, $p < .001$, partial $\eta^2 = .04$. The group centroid for gay men was significantly higher than that for the heterosexual men (Cohen’s $d = .50$), indicating greater neuroticism and depressive symptomatology, and lower life satisfaction.

**Discussion**

Although we predicted that there would be interactions between APED use and sexual orientation across all dependent variables, none existed within our sample. Only the hypothesized main effects for APED use and sexual orientation were found, suggesting that each are related independently to men’s body image concerns and psychosocial functioning.

Regarding APED use, men who used both leanness and muscle building products and who used just muscle building products could be differentiated from non-users based on their higher drive for leanness, drive for size and appearance intolerance, as well as their stronger tendency to endorse general and athletic body ideals. Further, men who used both products together were different from the other two groups in terms of their higher levels of body shame and greater dissatisfaction with their bodies. Since we excluded the few men in our sample that reported the use of anabolic steroids, the two APED use categories were constituted by men who reported using only legal APED substances, such as creatine and protein powders. Thus, our study extends past research that examined only anabolic steroid use as the muscle-building agent (e.g., Pope & Katz, 1994; Murray et al., 2016) and demonstrates that men who use legal APEDs also report higher levels of distress regarding their bodies, more internalization of societal appearance ideals, and stronger drives to achieve lean and muscular physiques. Regarding sexual orientation, as expected based on past research (e.g., Michaels et al., 2013), higher levels of body
dissatisfaction and shame, a drive to achieve a lean physique, more internalization of societal appearance ideals and less psychological well-being (e.g., lower satisfaction with life) differentiated the gay men from the heterosexual men in our sample.

Since muscularity and leanness represent societally-based body ideals to which many men subscribe (Engeln et al., 2013; Ferguson, 2013), it is not surprising that strong internalization of both body ideals differentiated the men who used both leanness and muscle-building products together or muscle-building products alone from those who did not use any such products. Our findings are consistent with other research (e.g., Karazia et al., 2013; Parent & Moradi, 2012) that has found direct relationships between the internalization of an athletic ideal and a predilection to use legal (e.g., protein, creatine) and illicit (e.g., AAS) muscle enhancing supplements. Consistent with objectification theory (Fredrickson & Roberts, 1997; Noll & Fredrickson, 1998), men with high levels of internalization have a set of rigid appearance standards that they believe they must follow. Because cultural ideals generally are unattainable for many men, they may resort to more drastic measures, such as the use of multiple types of APEDs.

As predicted, the men who used leanness and muscle-building products together demonstrated higher levels of body shame, stronger drives to be leaner as well as more muscular, more difficulty accepting a missed workout, and more anxiety (and negative thoughts) about their physical appearance compared to the men who used neither. Although the abuse of weight-gaining substances and an increased risk of legal and illicit AAS and prohormone usage have been associated with the pursuit of muscularity in both male athletes (Cafri et al., 2005a; Raudenbush & Meyer, 2003) and non-athletes (e.g., Cafri et al., 2005a; McCreary et al., 2007), it appears that combining this use with leanness products may be a reflection of even more body
image disturbances. In our study, the men who used both muscle and leanness products also were more ashamed of, and dissatisfied with, their bodies than the mean who used only muscle-building products. Thus, men who are using both products may be behaviourally demonstrating the fact that (a) they have internalized both male appearance ideals (to be lean and to be muscular) and (b) believe they do not measure up to either idea (and thus need the assistance of both types of APEDs). Regardless of sexual orientation, these men who are simultaneously pursuing the masculine body ideals of muscularity and leanness may resort to APEDs to help sculpt their physiques and, as they engage in this process, experience high levels of shame about the current state of their bodies.

Previous research has demonstrated that the drive for perfection and body dissatisfaction in men are associated with lower self-esteem and higher levels of depression and anxiety, which can be reduced through deliberate attempts to alter body shape, such as through dieting or weight lifting (Adams, Turner, & Buck, 2005; Cafri et al., 2002; McFarland & Kaminiski, 2009). Contrary to our expectations, however, psychological well-being (i.e., satisfaction with life, neuroticism, depression) did not differentiate significantly among the APED use categories. The majority of existing literature is specifically concerned with anabolic-androgenic steroid usage, which has shown to be directly associated with aggression and depression (Cafri et al., 2005a; Pope & Katz, 1994). However, little is known about the psychological well-being of men who use legal supplements (e.g., OTC fat burners, creatine, protein), which were the products used by the men in our sample. From our findings, the use of legal APEDs to achieve a leaner and/or more muscular physique is not related to men’s psychological well-being; thus, the risk to well-being may be associated primarily with the use of illicit substances. Further research, particularly longitudinal, is needed to tease out the relationship of use to psychological well-
being and how that might change over time and prolonged ingestion of such supplements.

As expected, higher levels of internalization, both athletic and general, and more body image concerns (i.e., shame and dissatisfaction) differentiated the gay and heterosexual men in our sample. Drive for leanness, but not a desire to pursue a more muscular physique, also was strongly associated with the gay, but not the heterosexual, men. These findings are consistent with objectification theory (Fredrickson & Roberts, 1997; Noll & Fredrickson, 1998), and past research that has demonstrated that the gay community, which is very body-focused, hypermasculinised, and concerned with overall physical appearance, creates pressures that may lead to (a) internalization (e.g., Frederick & Essayli, 2016; Joy & Numer, 2018; Lanzieri & Hildebrandt, 2016; VanKim, Porta, Eisenberg, Neumark-Stainer, & Laska, 2016) and (b) dissatisfaction and shame associated with current body size and shape and, in particular, a drive to be leaner (Aleva, Paraskeva, Craddock, & Diedrichs, 2018; Davids, Watson, Nilsson, & Marszalek, 2015; Mayo & George, 2014; Murray & Touyz, 2012). Due to these pressures within the gay community, gay men’s drive for leanness may be a sign of sexual objectification and body image pathology, and thus not simply the pursuit of a healthy body (Smolak & Murnen, 2008).

Psychological distress, as represented by higher levels of depression and neuroticism and less overall satisfaction with life, was associated most strongly with the gay men in our sample. Research has shown that gay men exhibit elevated levels of neuroticism because of social prejudice, experiences of discrimination, and even genetic variation (Feinstein, Goldfried, & Davila, 2012; Zietsch et al., 2011). These findings may also be explained by the relationship of body image to such psychopathologies. For example, neuroticism has been directly connected to body image concerns (e.g., appearance dissatisfaction; Swami, Hadji-Michael & Furnham,
2008), and found to moderate the body dissatisfaction-bulimic symptomatology relationship, increasing its strength (Brannan & Petrie, 2008). Thus, as would be predicted by objectification theory (Fredrickson & Roberts, 1997), a heightened level of neuroticism may interact with self-objectifying behaviours to ultimately increase gay men’s risk of body image concerns (e.g., dissatisfaction, drive for leanness). Further, the gay men in the current study expressed lower satisfaction with life (SWL) compared to their heterosexual counterparts. Bachman and Simon (2014) suggested that gay men’s lower SWL may be caused by gay-related stress that arises from internalized homonegativity, discrimination, and/or social oppression. Life satisfaction can also be affected by feelings of marginalization, rejection, and isolation within the gay community for those men who want to, but do not, approximate the mesomorphic standards of attractiveness (Lanzieri & Hildebrandt, 2016; Wood, 2004).

This study had limitations that warrant discussion. First, although diverse, our sample was one of convenience and will not represent the experiences of all gay or heterosexual men. Thus, caution must be taken in generalizing our findings and applying them to groups of who have similar demographics. Second, consistent with methodologies used in past research (e.g., Tiggeman et al., 2007), the men self-identified their sexual orientation using the Kinsey scale; we then created two sexual orientation groups (gay and heterosexual) based on their self-report. However, this approach is limited because it operationalizes sexual orientation through self-identification at a single point in time rather than by considering specific behaviours, emotions and/or attractions. Future studies might operationalize sexual orientation using assessments that are multidimensional, such as the Klein Sexual Orientation Grid (Klein, Sepekoff, & Wolf, 1985), which takes into consideration sexual attraction, emotional preference, and self-identification across time. Third, all data are based on self-report, and the men may have
underreported their attitudes and behaviours on certain measures (e.g., acknowledging use of illegal APEDs). Thus, our findings may underestimate the strength of some of the relationships among the variables. For example, collecting body weight and height through self-report is limited, but research has shown that there is good overlap (i.e., relatively high correlations) between self-reported BMI and objectively measured BMI (e.g., Kuczmarski, Kuczmarski, & Najjar, 2001; McAdams, Van Dam, & Hu, 2007). Furthermore, in a field-based study like this one, obtaining objective measures of height and weight were not possible. Fourth, our data were cross-sectional, thus we cannot determine directionality of the relationships. For example, although theoretically we would expect that higher levels of body image concerns would lead men to use APEDs in a way to help them approximate the societal ideal, and our data support a connection, longitudinal studies are needed to determine the directionality of the relationships, particularly in relation to the use of legal APEDs. Finally, as we had an insufficient number of men who reported use of illegal APEDs or only using leanness related products, we could not include them in the study. Thus, our findings are limited to men’s use of legal muscle-building substances, alone or in combination with leanness products. In future studies, researchers may need to oversample for the two excluded categories (e.g., sample weightlifters) to ensure sufficient numbers.

Our findings support significant relationships between APED use (particularly legal leanness and muscularity products) and higher levels of internalization and body image concerns; no relationships were noted with psychological well-being. In particular, our study extends past research (Hildebrandt et al., 2007; McCreary et al., 2007) by establishing these relationships with respect to legal APED use. For gay men, who often experience pressures from within their community to achieve hypermasculinised body ideals, body image concerns, greater
internalization, and more psychological distress differentiated them from the heterosexual men. These findings support the idea that the body and appearance ideals that exist within the gay community (Brewster et al., 2016; Smith et al., 2011; Tiggeman, Martins, & Kirkbride, 2007) can be toxic for some gay men, increasing the likelihood of experiencing various forms of psychological distress.
Table 1

**Descriptive Statistics of Participants**

<table>
<thead>
<tr>
<th>Variable</th>
<th>n</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sexual Orientation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterosexual</td>
<td>523</td>
<td>78.8%</td>
</tr>
<tr>
<td>Gay</td>
<td>141</td>
<td>21.2%</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18 to 24 years</td>
<td>510</td>
<td>76.8%</td>
</tr>
<tr>
<td>25 to 35 years</td>
<td>115</td>
<td>17.3%</td>
</tr>
<tr>
<td>36 years and above</td>
<td>39</td>
<td>5.9%</td>
</tr>
<tr>
<td><strong>Race/Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>African American/Black</td>
<td>54</td>
<td>8.2%</td>
</tr>
<tr>
<td>Asian or Pacific Islander</td>
<td>61</td>
<td>9.2%</td>
</tr>
<tr>
<td>Biracial</td>
<td>29</td>
<td>4.4%</td>
</tr>
<tr>
<td>Caucasian (European Descent)/White</td>
<td>292</td>
<td>44.0%</td>
</tr>
<tr>
<td>Hispanic/Latino</td>
<td>146</td>
<td>22.0%</td>
</tr>
<tr>
<td>Middle-Eastern</td>
<td>10</td>
<td>1.5%</td>
</tr>
<tr>
<td>Native American</td>
<td>13</td>
<td>2.0%</td>
</tr>
<tr>
<td>Other</td>
<td>59</td>
<td>8.9%</td>
</tr>
<tr>
<td><strong>Highest Level of Education Achieved</strong></td>
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<td></td>
</tr>
<tr>
<td>Some College</td>
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<tr>
<td>Associates/Specialty Degree</td>
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<td>8.9%</td>
</tr>
<tr>
<td>Bachelor’s Degree</td>
<td>82</td>
<td>12.3%</td>
</tr>
<tr>
<td>Master’s Degree</td>
<td>48</td>
<td>7.2%</td>
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<tr>
<td>Doctorate or Professional Degree</td>
<td>19</td>
<td>2.9%</td>
</tr>
<tr>
<td><strong>Relationship Status</strong></td>
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<td></td>
</tr>
<tr>
<td>Single</td>
<td>543</td>
<td>81.8%</td>
</tr>
<tr>
<td>Married or domestic partnership</td>
<td>106</td>
<td>16.0%</td>
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<tr>
<td>Divorced</td>
<td>12</td>
<td>1.8%</td>
</tr>
<tr>
<td>Widowed</td>
<td>3</td>
<td>0.5%</td>
</tr>
<tr>
<td><strong>Household Income</strong></td>
<td></td>
<td></td>
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<tr>
<td>&lt; $25,000</td>
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<td>43.2%</td>
</tr>
<tr>
<td>$25,000-$49,999</td>
<td>122</td>
<td>18.4%</td>
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<tr>
<td>$50,000-$74,999</td>
<td>83</td>
<td>12.5%</td>
</tr>
<tr>
<td>$75,000-$99,999</td>
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<td>8.9%</td>
</tr>
<tr>
<td>$100,000 +</td>
<td>113</td>
<td>17.0%</td>
</tr>
</tbody>
</table>
Table 2

Canonical correlations and structure coefficients

<table>
<thead>
<tr>
<th>Variables</th>
<th>APED Use</th>
<th></th>
<th>Sexual Orientation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Function 1</td>
<td>Function 2</td>
<td></td>
</tr>
<tr>
<td></td>
<td>$R^2_c$</td>
<td>$r_s$</td>
<td>$R^2_c$</td>
</tr>
<tr>
<td>Sat-Face</td>
<td>.24</td>
<td>.09</td>
<td></td>
</tr>
<tr>
<td>Sat-Body</td>
<td>.05</td>
<td>-.07</td>
<td></td>
</tr>
<tr>
<td>Sat-Legs</td>
<td>-.09</td>
<td>-.18</td>
<td></td>
</tr>
<tr>
<td>Shame</td>
<td>.05</td>
<td>.61</td>
<td></td>
</tr>
<tr>
<td>Leanness</td>
<td>.84</td>
<td>.20</td>
<td></td>
</tr>
<tr>
<td>MDDI-FI</td>
<td>-.03</td>
<td>.80</td>
<td></td>
</tr>
<tr>
<td>MDDI-DS</td>
<td>.60</td>
<td>-.46</td>
<td></td>
</tr>
<tr>
<td>MDDI-AI</td>
<td>.62</td>
<td>.24</td>
<td></td>
</tr>
</tbody>
</table>

*Note:* Sat = Body Parts Satisfaction Scale-Men subscales for Face, Body, and Legs. Shame = Body Shame Scale. Leanness = Drive for Leanness Scale. MDDI = Muscle Dysmorphic Disorder Inventory subscales for Functional Impairment (FI), Drive for Size (DS) and Appearance Intolerance (AI). $R^2_c$ = squared canonical correlation; $r_s$ = structure coefficients.
Table 3

**Canonical correlations and structure coefficients**

<table>
<thead>
<tr>
<th>Variables</th>
<th>APED use $R^2_c$</th>
<th>$r_s$</th>
<th>Sexual Orientation $R^2_c$</th>
<th>$r_s$</th>
</tr>
</thead>
<tbody>
<tr>
<td>General</td>
<td>.10</td>
<td>.06</td>
<td>.97</td>
<td></td>
</tr>
<tr>
<td>Athletic</td>
<td>.99</td>
<td>.56</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Note:* General and Athletic = subscales from the Sociocultural Attitudes Toward Attractiveness Questionnaire – 3.

$R^2_c = $ squared canonical correlation; $r_s = $ structure coefficients.
Table 4

*Canonical correlations and structure coefficients*

<table>
<thead>
<tr>
<th>Sexual Orientation</th>
<th>Function 1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variables</td>
<td>$R^2_c$</td>
</tr>
<tr>
<td>SWL</td>
<td>-.58</td>
</tr>
<tr>
<td>Dep.</td>
<td>.52</td>
</tr>
<tr>
<td>Neurot.</td>
<td>.98</td>
</tr>
</tbody>
</table>

Note: SWL = Satisfaction with Life Scale. Dep = Patient Health Questionnaire-9 Depression. Neurot. = Neuroticism subscale from the NEO-Five Factor Inventory. $R^2_c$ = squared canonical correlation; $r_s$ = structure coefficients.
Table 5

Correlations, Means, and Standard Deviations Among Measured Variables for Gay (N = 141) and Heterosexual (N = 523) Men

<table>
<thead>
<tr>
<th></th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>BMI</td>
<td>-</td>
<td>-.207</td>
<td>-.274</td>
<td>.016</td>
<td>.172</td>
<td>-.116</td>
<td>.367</td>
<td>-.570</td>
<td>.108</td>
<td>.081</td>
<td>.029</td>
<td>-.103</td>
<td>.056</td>
</tr>
<tr>
<td>2.</td>
<td>BPSS-F</td>
<td>-.116</td>
<td>-</td>
<td>.543</td>
<td>.361</td>
<td>-.414</td>
<td>-.148</td>
<td>-.459</td>
<td>-.141</td>
<td>.075</td>
<td>-.242</td>
<td>-.274</td>
<td>.478</td>
<td>-.285</td>
</tr>
<tr>
<td>3.</td>
<td>BPSS-B</td>
<td>-.274</td>
<td>.599</td>
<td>-</td>
<td>.600</td>
<td>-.679</td>
<td>-.284</td>
<td>-.720</td>
<td>-.046</td>
<td>.091</td>
<td>-.461</td>
<td>-.417</td>
<td>.337</td>
<td>-.346</td>
</tr>
<tr>
<td>4.</td>
<td>BPSS-L</td>
<td>-.042</td>
<td>.451</td>
<td>.657</td>
<td>-</td>
<td>-.426</td>
<td>-.229</td>
<td>-.409</td>
<td>-.279</td>
<td>-.006</td>
<td>-.268</td>
<td>-.292</td>
<td>.283</td>
<td>-.220</td>
</tr>
<tr>
<td>5.</td>
<td>Shame</td>
<td>.302</td>
<td>-.470</td>
<td>-.598</td>
<td>-.364</td>
<td>-</td>
<td>.340</td>
<td>.844</td>
<td>-.019</td>
<td>.150</td>
<td>.526</td>
<td>.504</td>
<td>-.335</td>
<td>.462</td>
</tr>
<tr>
<td>6.</td>
<td>Leanness</td>
<td>-.027</td>
<td>-.031</td>
<td>-.001</td>
<td>-.069</td>
<td>.042</td>
<td>-</td>
<td>.251</td>
<td>.371</td>
<td>.266</td>
<td>.623</td>
<td>.683</td>
<td>-.124</td>
<td>.254</td>
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<tr>
<td>7.</td>
<td>MD-FI</td>
<td>.462</td>
<td>-.449</td>
<td>-.602</td>
<td>-.358</td>
<td>.769</td>
<td>.018</td>
<td>-</td>
<td>-.168</td>
<td>.122</td>
<td>.433</td>
<td>.378</td>
<td>-.341</td>
<td>.454</td>
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<tr>
<td>8.</td>
<td>MD-DS</td>
<td>-.405</td>
<td>-.127</td>
<td>-.076</td>
<td>-.211</td>
<td>.068</td>
<td>.373</td>
<td>-.056</td>
<td>-</td>
<td>.107</td>
<td>.194</td>
<td>.277</td>
<td>-.158</td>
<td>.051</td>
</tr>
<tr>
<td>9.</td>
<td>MD-AI</td>
<td>.052</td>
<td>-.145</td>
<td>-.039</td>
<td>-.053</td>
<td>.187</td>
<td>.355</td>
<td>.233</td>
<td>.336</td>
<td>-</td>
<td>.154</td>
<td>.284</td>
<td>-.115</td>
<td>.159</td>
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<tr>
<td>10.</td>
<td>SATAQ-G</td>
<td>.055</td>
<td>-.245</td>
<td>-.267</td>
<td>-.255</td>
<td>.365</td>
<td>.465</td>
<td>.249</td>
<td>.338</td>
<td>.229</td>
<td>-</td>
<td>.804</td>
<td>-.140</td>
<td>.328</td>
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<tr>
<td>11.</td>
<td>SATAQ-A</td>
<td>.091</td>
<td>-.180</td>
<td>-.231</td>
<td>-.205</td>
<td>.316</td>
<td>.580</td>
<td>.213</td>
<td>.366</td>
<td>.363</td>
<td>.726</td>
<td>-</td>
<td>-.250</td>
<td>.360</td>
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<td>12.</td>
<td>SWL</td>
<td>-.012</td>
<td>.435</td>
<td>.354</td>
<td>.337</td>
<td>-.386</td>
<td>.039</td>
<td>-.334</td>
<td>-.098</td>
<td>-.121</td>
<td>-.217</td>
<td>-.115</td>
<td>-</td>
<td>-.479</td>
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<tr>
<td>13.</td>
<td>Depression</td>
<td>-.002</td>
<td>-.345</td>
<td>-.281</td>
<td>-.219</td>
<td>.384</td>
<td>-.016</td>
<td>.391</td>
<td>.137</td>
<td>.254</td>
<td>.165</td>
<td>.076</td>
<td>-.487</td>
<td>-</td>
</tr>
<tr>
<td>14.</td>
<td>Neurot.</td>
<td>-.046</td>
<td>-.364</td>
<td>-.350</td>
<td>-.283</td>
<td>.467</td>
<td>.006</td>
<td>.368</td>
<td>.198</td>
<td>.233</td>
<td>.277</td>
<td>.176</td>
<td>-.589</td>
<td>.671</td>
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</table>
Supplemental Tables for Electronic Version

Table 1

*Adjusted Means and Standard Errors by Use of Leanness/Muscle Products and Sexual Orientation for Body Image Measures*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Neither (n=306)</th>
<th>Muscle (n=273)</th>
<th>Lean/Musc (n=85)</th>
<th>Gay (n=141)</th>
<th>Heterosex (n=523)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sat-Face</td>
<td>4.35 (.06)</td>
<td>4.34 (.07)</td>
<td>4.38 (.10)</td>
<td>4.26 (.08)</td>
<td>4.44 (.05)</td>
</tr>
<tr>
<td>Sat-Body</td>
<td>3.57 (.07)</td>
<td>3.66 (.08)</td>
<td>3.43 (.12)</td>
<td>3.25 (.09)</td>
<td>3.84 (.05)</td>
</tr>
<tr>
<td>Sat-Legs</td>
<td>4.16 (.08)</td>
<td>4.12 (.09)</td>
<td>3.97 (.14)</td>
<td>3.96 (.10)</td>
<td>4.20 (.06)</td>
</tr>
<tr>
<td>Shame</td>
<td>2.87 (.08)</td>
<td>2.84 (.09)</td>
<td>3.40 (.13)</td>
<td>3.43 (.10)</td>
<td>2.64 (.06)</td>
</tr>
<tr>
<td>Leanness</td>
<td>3.86 (.06)</td>
<td>4.42 (.07)</td>
<td>4.71 (.10)</td>
<td>4.50 (.08)</td>
<td>4.16 (.05)</td>
</tr>
<tr>
<td>MDDI-FI</td>
<td>2.56 (.07)</td>
<td>2.43 (.07)</td>
<td>3.01 (.11)</td>
<td>2.99 (.08)</td>
<td>2.34 (.05)</td>
</tr>
<tr>
<td>MDDI-DS</td>
<td>2.39 (.06)</td>
<td>3.01 (.07)</td>
<td>2.72 (.10)</td>
<td>2.80 (.08)</td>
<td>2.62 (.05)</td>
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<tr>
<td>MDDI-AI</td>
<td>1.46 (.06)</td>
<td>1.89 (.07)</td>
<td>2.11 (.10)</td>
<td>1.84 (.08)</td>
<td>1.80 (.05)</td>
</tr>
</tbody>
</table>

*Note:* Sat = Body Parts Satisfaction Scale-Men subscales for Face, Body, and Legs (scores can range from 1, *extreme dissatisfaction*, to 6, *extreme satisfaction*). Shame = Body Shame Scale (scores can range from 1, *low shame*, to 5, *high shame*). Leanness = Drive for
Leanness Scale (scores can range from 1, low drive, to 6, high drive). MDDI = Muscle Dysmorphic Disorder Inventory subscales for Functional Impairment (FI), Drive for Size (DS) and Appearance Intolerance (AI) (scores can range from 1, low, to 5, high, on each subscale)

Table 2

Adjusted Means and Standard Errors by Use of Leanness/Muscle Products and Sexual Orientation for Internalization Measures

<table>
<thead>
<tr>
<th>Variables</th>
<th>Neither (n=306)</th>
<th>Muscle (n=273)</th>
<th>Lean/Musc (n=85)</th>
<th>Gay (n=141)</th>
<th>Heterosexual (n=523)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.98 (.07)</td>
<td>3.32 (.08)</td>
<td>3.71 (.12)</td>
<td>3.67 (.09)</td>
<td>3.01 (.05)</td>
</tr>
<tr>
<td></td>
<td>2.99 (.07)</td>
<td>3.58 (.07)</td>
<td>3.82 (.11)</td>
<td>3.65 (.09)</td>
<td>3.27 (.05)</td>
</tr>
</tbody>
</table>

*Note:* General and Athletic = subscales from the Sociocultural Attitudes Toward Attractiveness Questionnaire – 3 (scores can range from 1, low internalization, to 5, high internalization).
Table 3

*Adjusted Means and Standard Errors by Use of Leanness/Muscle Products and Sexual Orientation for Psychological Well-Being Measures*

<table>
<thead>
<tr>
<th>Variables</th>
<th>Neither (n=306)</th>
<th>Muscle (n=273)</th>
<th>Lean/Muscle (n=85)</th>
<th>Gay (n=141)</th>
<th>Heterosexual (n=523)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sat-Life</td>
<td>23.15 (.48)</td>
<td>23.03 (.54)</td>
<td>22.36 (.81)</td>
<td>21.72 (.62)</td>
<td>23.97 (.37)</td>
</tr>
<tr>
<td>Dep.</td>
<td>6.63 (.42)</td>
<td>6.73 (.47)</td>
<td>8.49 (.71)</td>
<td>8.26 (.54)</td>
<td>6.31 (.32)</td>
</tr>
<tr>
<td>Neurot.</td>
<td>33.32 (.65)</td>
<td>33.75 (.72)</td>
<td>35.74 (1.09)</td>
<td>36.81 (.83)</td>
<td>31.73 (.49)</td>
</tr>
</tbody>
</table>

*Note:* Sat-Life = Satisfaction with Life Scale (scores can range from 5, *low satisfaction*, to 35, *high satisfaction*). Dep = Patient Health Questionnaire-9 (scores can range from 0, *few depressive symptoms*, to 27, *high depressive symptoms*). Neurot. = Neuroticism subscale from the NEO-Five Factor Inventory (scores can range from 12, *low neuroticism*, to 60, *high neuroticism*).
References


doi:10.1123/jsep.25.2.161


doi:10.1177/107769901108800105

doi:10.1016/j.bodyim.2011.03.005

doi:10.1016/j.bodyim.2008.03.004

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