

# Drive for Muscularity and Beliefs about Legal Performance Enhancing Substances as Predictors of Current Use and Willingness to Use

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## Abstract

Using a sample of college-aged male athletes ( $n = 56$ ) and nonathletes ( $n = 43$ ), negative and positive beliefs were tested as mediators of the relationship between Drive for Muscularity (DM) and use of performance enhancing substances (PES). Results showed that the Muscularity Behavior (MB) and Muscularity-oriented Body Image (MBI) subscales of the DM scale differentially predicted PES use. Results also showed that negative and positive beliefs are mediators MB–PES use relationship. Neither the MB nor MBI subscales predicted willingness to use a new performance enhancing drug.

## Keywords

- *attitudes*
- *beliefs*
- *performance enhancing substances*

LEGAL performance enhancing substances (PES) are substances that claim to improve one's athletic performance or physical appearance by increasing muscle mass. Legal PES are sold as dietary supplements and are available over-the-counter. Males are more likely to use these substances than females, with estimates of use ranging from 5 percent to 17 percent among males and 0.2 percent to 10 percent among females (Dodge & Jaccard, 2006, 2007; Field et al., 2005). In recent years, some legal PES have been pulled from the market or placed on the controlled substances list due to the adverse health outcomes associated with their use (e.g. Ephedrine and Androstenedione). Thus, males who choose to use legal PES to improve their athletic performance or physical appearance may be using substances that compromise their physical health.

Despite the significant percentage of males using potentially dangerous PES, very little is known about factors that affect decisions to use these substances. One factor likely to affect males' decisions to use legal PES is body dissatisfaction or body image concerns. Surprisingly, very little research has focused on understanding the psychological processes through which male body image concerns affect decisions to use legal PES.

### *Male body image and use of legal PES*

Considerable research exists on body image concerns among females and shows that in general, females are dissatisfied with their bodies and wish to be thinner (Strahan, Wilson, Cressman, & Buote, 2006). Body dissatisfaction among females has been linked to a wide range of negative physical and psychological outcomes (Neumark-Stzainer, Paxton, Hannan, Haines, & Story, 2006; Rierdan, Koff, & Stubbs, 1987). Exposure to media messages stressing the thin ideal are believed to be partially responsible for body dissatisfaction and its associated outcomes (Bessenoff, 2006; Tiggemann, 2006).

While societal standards for the female ideal tend to be thinness, for males the ideal is lean and muscular (Pope, Olivardia, Gruber, & Borowiecki, 1999). Over the past three decades, males have been exposed to ideal body types that are nearly impossible to achieve without using chemical agents (Pope, Phillips, & Olivardia, 2002). Given that exposure to ideals is associated with negative health outcomes among females, concerns have been raised about the effects such ideals have on males (Field et al., 2005; Pope et al., 2002).

One outcome that may be linked to the desire to be more muscular is use of legal PES. For example, studies have reported that exposure to muscle magazines, the desire to gain weight, and thoughts about more defined muscles are all associated with use of legal PES among males (Field et al., 2005). Thus, the desire to be more muscular appears to be relevant for understanding the use of PES among males.

*Drive for muscularity* Drive for Muscularity (DM) is a specific type of body dissatisfaction experienced by males whereby they feel that their bodies are not muscular enough (McCreary & Sasse, 2000). Males with high DM have the desire to achieve a muscular mesomorphic physique (McCreary & Sasse, 2000). Given the muscle building potential of legal PES, these substances should be particularly attractive to males who are high in DM. Several studies have shown that athletes, a group that may be higher in DM, are more likely to report using PES than nonathletes (Dodge & Jaccard, 2006; Field et al., 2005). The present study will test whether DM is related to current legal PES use and willingness to try a new performance enhancing drug independent of athlete status.

*Drive for Muscularity subscales* The DM scale is comprised of two subscales: a Muscularity-oriented Body Image (MBI) subscale and a Muscularity Behavior (MB) subscale (McCreary & Sasse, 2000). The MBI reflects one's attitude toward the desire to gain muscle mass. The MB reflects the extent to which one engages in behaviors to bring about more muscle. Most studies on the psychometric properties of the DM scale tend to examine the full scale, but when used with male samples the authors of the scale have suggested the two subscales may be examined separately (McCreary, Sasse, Saucier, & Dorsch, 2004). The subscales are positively correlated but not highly so (McCreary et al., 2004) suggesting the subscales may differentially relate to outcomes. Therefore, one objective of the present study is to examine whether the attitude and behavior subscales relate independently to current PES use and willingness to try a new performance enhancing drug.

*Beliefs about PES* Although several studies have suggested that DM will be related to PES use (McCreary & Sasse, 2000; McCreary et al., 2004) none have proposed psychological processes that would account for such a relationship. One viable

set of mediators for the DM–legal PES use relationship are beliefs about legal PES. The rationale for beliefs as a mediator of the DM–legal PES use relationship is described below.

Individuals with stronger DM may hold more positive beliefs and fewer negative beliefs about the use of PES. For example, a male with a strong desire to add muscle to his body may believe more strongly in the benefits of using PES than a male with less desire to gain muscle. These positive beliefs may in turn, increase the likelihood he will use a legal PES. Similarly, a male with a strong desire to gain muscle may be less likely to believe in the negative effects of PES or may be less likely to pursue information about the negative outcomes associated with use. Research has shown that adolescent boys who desire to gain weight report less certainty about the side-effects of using PES than boys who do not wish to gain weight (Wang, Yesalis, Fitzhugh, Buckley, & Smicklas-Wright, 1994). Thus, a male with strong DM may perceive fewer risks associated with the use of PES than a male with low DM. These low negative beliefs in turn, lead to a greater likelihood he will use PES. Another objective of the present study is to identify whether positive and negative beliefs mediate the relationship between DM and current PES use.

In sum, there are three objectives of the present study. One objective is to examine the degree of independence between the MBI and MB subscales of the DM scale. Another objective is to examine whether these subscales predict current use of legal PES and willingness to try a new performance enhancing drug independent of sports participation. A final objective is to examine whether positive and negative beliefs mediate the relationship between DM subscales and current use of legal PES.

## Method

### Procedure

Ninety-nine males participated in the present study, 56 of whom were on a NCAA Division I sports team. Approximately 30 percent of the sample were freshmen, 35 percent sophomores, 10 percent juniors, and 25 percent seniors. Ninety-seven percent of the sample was non-Hispanic. Eighty-seven percent reported their race as Caucasian, three percent African American, five percent Asian, and five percent reported other.

Nonathletes were recruited from advertisements posted around campus and from introductory

psychology classes. Approximately half of the participants were paid for participation and the others received credit toward fulfilling a course requirement. Athletes were recruited by contacting coaches or team captains via email. Athletes were from baseball, soccer, cross country, squash, tennis, lacrosse, and rowing teams. The largest number of athletes were from baseball ( $n = 29$ ) and soccer ( $n = 11$ ). To minimize selection bias, study descriptions did not mention PES. The study was approved by the University's Institutional Review Board.

## Measures

### Drive for Muscularity

Drive for Muscularity was assessed using the Drive for Muscularity Scale (McCreary & Sasse, 2000). The DMS consists of an attitude (MBI) and behavior (MB) subscale. Each subscale contains seven items with adequate internal consistency in the present sample ( $\alpha = .86$  and  $.83$  respectively). Sample items for the MBI and MB subscales include: 'I wish that I were more muscular' and 'I lift weights to build up muscle' respectively. Participants responded on a scale from 1 (*always*) to 6 (*never*). Items were reverse scored so that higher numbers indicate higher MBI and MB scores.

**Belief scales** Modal salient beliefs from an open-ended elicitation task were identified and used to create the belief items for the present study. The elicitation task was completed by nearly 200 NCAA Division I athletes. Participants were asked 'What do you think are the advantages [disadvantages] if within the next six weeks you decided to use a legal performance enhancing substance to increase your athletic performance?' Advantages and disadvantages were listed on separate pages. Two trained raters coded the beliefs (inter-rater agreement of .97). The modal salient beliefs used in the present study appear in the Appendix.

The modal salient beliefs from the open-ended elicitation task were used to construct the belief scale. The stem of the question read 'Using legal performance enhancing substances would ...' Participants responded on a scale from 1 (*extremely likely*) to 7 (*extremely unlikely*). Items were reverse scored such that higher numbers indicated greater endorsement of beliefs. Both positive and negative belief scales had adequate internal consistency ( $\alpha = .81$  and  $.83$ , respectively).

**Willingness to use a new performance enhancing drug** Participants read the following scenario: 'A new drug has been developed and it

is claimed that it increases a person's physical capacities (e.g. strength, muscle mass, power, or endurance) significantly. Because this drug is so new the side-effects, if any, of the drug are not known.' Participants were asked 'How willing would you be to try this drug?' Responses ranged from 0 (*definitely would not try it*) to 10 (*definitely would try it*).

**Use of PES** Two items assessed PES use. One item was designed to characterize participants' history of use and asked participants if they had ever tried a PES to help improve their athletic performance or physical appearance. A second item, designed to assess current use asked if participants were currently using a PES to help improve their athletic performance or physical appearance. Responses were scored 1 (*yes*) and 0 (*no*).

**Athlete status** Participants reported whether or not they were a member of an intercollegiate athletic team. Responses were scored so that 1 (*yes*) and 0 (*no*).

**Demographics** Participants self-reported ethnicity, race, and year in school.

## Results

### Descriptive statistics

Approximately 37 percent of the sample reported having used a PES at some point in their life and about 19 percent of the sample reported current use of a legal PES. About 18 percent of athletes and 21 percent of nonathletes reported current use of legal PES. The difference in these percentages is not statistically significant ( $\chi^2 = 0.15, p > .05$ ) suggesting athlete status is unrelated to current PES use. Athletes reported higher MB scores ( $M = 2.94, SD = 1.05$ ) and greater willingness to try the drug ( $M = 3.3, SD = 3.3$ ) than nonathletes ( $M = 2.25, SD = 1.20; M = 1.0, SD = 1.6$ ) and these differences were statistically significant ( $t(96) = 3.06, p < .01; t(81.4)$  equal variances not assumed = 4.52,  $p < .01$ , respectively).

### Drive for Muscularity subscales

The Pearson correlation between MB and MBI ( $r = .39, p < .01$ ) is not particularly strong, suggesting a fair degree of independence between the subscales. Pearson correlations between MB and current use of PES, willingness to use drug, and athlete status

( $r = .58, .40, .39, p < .01$ , respectively) are unique from the pattern that emerges between MBI and these same variables ( $r = .16, .13, .07, p > .10$ ), providing additional support for the independence of the two subscales.

### Current use of legal PES

A logistic regression analysis was used to test whether MBI and MB subscales predicted odds of current PES use where current PES use was regressed onto the MB and MBI subscales. Results of the analysis show that MB is a statistically significant predictor of legal PES use such that for every one-unit increase in MB the odds of using a supplement are predicted to increase by a multiplicative factor of 4.69 ( $Exp \beta = 4.69, 95\% CI = 2.36$  to 9.31). The MBI subscale is not a statically significant predictor of legal PES use ( $Exp \beta = 0.87, 95\% CI = 0.47$  to 1.61) and is no longer pursued as a predictor variable.

### Tests of mediation

Mediation was tested using the joint significance test as recommended by MacKinnon and colleagues (Fritz & MacKinnon, 2007; MacKinnon, Lockwood, Hoffman, West & Sheets, 2002). According to the joint significance test, support for mediation requires that: (a) the relationship between beliefs and the legal PES use be statistically significant; and (b) the relationship between the MB and beliefs be statistically significant.

**Negative beliefs** To test whether negative beliefs mediate the relationship between MB and legal PES use, two regression analyses were conducted. A logistic regression analysis was run regressing current PES use onto negative beliefs. Results of the analysis show that negative beliefs are a significant predictor of current PES use such that for every one-unit increase in negative beliefs the odds that an individual will use legal PES are predicted to decrease by a multiplicative factor of .30 ( $Exp \beta = 0.30, 95\% CI = 0.16$  to 0.54). To test whether MB predicts negative beliefs, a linear regression analysis was run regressing negative beliefs onto MB. Results of the analysis show that MB is a significant predictor of negative beliefs such that for every one-unit increase in MB negative beliefs are predicted to decrease by about one-half a scale unit ( $b = -0.53, 95\% CI = -0.77$  to 0.30). Because both the negative belief-PES use relationship and MB-negative belief relationships were

statistically significant, we can conclude mediation is present based on the joint significance test.

**Positive beliefs** To test whether positive beliefs mediate the relationship between MB and legal PES use, two regression analyses were conducted. A logistic regression analysis was run regressing current PES use onto positive beliefs. Results of the analysis show that positive beliefs are a statistically significant predictor of current PES use such that for every one-unit increase in positive beliefs the odds that an individual will use a legal PES are predicted to increase by a multiplicative factor of 1.67 ( $Exp \beta = 1.67$ , 95% CI = 1.01 to 2.77). To test whether MB predicted positive beliefs, a linear regression analysis was run regressing positive beliefs onto MB. Results of the analysis show that MB is a statistically significant predictor of positive beliefs such that for every one-unit increase in MB positive beliefs are predicted to increase by about one-fourth of a scale unit ( $b = 0.29$ , 95% CI = 0.73 to 0.51). Because both the positive belief–PES use relationship and MB–positive belief relationships were statistically significant, we can conclude mediation is present based on the joint significance test.

### **Willingness to use performance enhancing drug**

To test the third study objective, willingness to use the new drug was regressed onto athlete status, current use of legal PES, and MB. Results show a statistically significant effect of athlete status ( $b = 2.23$ , 95% CI = 1.12 to 3.32) and current PES use ( $b = 1.65$ , 95% CI = 0.29 to 3.56) on willingness to try the drug (adjusted  $R^2 = 0.27$ ,  $p < .01$ ). The MB subscale was unrelated to willingness ( $b = 0.37$ , 95% CI = -0.21 to 0.95).

## **Discussion**

This is one of the first studies to examine the effect of the DM subscales on current use of PES. Results showed that MB was a statistically significant predictor of use but MBI was not. Although it may seem obvious that the behavioral subscale would predict behavioral outcomes, this finding is important for researchers who use the DM scale, especially when considered with the result that the MBI subscale did not predict behaviors. Researchers using the full DM scale should be aware that the behavioral subscale may be responsible for most of the explained variance, not the attitude subscale.

Results of the present study suggest that negative beliefs and positive beliefs mediate the relationship between the MB subscale and current PES use. It appears that males who engage in behaviors aimed at increasing muscle have higher positive beliefs and lower negative beliefs about PES than males who do not engage in such behaviors. These beliefs in turn, are associated with an increased likelihood of using PES. Future studies should examine the effect of positive and negative beliefs on decisions to use these substances using longitudinal and experimental designs to assist in providing information about potential causal pathways between beliefs and PES use.

Current use of PES was associated with an increased willingness to use a new and potentially dangerous performance enhancing drug. This adds to existing literature that has suggested use of legal PES may be a risk factor or gateway for use of more dangerous, illegal PES (Dodge & Jaccard, 2006).

In the present study, athlete status was unrelated to current PES use. Most studies that have documented such differences rely on samples of high school aged adolescents (Bell, Dorsch, McCreary, & Hovey, 2004; Field et al., 2005). It may be that high school athletes have easier access to PES than nonathletes. As males enter college these differences in access no longer exist. Another possibility is that the athlete–nonathlete differences documented in past research are driven primarily by sports that were not included in our study (e.g. football).

Although we feel this study makes important contributions to the literature on male body image and PES use, several limitations deserve mentioning. A growing body of research suggests that the body image concerns of homosexual males differ from the dissatisfaction of heterosexual males (Harvey & Robinson, 2003; Tiggemann, Martins, & Kirkbride, 2007). Sexual orientation was not assessed in the present study so the extent to which relationships presented here vary as a function of sexual orientation could not be tested. The sample was racially and ethnically homogeneous making it difficult generalize to non-White populations. Participants may have under-reported or over-reported PES use, which would bias parameter estimates. Despite these limitations, we feel the study makes important contributions to the literature on PES use and provides avenues for future research.

## Appendix

### Belief scales

#### Positive beliefs

1. Make me bigger.
2. Make me faster.
3. Give me more energy.
4. Improve my endurance.
5. Make me stronger.
6. Help me train better.
7. Help me perform better.

#### Negative beliefs

1. Cause heart problems.
2. Be a waste of money.
3. Cause long term side-effects.
4. Make it hard to know my true level of ability.
5. Cause long term negative side-effects.
6. Cause me to become addicted or dependent.
7. Make me feel like I was doing something wrong.

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