Psychometric evaluation of the Drive for Leanness Scale in a sample of Irish men

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A B S T R A C T

Smolak and Murnen (2008) developed and assessed the Drive for Leanness Scale (DLS), a measure of men and women's desire to have limited body fat and toned, healthy muscles. The psychometric properties of this scale were investigated using an online sample of Irish men (N = 545). Confirmatory factor analyses suggested that a unidimensional factor structure adequately matched the observed data (i.e., fit indices suggested acceptable model fit). Analyses also showed that the DLS yielded reliable and convergent valid scores, suggesting that the scale holds promise as an indicant of the drive for leanness. Strengths and limitations associated with this study are discussed, including problems inherent in Internet research. Directions for future inquiry, such as the need for additional psychometric work, also are provided.

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1. Introduction

Recognizing men's desire to be lean and muscular, and women's wish to be thin and toned, Smolak and Murnen (2008) developed the Drive for Leanness Scale (DLS), a measure of men and women's “motivating interest in having relatively low body fat and toned, physically fit muscles” (p. 251). This construct warrants empirical attention given its potential clinical utility. For example, the ideal male body is lean and muscular (Kimmel & Mahalik, 2004), and efforts to attain this physique may increase vulnerability to the development of eating disorders (Yelland & Tiggemann, 2003). Body fat dissatisfaction has predicted variance in symptoms of eating disorders among men (Blashill, 2010; Smith, Hawksworth, Bodell, & Joiner, 2011; Tylka, 2011), and sociocultural pressures on men to be lean have predicted variance in disordered eating behaviors (Tylka, 2011; Tylka & Andorka, 2012).

Smolak and Murnen's (2008) samples were college students from the United States of America, a majority of which were female and Caucasian. Of 18 attitudinal items created initially by Smolak and Murnen (2008), 10 were retained after consulting item-total correlations and Cronbach’s alpha values. A 6-point response format (never to always) was adopted, with higher scores denoting a greater drive for leanness. In their first study, Cronbach’s alphas were .83 for men and .71 for women, and the scale's temporal stability was supported by a two-week test-retest correlation coefficient of .69. Moderate positive correlations emerged between the DLS and the drives for thinness and muscularity, both of which attest to the scale's discriminant validity (i.e., the drive for leanness was distinguishable from the desires to be thin and muscular).

In their second study, Smolak and Murnen (2008) investigated the dimensionality of the DLS by conducting a principal component analysis (PCA) with varimax rotation. Six items, loading strongly on the first component (> .62), were retained. Cronbach’s alphas were satisfactory (αs = .79 and .83 for men and women, respectively) and various strands of evidence in support of the measure's construct validity were provided (e.g., scores on the DLS accounted for unique variance in men and women's body shame after controlling for the drives for thinness and muscularity).

Smolak and Murnen (2008) recommended additional psychometric testing of the DLS, identifying their sample's homogeneity in terms of age and ethnicity as problematic vis-à-vis the generalizability of their research. They also noted the small number of men in their study as a limitation. To date, further assessment of the scale's reliability and validity has not been conducted. The current study addresses these issues by distributing the DLS to a sample of Irish men and evaluating the scale's dimensionality, scale score reliability, and convergent validity. The relationship between the DLS and social desirability bias also was explored.

Irish men's body image warrants empirical attention given their concerns about masculinity and body fat (McDonagh, Morrison, & McGuire, 2008; Ryan & Morrison, 2009). Using a sample of 136 men attending a university in Western Ireland, McDonagh et al. found that 35% agreed or strongly agreed that “If a partner were to see me nude I would be concerned about the overall masculinity of my body” and 38% agreed or strongly agreed that “During sexual activity, I would be concerned about how my body looks to a partner.”
Correlational analyses revealed that participants’ body image self-consciousness during physical intimacy correlated positively with their drive for muscularity and sexual anxiety, and negatively with their body esteem, self-rated physical attractiveness, and sexual esteem. Ryan and Morrison’s (2009) qualitative study of young Irish men’s body image revealed participants’ idealization of lean musculature. Participants said Irish men diet and exercise to achieve lean muscles for many reasons, including improved sporting performance and enhanced sexual attractiveness.

Given the purported unidimensionality of the DLS (Smolak & Murnen, 2008), the current research investigated the adequacy of a one-factor solution, using confirmatory factor analysis (CFA). To investigate the scale’s convergent validity, the following hypotheses were tested.

**Hypothesis 1.** Men’s drive for muscularity and upward body comparisons (i.e., comparisons with others perceived as possessing “better” physiques) correlate positively (Ryan & Morrison, 2011). A similar association between participants’ drive for lean muscles and engagement in upward body comparisons was predicted.

**Hypothesis 2.** Researchers (e.g., Bergeron & Tykla, 2007) have found that the drive for muscularity correlates positively with muscle dissatisfaction. A similar association was predicted between the drive for leanness and dissatisfaction with current musculature.

**Hypothesis 3.** Men’s body fat dissatisfaction and self-reported engagement in weight loss behaviors such as dieting are positively correlated (Tykla, 2011). A positive association was likewise anticipated between the desire to attain lean muscles and body fat dissatisfaction.

### 2. Method

#### 2.1. Participants

Participants were 545 Irish men aged 18 to 61 years (M = 28.19, SD = 8.03), 98.20% of whom self-identified as Caucasian (0.7% identified their ethnicity as mixed; 0.2% as Asian; and 0.9% did not give their ethnicity). Most categorized themselves as heterosexual (86.4%), with others self-identifying as gay (6.4%) or bisexual (5.9%), or deciding not to give their sexual orientation (1.3%). While many men were employed full-time (53.9%), others were undergraduate college students (19.8%), unemployed (9.5%), postgraduate college students (7.2%), secondary school students (3.5%), retired (0.6%), or disabled (0.6%). Some men did not give their employment status (4.6%).

#### 2.2. Measures

**2.2.1. Demographic questions**

Participants were asked to indicate their gender, age, nationality, ethnicity, sexual orientation, and employment status.

**2.2.2. Drive for Leanness Scale (DLS; Smolak & Murnen, 2008)**

Psychometric information on the 6-item, unidimensional DLS is outlined in the Introduction. A sample item is “My goal is to have well-toned muscles.” To ensure the second item was grammatically correct, “When a person’s body is hard and firm, its says [sic] they are well-disciplined” was replaced by “When a person’s body is hard and firm, it says he or she is well-disciplined.” Smolak and Murnen (2008) used a 6-point response format that included “usually” and “often,” whose meanings may appear synonymous (Often, 2012). The lack of distinction between “usually” and “often” is problematic as response options should be worded to have equal intervals such that differences in endorsement between adjacent pairs of response options are approximately the same (DeVellis, 2003). Thus, in the current study, a 5-point response format was used: “never,” “rarely,” “sometimes,” “often,” and “always.” To guard against acquiescence and response set behaviors, the direction of response options was switched periodically (e.g., 1 = never; 5 = always for some items and 1 = always; 5 = never for other items). Barnette (2000) suggests that this technique is superior to using positively and negatively keyed items. Total scores could range from 6 to 30, with higher scores reflecting a stronger drive for leanness.

**2.2.3. Revised Male Body Attitudes Scale (MBAS-R; Ryan, Morrison, Roddy, & McCutcheon, 2011)**

Two subscales of a 3-factor measure of male body dissatisfaction were used: the Body Fat Dissatisfaction subscale (BF, five items, scores range from 5 to 25) and Muscularity Dissatisfaction subscale (MUS, seven items, scores can range from 7 to 35). A 5-point response format (i.e., never, rarely, sometimes, often, always) was used, with higher scores denoting greater negativity toward one’s body fat or muscularity. The direction of response options was switched periodically. A sample item is “I feel excessively fat.” Ryan, Morrison, Roddy, et al. (2011) furnish evidence in support of the revised measure’s scale score reliability and validity.

**2.2.4. Social Desirability Scale (SDS-17; Stöber, 2001)**

As Stöber (2001) recommends the omission of one item, 16 items were used. The SDS-17 assesses the tendency to answer the scale items in a manner that garners social approval (e.g., “I sometimes lie”). Psychometric testing conducted by Stöber (2001) and Blake, Valdiserri, Neuendorf, and Nemeth (2006) indicates that the SDS-17 has good scale score reliability (e.g., Cronbach’s alpha = .80) and criterion-related validity (i.e., scores on the SDS-17 correlate positively with other measures of social desirability bias). A 5-point Likert-type response format was used: “strongly disagree,” “disagree,” “neither disagree nor agree,” “agree,” and “strongly agree,” with higher scores (possible range is 16 to 80) reflecting greater social desirability bias.

**2.2.5. Upward Male Body Comparison Behaviors Scale (MBC-BUPWARD; Ryan & Morrison, 2011)**

This 7-item unidimensional scale measures frequency of self-reported comparisons to men with “better” bodies (sample item: “I compare my body to the bodies of men who look better than me”). Recent research tests to the scale’s psychometric soundness (Ryan & Morrison, 2011; Ryan, Morrison, & Roddy, 2011). For example, a Cronbach’s alpha of .93 and positive correlation between the MBC-BUPWARD and a measure of personal investment in one’s appearance support the scale’s reliability and construct validity, respectively (Ryan & Morrison, 2011). A 5-point response format (i.e., never, rarely, sometimes, often, always) was employed, with higher scores denoting more upward body comparison behaviors (possible range 7 to 35).

### 2.3. Procedure

Ethical approval was obtained from the institutional review board affiliated with the first author’s university. Potential participants were invited to complete an online body image questionnaire through convenience and snowball sampling methods. An advertisement inviting research participation appeared on Boards.ie, Ireland’s largest online...
community with many different forums, and respondents were asked to forward our invitation to other Irish men potentially interested in taking part. Demographic questions appeared on the first page of the questionnaire, followed by the MBC-BUPWARD (Ryan & Morrison, 2011) on the second page, the modified version of the DLS (Smolak & Murnen, 2008) and MBAS-R (Ryan, Morrison, Roddy, et al., 2011) on the third page, and the SDS-17 (Stöber, 2001) on the fourth page. Participants were informed that, if desired, they could enter a competition to win one €50 gift voucher. As contact details and questionnaire data were submitted separately, participant anonymity was safeguarded. One hundred and twenty-nine men entered the competition and one winner was randomly selected. An online debriefing report was available to all participants.

2.4. Statistical analyses

Using IBM SPSS AMOS 19, CFAs were conducted on data sets A and B. For CFA, Hoyle (2000) recommends using fit statistics that possess different computational logic. Thus, absolute fit was assessed using the Standardized Root Mean Square Residual (SRMR) and the Root Mean Square Error of Approximation (RMSEA); and comparative fit was examined using Bentler’s comparative fit index (CFI). Suggested guidelines for these indices are: SRMR close to .08 (Hu & Bentler, 1999); RMSEA close to .06 (Hu & Bentler, 1999); and CFI close to .95 (Hu & Bentler, 1999). Modification indices (MIs) also were inspected to assess the extent to which the hypothesized model was appropriately described (Byrne, 2001). Pearson’s r correlations were used to test Hypotheses 1 to 3. These correlations were conducted appropriately described (Byrne, 2001). Descriptive and reliability statistics are provided standard error estimates that are less biased (Byrne, 2001). Brown (2006) noted advantages of this approach and its suitability for samples that are moderate in size. Fit indices for a unidimensional modified DLS were as follows: χ²(⁹) = 31.17, p < .001; SRMR = .04; RMSEA = .10 (90% CI: .06–.14); and CFI = .94. Standardized coefficients ranged from .56 to .69 (M = .64), and MIs were negligible.

Data also emerged as multivariate non-normal for the modified DLS (Mardia’s coefficient = 7.90) in the second data set. A case exceeding the critical value for Mahalanobis distance was deleted and bootstrapping was used. Fit indices for a unidimensional modified DLS were as follows: χ²(⁹) = 30.91, p < .001; SRMR = .04; RMSEA = .09 (90% CI: .06–.13); and CFI = .95. Standardized coefficients ranged from .48 to .71 (M = .64). Again, MIs were negligible. Thus, in both data sets, a unidimensional model provided adequate fit to the data, and items appeared representative of the latent construct and varied in content.

3. Results

Descriptive and reliability statistics are given in Table 1. On average, participants’ drive for leanness, body fat dissatisfaction, muscle dissatisfaction, engagement in upward body comparisons, and socially desirable responding were moderate.

3.1. Confirmatory factor analyses (data sets A and B, n = 262 and 283, respectively)

In the first data set, data emerged as multivariate non-normal for the modified DLS (Mardia’s coefficient = 13.75). Given problems associated with maximum likelihood (ML) estimation under non-normal conditions, bootstrapping was used after the deletion of three cases exceeding the critical value for Mahalanobis distance (i.e., 22.46 for 6 dependent variables). Bootstrapping is not based on the assumption of normal distribution and, relative to ML estimation, provides standard

<table>
<thead>
<tr>
<th>Measure (data set)</th>
<th>BF (data set A)</th>
<th>BF (data set B)</th>
<th>MBC-BUPWARD (data set A)</th>
<th>MBC-BUPWARD (data set B)</th>
<th>Modified DLS (data set A)</th>
<th>Modified DLS (data set B)</th>
<th>MUS (data set A)</th>
<th>MUS (data set B)</th>
<th>SDS-17 (data set A)</th>
<th>SDS-17 (data set B)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean (SD)</td>
<td>14.35 (5.57)</td>
<td>13.97 (5.66)</td>
<td>19.04 (6.20)</td>
<td>19.54 (6.58)</td>
<td>21.05 (4.19)</td>
<td>20.52 (4.25)</td>
<td>19.57 (6.28)</td>
<td>19.72 (6.37)</td>
<td>52.05 (7.53)</td>
<td>52.60 (6.92)</td>
</tr>
<tr>
<td>Alpha (95% CI)</td>
<td>.90 (.88–.92)</td>
<td>.91 (.89–.92)</td>
<td>.91 (.89–.92)</td>
<td>.92 (.91–.94)</td>
<td>.79 (.74–.82)</td>
<td>.80 (.76–.84)</td>
<td>.88 (.86–.90)</td>
<td>.88 (.86–.90)</td>
<td>.75 (.70–.79)</td>
<td>.70 (.65–.75)</td>
</tr>
</tbody>
</table>

BF = Body Fat subscale of the Revised Male Body Attitudes Scale (MBAS-R; Ryan, Morrison, Roddy, et al., 2011); MBC-BUPWARD = Upward Male Body Comparison Behaviors Scale (Ryan & Morrison, 2011); modified DLS = Modified version of the Drive for Leanness Scale (Smolak & Murnen, 2008); MUS = Muscularity subscale of the Revised Male Body Attitudes Scale (MBAS-R; Ryan, Morrison, Roddy, et al., 2011); SDS-17 = Social Desirability Scale (Stöber, 2001).

Data also emerged as multivariate non-normal for the modified DLS (Mardia’s coefficient = 7.90) in the second data set. A case exceeding the critical value for Mahalanobis distance was deleted and bootstrapping was used. Fit indices for a unidimensional modified DLS were as follows: χ²(⁹) = 30.91, p < .001; SRMR = .04; RMSEA = .09 (90% CI: .06–.13); and CFI = .95. Standardized coefficients ranged from .48 to .71 (M = .64). Again, MIs were negligible. Thus, in both data sets, a unidimensional model provided adequate fit to the data, and items appeared representative of the latent construct and varied in content.

3.2. Reliability analysis

Cronbach’s alpha coefficients and 95% confidence intervals for the 6-item modified DLS suggest the measure yielded reliable scores in both data sets (Table 1). The mean interitem correlations were .38 and .41 (ranges = .29–.55 and .25–.53) in data sets A and B, respectively. Table 2 lists the modified DLS items, showing the percentages of participants that chose each response option.

3.3. Convergent validity

In support of Hypotheses 1 to 3, drive for leanness was positively associated with upward body comparison behaviors, muscularity dissatisfaction, and body fat dissatisfaction (Table 3). Negative associations emerged between scores on the modified DLS and SDS-17 in data sets A and B. Therefore, all correlations were recomputed, controlling for social desirability bias; no substantive differences were noted (see Table 3).

4. Discussion

The current study psychometrically evaluated the modified DLS among a sample of Irish men, with results attesting to the measure’s psychometric soundness. First, findings supported previous research on the factor structure of the modified DLS (Smolak & Murnen, 2008). Both confirmatory factor analyses suggest that the scale’s unidimensional model adequately matched the observed data. For example, SRMRs were .04 in both data sets. However, RMSEAs of .10 and .09 for data sets A and B, respectively, suggest that model fit could be improved (MacCallum, Browne, & Sugawara, 1996).

Second, the modified DLS yielded reliable scores with 95% confidence intervals identifying .74 to .82 and .76 to .84, as plausible lower and upper limits for Cronbach’s alpha in data sets A and B, respectively. Third, the three tests of convergent validity were supported. Drive for leanness attitudes correlated strongly with engagement in upward body comparisons and muscularity dissatisfaction, and moderately with body fat dissatisfaction. The magnitudes of these relations suggest the constructs’ distinctiveness; thus, future research may benefit from investigating persons’ attitudes towards leanness, body fat, and muscularity. Negative correlations between socially desirable responding and the modified DLS suggest that participants seeking social approval were more likely to deny wanting lean muscles, possibly due to the perceived taboo nature of male body image (Pope, Philips, & Olivardia, 2000). It should be noted, however, that treating social desirability bias as a covariate had minimal effects on the tests of validity.

3. The SRMR is preferred to the RMSEA, which tends to be higher among scales with few items (Kenny & McCoach, 2003) and, therefore, sometimes rejects true models (Iacobucci, 2010).
Table 2

Percentages of participants that selected each response option on the modified Drive for Leanness Scale.

<table>
<thead>
<tr>
<th>Modified DLS Item</th>
<th>Never</th>
<th>Rarely</th>
<th>Sometimes</th>
<th>Often</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. I think the best looking bodies are well-toned.</td>
<td>3.1% (2.1%)</td>
<td>3.8% (3.5%)</td>
<td>19.5% (25.5%)</td>
<td>41.6% (41.8%)</td>
<td>32.1% (27.0%)</td>
</tr>
<tr>
<td>2. When a person's body is hard and firm, it says he or she is well-disciplined.</td>
<td>6.5% (7.1%)</td>
<td>7.6% (12.4%)</td>
<td>34.4% (40.8%)</td>
<td>39.3% (30.5%)</td>
<td>12.2% (9.2%)</td>
</tr>
<tr>
<td>3. My goal is to have well-toned muscles.</td>
<td>8.0% (6.0%)</td>
<td>11.8% (17.7%)</td>
<td>27.9% (27.3%)</td>
<td>32.1% (27.3%)</td>
<td>20.2% (21.6%)</td>
</tr>
<tr>
<td>4. Athletic looking people are the most attractive people.</td>
<td>1.5% (2.5%)</td>
<td>7.3% (6.7%)</td>
<td>36.6% (39.4%)</td>
<td>42.4% (38.3%)</td>
<td>12.2% (13.1%)</td>
</tr>
<tr>
<td>5. It is important to have well-defined abs.</td>
<td>11.8% (13.1%)</td>
<td>22.9% (21.3%)</td>
<td>34.7% (40.1%)</td>
<td>21.4% (18.9%)</td>
<td>9.2% (6.7%)</td>
</tr>
<tr>
<td>6. People with well-toned muscles look good in clothes.</td>
<td>1.9% (2.1%)</td>
<td>2.7% (3.2%)</td>
<td>33.2% (39.4%)</td>
<td>46.2% (39.6%)</td>
<td>16.0% (16.0%)</td>
</tr>
</tbody>
</table>

Modified DLS = modified version of the Drive for Leanness Scale (Smolak & Murnen, 2008); percentages for data set A are without brackets; percentages for data set B are within brackets.

The current investigation advances the work of Smolak and Murnen (2008) by psychometrically evaluating the modified DLS in a different cultural group (namely, Irish men). The demographic profile of our participants also is advantageous because, contrary to many studies, the majority of participants were from the community (e.g., employed men) and in their late twenties. Inspection of endorsement rates for the six items comprising the modified DLS (see Table 3) corroborates previous research suggesting the saliency of body image to Irish men (McDonagh et al., 2008; Ryan & Morrison, 2009). For example, in both data sets, few men denied thinking that “the best bodies are well-toned” and slightly more than 50% “often” or “always” thought that athletic people are the most attractive.

Given its promising psychometric properties, the modified DLS may be used to investigate whether men wishing to attain lean muscularity are at greater risk of developing an eating disorder (Yelland & Tiggemann, 2003). Eating attitudes and behaviors associated with anorexia and bulimia nervosa have positively correlated with the drive for muscularity (Duggan & McCreary, 2004; McCreary & Sasse, 2000). However, the latter variable omits a focus on leanness and is conceptually distinct from the modified DLS (Smolak & Murnen, 2008). Future research should compare the abilities of the drives for muscularity and leanness to account for variance in eating disorder symptomatology.

Researchers also should examine the relations between the modified DLS and symptoms of muscle dysmorphia, such as the consumption of performance enhancing drugs aimed at reducing body fat and increasing muscle mass (Morgan, 2008). As muscle dysmorphia is characterized by a pathological preoccupation with being insufficiently lean and muscular (Olivardia, 2007), the drive for leanness is a possible etiological factor. Although researchers have documented men’s drive for thinness and drive for muscularity predict variance in dimensions of muscle dysmorphia (Kelley, Neufeld, & Mushers-Eizenman, 2010), to date, the drive for leanness has yet to be investigated.

While the current findings improve understanding of the modified DLS’s psychometric properties, caveats should be noted. Online surveys possess certain advantages (Eysenbach & Wyatt, 2002); however, the generalizability of findings is unclear given self-selection biases (Eysenbach & Wyatt, 2002). Also, the current sample is not representative of Irish men (e.g., few elderly men participated). Future psychometric work on the modified DLS may benefit by employing representative samples of men and women from different cultural contexts, and conducting multifarious tests of validity (e.g., predictive and discriminant).

5. Conclusion

In conclusion, although further psychometric work is warranted, the current research supports the scale score reliability and validity of the modified DLS. To date, researchers have focused mainly on men’s wish to get bigger muscles and women’s desire to become thinner (Smolak & Murnen, 2008). Such a narrow emphasis elides the fact that both groups idealize lean muscle tone (Smolak & Murnen, 2008). Given its appropriateness for men and women, the modified DLS may be used to investigate gender differences in the drive for leanness and investigate whether this drive differentially relates to other variables of interest, such as symptoms of eating disorders.

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Contributors

Drs. Travis A. Ryan and Todd G. Morrison designed the study and wrote the protocol. Dr. Ryan conducted literature searches and provided summaries of previous research studies. Dr. Ryan conducted the statistical analysis, and wrote the first draft of the manuscript. Both authors contributed to and have approved the final manuscript.

Conflict of interest

Drs. Travis A. Ryan and Todd G. Morrison declare that they have no conflicts of interest.

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