

BRIEF REPORT

A Confirmation of the Drive for Muscularity Scale With Sexual Minority Men

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The Drive for Muscularity Scale (DMS) is the most widely used instrument to assess men's body image concerns and responses to societal pressure to achieve a mesomorphic body shape (i.e., lean and highly muscular). While the DMS has generated substantial evidence for its validity across multiple samples of heterosexual men, its factor structure with sexual minority men is largely unexamined. Responding to calls for researchers to validate body image measures across diverse groups, our study utilized confirmatory factor analysis to examine the factor structure of the DMS with a sample of 202 sexual minority men (73% White/European American, 79% gay) from the United States who were recruited online. Results indicated that the original 2-factor structure of the DMS yielded acceptable fit to the data and all items loaded significantly on their respective factors ($p < .001$). Construct validity was evidenced by positive correlations with psychological distress. We encourage future researchers to investigate the validity of the DMS with sexual minority men of color.

Public Significance Statement

The present study supports the attitudinal and behavioral dimensions of the Drive for Muscularity Scale (DMS) with a sample of sexual minority men from the United States. Construct validity of the measure was also evidenced by positive relationships between the DMS total scale scores and Muscular-Oriented Body Image subscale score with psychological distress.

Keywords: drive for muscularity, Drive for Muscularity Scale, body image, sexual minority men, measurement

Accumulating research suggests that muscularity is an important body image variable to consider in the experiences of men cross-culturally (e.g., Frederick et al., 2007) and with sexual minority men in particular (Brewster, Sandil, DeBlaere, Breslow, & Eklund, 2016; Martins, Tiggemann, & Kirkbride, 2007; Pope et al., 2000). Specific to body image, some studies indicate that compared to heterosexual men, sexual minority men are more driven to gain bulk and have more defined musculature (Martins et al., 2007; Yelland & Tiggeman, 2003). The drive for muscularity has been defined as an individual's desire to be highly muscular related to their internalization of societal expectations of a muscular mesomorphic body shape (i.e., lean yet highly muscular; Edwards, Tod,

& Molnar, 2014; McCreary & Sasse, 2000). Other measures have been developed to assess the drive for muscularity among men—such as the Drive for Muscularity Attitudes Questionnaire (Morrison, Morrison, Hopkins, & Rowan, 2004)—but the Drive for Muscularity Scale (DMS; McCreary & Sasse, 2000) is particularly useful in that it considers behavioral components of this construct *in addition to* attitudes (Nerini, Matera, Baroni, & Stefanile, 2016). Since its development, the DMS has been widely used. Indeed, a search of the PsycINFO database resulted in 200 publications that included the term, “Drive for Muscularity Scale” (the search was conducted on February 4, 2017).

Research with the DMS has found relations between DMS scores and an array of variables of interest with samples of heterosexual women and men (e.g., body dissatisfaction, depression; for a review, see McCreary, 2007; Sepúlveda, Parks, de Pellegrin, Anastasiadou, & Blanco, 2016). Historically, although the DMS has also been utilized with samples of sexual minority men (e.g., Nerini et al., 2016), fewer studies have focused explicitly on their unique marginalization experiences in the United States (U.S.). For some sexual minority men, obtaining a muscular physique may be one way of conforming to gender-typical masculine body norms that can serve to buffer against heterosexist stereotypes that gay

This article was published Online First March 13, 2017.

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men are weak or feminine (Brennan, Craig, & Thompson, 2012). Furthermore, the AIDS epidemic created dramatic changes in how gay male bodies are portrayed; as a result, some sexual minority men may use musculature as a means of communicating their HIV-negative status, when men with HIV are traditionally seen as frail (Levesque & Vichesky, 2006; Siconolfi, Halkitis, Allomong, & Burton, 2009). Considering societal heterosexism, internalized homonegativity, and a sexual culture that privileges muscularity, sexual minority men often internalize standards of attractiveness that simultaneously emphasize slimness and mass (Brewster et al., 2016; Martins et al., 2007; Pope et al., 2000). These contradictory body image pressures may lead sexual minority men to be particularly vulnerable to the negative impact of drive for muscularity on psychological distress, body satisfaction, body image, compulsive exercise, intent to use steroids, and eating disorder symptomatology, and accumulating research corroborates these assertions (e.g., Brennan et al., 2012; Duggan & McCreary, 2004; Yean et al., 2013).

Despite the relevance of the drive for muscularity and the use of the DMS in studies with sexual minority men, no investigation to date has examined the structural validity of this measure with a sample of U.S. sexual minority men. Examining the factor structure of the DMS for sexual minority men in the U.S. is critical, as their experiences with heterosexist policies and cultural values may shift how they internalize and enact a drive for muscularity compared to heterosexual men (Kaminski, Chapman, Haynes, & Own, 2005; Martins et al., 2007; Yelland & Tiggemann, 2003). Furthermore, the continued use of this measure without testing its structural validity with sexual minority men assumes an equivalence with heterosexual men that may not be accurate and could potentially obfuscate important construct variations between these groups.

McCreary and Sasse (2000) created the 15 items of the DMS by surveying individuals participating in weight-training at a local fitness center and reviewing articles in weight-training magazines. Items were patterned after measures intended to assess drive for thinness among women (McCreary, Sasse, Saucier, & Dorsch, 2004). In their initial examination of the factor structure of this measure with a sample of high school and college students (sexual orientation not reported), McCreary and colleagues (2004) reported a two-factor solution representing muscularity attitudes, termed Muscle-Oriented Body Image (MBI; 7 items: 1, 7, 9, 11, 13, 14, 15), and behaviors associated with men attempting to become more muscular, termed Muscle-Oriented Behavior (MB; 8 items: 2, 3, 4, 5, 6, 8, 10, 12 [7 items with Item 10—"I think about taking anabolic steroids"—omitted]). Since this initial exploratory factor analysis, several studies have utilized confirmatory procedures (i.e., Confirmatory Factor Analysis [CFA]) to test the replicability of this two-factor model. For instance, the two-factor structure and psychometric properties have been supported with a sample of Argentinian men (Compte, Sepúlveda, de Pellegrin, & Blanco, 2015) and replicated with slight modification with other samples of Spanish (Sepúlveda et al., 2016) and Portuguese (Campana, Tavares, Swami, & da Silva, 2013) men. Importantly, although these prior studies represent ethnically diverse samples, they did not report the sexual orientation of their participants. One prior study examined the factor structure of the DMS with a subsample of gay men in Italy (Nerini et al., 2016). The authors confirmed the presence of two factors (Item 10 was omitted).

However, their subsample of gay men ($n = 143$) did not meet the generally accepted minimum sample size recommendations for CFA (e.g., $n \geq 200$; Quintana & Maxwell, 1999) and cannot be assumed to generalize to U.S. samples.

More specifically, prior studies utilizing other measures have found that muscular body ideals vary across cultures; notably, Frederick and colleagues (2007) found that—while dissatisfaction with muscularity was widespread among men in the U.S., the Ukraine, and Ghana—it was most prevalent in the U.S. For example, over 90% of U.S. men in their cross-cultural study reported a desire to be more muscular, as did two thirds of Ukrainian men, and just under half of Ghanaian men. Considering that there is evidence that drive for muscularity may also be heightened for sexual minority men compared to heterosexual men (Duggan & McCreary, 2004; Martins et al., 2007), examining the validity and reliability of a tool such as the DMS is invaluable to research with sexual minority men in the U.S.

Consequently, the present study is, to our knowledge, the first to investigate the dimensionality of the DMS with an adequate sample size of sexual minority men in the U.S. In addition, the utilization of a sample that is composed of men who self-identify as gay, bisexual, and other “non-heterosexual” orientations (e.g., queer) provides a more inclusive examination of sexual minority men. Finally, because there has been variability in the inclusion of Item 10 in prior psychometric examinations and in actual use of the DMS in quantitative studies, with some studies omitting Item 10 (e.g., Nerini et al., 2016) and others retaining it (e.g., Keum, Wong, DeBlaere, & Brewster, 2015), we examine the proposed two-factor model both with and without this item to inform future use of this measure.

Also, because drive for muscularity has strong theoretical grounding and the factor structure of the DMS has been supported with prior diverse samples utilizing CFA procedures, CFA was deemed appropriate for use in the current investigation (Fabrigar, Wegener, MacCallum, & Strahan, 1999). Also, based on prior theory and research (e.g., McCreary, 2007; McCreary & Sasse, 2000), the correlations between DMS total and subscale scores and psychological distress were examined as evidence of construct validity. We hypothesized that DMS scores would be positively related to distress.

Method

Participants

Data from 202 sexual minority men, ranging in age from 18 to 62 years old ($M = 28.80$, $SD = 14.50$, $Mdn = 23.00$) were analyzed in the current study. In terms of race/ethnicity, most participants, approximately 73%, identified as White/European American (Multiracial [8%], Black/African American [4%], Latina/o American [3%], Asian American/Pacific Islander [2%], another unspecified race/ethnicity [1%], Native American <1%). With regard to sexual orientation, the majority identified as gay (79%; mostly gay [12%], another self-specified sexual orientation [5%], bisexual [3%], mostly heterosexual <1%). Approximately 29% of participants earned a postgraduate degree (4-year college degree [28%], completed some college/2-year college degree [28%], some postgraduate work [10%], high school diploma [5%]). Regarding social class, the majority identified as middle

class (41%; lower-middle/working/lower social class [31%], upper/upper-middle class [28%]).

Measures

Drive for muscularity. The Drive for Muscularity Scale (DMS; McCreary & Sasse, 2000) is a 15-item self-report questionnaire assessing attitudes and behaviors associated with the desire for a more muscular body. Items are rated on a six-point response scale (1 = *Never* to 6 = *Always*), with higher scores indicating higher levels of drive for muscularity. Construct validity of the DMS with sexual minority men has been established via its positive relations with frequency of purchasing muscle and fitness magazines and a measure of physique anxiety (Duggan & McCreary, 2004). Cronbach's alpha for the DMS items with a sample of predominately sexual minority men (70%) was .91 (Duggan & McCreary).

Psychological distress. The Hopkins Symptom Checklist—21 (HSCL-21; Green, Walkey, McCormick, & Taylor, 1988) is a 21-item self-report questionnaire assessing psychological distress. Items are rated on a four-point response scale (1 = *Not at all* to 4 = *Extremely*), with higher scores indicating higher levels of psychological distress. Construct validity was supported by a positive relationship with depression and negative correlations with self-esteem and optimism with a sample of sexual minority men (Morrison, 2011). Cronbach's alpha was .93 with that sample (Morrison). Cronbach's alpha with the current sample was .92.

Demographics. Participants indicated their age, race/ethnicity, sexual orientation, education level, and socioeconomic status.

Procedure

Participants were drawn from a larger study on sexual minority men's experiences with body image and minority stress (Brewster et al., 2016). The convenience sample was recruited via electronic flyers and posts about the study on blogs, listservs, and virtual communities (i.e., Tumblr, Facebook, Craigslist) targeted toward sexual minority men; it was advertised as a survey of about body image and stress. Participants were directed to an online survey and asked to complete an informed consent process affirming they (a) identified as a sexual minority man, (b) lived in the United States, and (c) were 18 years of age or older. Low levels of any missing data were addressed with the Expectation-Maximization function in SPSS 22.0 (Jackson, Gillaspay, & Purc-Stephenson, 2009).

Results

AMOS 23.0 with maximum likelihood estimation was used to conduct a CFA to evaluate the fit of the hypothesized two-factor model with the present data. The sample size of 202 met guidelines for deriving meaningful and interpretable models and fit indices (Quintana & Maxwell, 1999). With regard to normality, all items met criteria for acceptable univariate normality (skewness index <3, kurtosis index <10; Weston & Gore, 2006) and Mardia's normalized estimate of multivariate kurtosis (i.e., 40.87) supported multivariate normality (Bollen, 1989). Also, we inspected the largest multivariate outliers (indicated by Mahalanobis distances) and found that removal of these cases had minimal impact on fit

index values and parameter estimates; thus all participants were retained. Model fit was evaluated with the comparative fit index (CFI), root mean square error of approximation (RMSEA), and standardized root mean residual (SRMR). Given our sample size (i.e., $N < 500$), CFI values less than or equal to .90, RMSEA values less than or equal to .10, and SRMR values less than or equal to .10 were used as criteria for acceptable model fit (e.g., Weston & Gore, 2006).

Replicating the two-factor structure reported by McCreary and colleagues (2004) and in prior CFAs (e.g., Sepúlveda et al., 2016), 14 items of the DMS were constrained to load onto two correlated factors (i.e., MBI and MB). This initial model provided acceptable fit to the data ($\chi^2 [76, n = 202] = 228.30, p < .001$, CFI = .92, SRMR = .10, RMSEA = .10, 90% CI [.09, .12]). As presented in Table 2, standardized regression weights for the MBI and MB subscales ranged from .64 to .94 and .36 to .95, respectively, and were significant ($p < .001$). MBI and MB subscales were also significantly related, $r = .30, p = .002$, and exhibited good reliability (MBI: $\alpha = .93$, MB: $\alpha = .87$, Total: $\alpha = .93$). With the retention of Item 10, the model provided a fit to the data that approached acceptable ($\chi^2 [89, N = 202] = 270.10, p < .001$, CFI = .91, SRMR = .11, RMSEA = .10, 90% CI [.09, .11]). Standardized regression weights for the MBI and MB subscales ranged from .64 to .94 and .36 to .94, respectively, and were significant ($p < .001$). MBI and MB subscales were also significantly related, $r = .30, p = .002$ (see Table 3) and exhibited good reliability (MBI: $\alpha = .93$, MB: $\alpha = .87$, Total: $\alpha = .90$).

To assess our sample characteristics, mean scores of DMS items (see Table 1) were compared to those reported in the original factor analysis by McCreary and colleagues (2004) with their sample (men of unspecified sexual orientations). Independent samples *t* tests, with a corrected *p* value of .003 ($p = .05/16$) to account for the multiple comparisons, indicated that our sample reported higher mean item scores on 3 items (Items 3, 4, 7) and on the total score (omitting Item 10). The highest mean score across both studies was Item 1 ("I wish I was more muscular") and did not

Table 1
Means and Standard Deviations for DMS Items

DMS Item	<i>M</i>	<i>SD</i>
1. <i>I wish I were more muscular</i>	4.32	1.21
2. <i>I lift weights to build more muscle</i>	3.18	1.52
3. <i>I use protein or energy supplements</i>	2.38	1.64
4. <i>I drink weight gain or protein shakes</i>	2.31	1.64
5. <i>I try to consume as many calories as I can in a day</i>	1.90	1.22
6. <i>I feel guilty if I miss a weight-training session</i>	2.46	1.54
7. <i>I think I would feel more confident if I had more muscle mass</i>	3.89	1.47
8. <i>Other people think I work out with weights too often</i>	1.39	.80
9. <i>I think I would look better if I gained 10 pounds of bulk</i>	3.00	1.81
10. <i>I think about taking anabolic steroids</i>	1.49	1.11
11. <i>I think I would feel stronger if I gained a little more muscle mass</i>	3.78	1.40
12. <i>I think that my weight-training schedule interferes with other aspects of my life</i>	1.84	1.24
13. <i>I think that my arms are not muscular enough</i>	3.96	1.44
14. <i>I think that my chest is not muscular enough</i>	3.98	1.45
15. <i>I think that my legs are not muscular enough</i>	3.18	1.57
Total scale score (Item 10 omitted)	2.97	.95

Table 2
CFA of the 14-Item DMS

DMS Item	MBI <i>M</i> = 3.73 <i>SD</i> = 1.24	MB <i>M</i> = 2.21 <i>SD</i> = 1.04
13. <i>I think that my arms are not muscular enough</i>	.94	
14. <i>I think that my chest is not muscular enough</i>	.92	
7. <i>I think I would feel more confident if I had more muscle mass</i>	.83	
1. <i>I wish I were more muscular</i>	.82	
11. <i>I think I would feel stronger if I gained a little more muscle mass</i>	.80	
15. <i>I think that my legs are not muscular enough</i>	.71	
9. <i>I think I would look better if I gained 10 pounds of bulk</i>	.64	
4. <i>I drink weight gain or protein shakes</i>		.95
3. <i>I use protein or energy supplements</i>		.95
2. <i>I lift weights to build more muscle</i>		.71
5. <i>I try to consume as many calories as I can in a day</i>		.64
6. <i>I feel guilty if I miss a weight-training session</i>		.61
8. <i>Other people think I work out with weights too often</i>		.45
12. <i>I think that my weight-training schedule interferes with other aspects of my life</i>		.36

Note. CFA = Confirmatory Factor Analysis; DMS = Drive for Muscularity Scale; MBI = Muscle-Oriented Body Image; MB = Muscle-Oriented Behavior.

differ significantly between samples. Finally, as evidence of the validity of the DMS, the total DMS score with, $r = .25$, $p < .001$, and without Item 10, $r = .24$, $p = .001$, and the MBI subscale score, $r = .29$, $p < .001$, were positively correlated with psychological distress with our sample of sexual minority men. However, although the MB subscale score inclusive of Item 10 did approach significance, $r = .13$, $p = .07$, this subscale was not correlated with distress (without Item 10, $r = .10$, $p = .10$).

Discussion

In recent years, researchers have demonstrated links between drive for muscularity and indicators of men's physical and mental health (e.g., Brennan et al., 2012; McCreary, 2007). Considering

that sexual minority men may be particularly vulnerable to body image concerns (Nerini et al., 2016), confirming the structure of widely used body image measures, such as the DMS, with this population is critical for establishing a base of psychometrically sound and culturally competent instruments. To our knowledge, the present study is the first analysis of the factor structure of the DMS with sexual minority men from the U.S.

Our results support the two-factor structure reported by the scale developers (omitting Item 10, McCreary et al., 2004), corroborating the dimensionality of the drive for muscularity construct with our sample. In addition, because studies have varied in their inclusion of Item 10, we also examined the factor structure of the DMS with this item retained. Although this model resulted in slightly worse fit, the fit approached acceptable standards. Given that fit indices across the 14-

Table 3
CFA of the 15-Item DMS

DMS Items	MBI <i>M</i> = 3.73 <i>SD</i> = 1.24	MB <i>M</i> = 2.12 <i>SD</i> = .98
13. <i>I think that my arms are not muscular enough</i>	.94	
14. <i>I think that my chest is not muscular enough</i>	.92	
7. <i>I think I would feel more confident if I had more muscle mass</i>	.83	
1. <i>I wish I were more muscular</i>	.82	
11. <i>I think I would feel stronger if I gained a little more muscle mass</i>	.80	
15. <i>I think that my legs are not muscular enough</i>	.71	
9. <i>I think I would look better if I gained 10 pounds of bulk</i>	.64	
4. <i>I drink weight gain or protein shakes</i>		.94
3. <i>I use protein or energy supplements</i>		.94
2. <i>I lift weights to build more muscle</i>		.71
5. <i>I try to consume as many calories as I can in a day</i>		.64
6. <i>I feel guilty if I miss a weight-training session</i>		.62
8. <i>Other people think I work out with weights too often</i>		.45
10. <i>I think about taking anabolic steroids</i>		.38
12. <i>I think that my weight-training schedule interferes with other aspects of my life</i>		.36

Note. CFA = Confirmatory Factor Analysis; DMS = Drive for Muscularity Scale; MBI = Muscle-Oriented Body Image; MB = Muscle-Oriented Behavior.

and 15-item versions of the DMS were comparable, and internal consistency reliability estimates were good for all subscale and total scale scores, we assert that computing a score inclusive of item 10 could be appropriate with samples of sexual minority men. At this time, we would suggest that investigators allow the scope and intention of their research questions to guide their decision regarding the retention or exclusion of Item 10. However, acknowledging that item 10 has performed inconsistently in prior studies (Keum et al., 2015), future studies to corroborate its validity and the 14- versus 15-item DMS with sexual minority men is strongly recommended.

Comparison of individual item means between our sample of sexual minority men and the scale development sample of men (sexual orientation not reported) indicated that sexual minority men reported significantly higher scores on 3 of the 15 DMS items, as well as a significantly higher total scale score. The items represented both behavioral (Items 3 and 4) and attitudinal (Item 7) components and reinforce the assertion that sexual minority men may experience even greater body-image related pressures than their heterosexual counterparts (e.g., Kimmel & Mahalik, 2004). More specifically, sexual minority men are argued to experience heightened sociocultural pressures to be both thin *and* muscular beyond similar pressures experienced by heterosexual men due to greater sexual objectification and concern with muscularity among this group (e.g., Yelland & Tiggemann, 2003); such discrepant bodily aims may trigger uniquely unhealthy approaches to weight management and muscle building strategies, such as compulsive exercise (e.g., Brewster et al., 2016; Kaminski et al., 2005).

Finally, as evidence of construct validity, we found that the DMS total scale scores, with and without Item 10, and MBI subscale scores were positively correlated with psychological distress. This is consistent with previous work that has reported positive relationships between these scores and measures of depression (McCreary & Sasse, 2000) and anxiety (Sepúlveda et al., 2016). The MB subscale scores were unrelated to psychological distress. Although unexpected, this pattern of results suggests that the MBI and MB subscales are distinct constructs that may operate differentially in the health of sexual minority men, providing additional support for the utility of DMS subscale scores with this population.

The present study should be interpreted in light of a number of limitations. First, our data were collected online, which may limit participation to those with access to a computer, smart phone, and/or stable Internet connection. As such, this methodology may have constrained participants to sexual minority men who are more highly educated and affluent than that of the general U.S. population. Relatedly, a majority of our participants identified as White (73%) and gay (79%), which may limit the generalizability of our findings. Considering that racial and ethnic identity both play unique roles in constructing body image norms for men (Ricciardelli, McCabe, Williams, & Thompson, 2007), validating the DMS with sexual minority men of color is an important next step in affirming the psychometric strength of this measure. Relatedly, although CFA analyses to date have largely tested the two-factor model presented in the current study, a higher order or global factor has received mixed support in prior EFA and CFA examinations (e.g., McCreary et al., 2004; Sepúlveda et al., 2016). Thus, future studies should investigate this possibility as well.

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Received August 18, 2016

Revision received February 13, 2017

Accepted February 16, 2017 ■