Eating Disorders & Disordered Eating Among Male Athletes: Unique Risk Factors, Presentation, and Interventions

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- Brillon Joseph

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Introduction

The American Psychological Association defines eating disorders as "any disorder characterized primarily by a pathological disturbance of attitudes and behaviors related to food, including anorexia nervosa, bulimia nervosa, and binge-eating disorder" (American Psychological Association, 2015). One common belief or conception is that eating disorders mainly impact females and that males are not particularly vulnerable to developing eating disorders or disordered eating habits. However, as the emerging data indicate, this is far from the truth.

Research demonstrates that eating disorders are growing in prevalence among males in general. Males reportedly account for at least ten percent of all eating disorder diagnoses with even that number believed to be an underestimate and prevalence rates being approximated as high as 33% in the United Kingdom (Murray et al., 2017). It is important to highlight the fact that research on eating disorders has been done primarily with female samples due to the belief that these were female-targeted disorders. Therefore, the possibility exists that the observed increase in prevalence is simply because research on eating disorders is now more inclusive of a demographic that was largely excluded in the past. Gorrel and Murray (2019) capture this well when they state, "Historically, EDs are among the most gendered of psychiatric illnesses, and it was not until nearly a century after anorexia nervosa (AN) was first clinically described that the notion of male ED presentation was broached in the extant literature" (p. 641). In addition to this change in the demographic makeup of samples used in relevant research, other important factors

may serve to elucidate exactly why males were excluded from discussions about eating disorders.

One such factor has to do with how eating disorders tend to be presented among males and how that is usually perceived by loved ones as well as healthcare professionals. While there are several similarities across genders, eating disorder presentation among males is not entirely identical to eating disorder presentation among females. Murray et al. (2017) explain in detail how male eating disorder presentations differ from female eating disorder presentations (pp. 2-4). The problematic behaviors and habits that characterize eating disorders sometimes resemble behaviors that individuals perceive as acceptable behaviors and habits that are characteristic of males who are seeking to achieve certain fitness goals or better overall health. Therefore, these behaviors are not always seen as problematic or distressing even though they are. This, coupled with the fact that men have been socialized to withhold their emotions and suffer through their struggles in silence results in men remaining undiagnosed. Considering that this is a problem among the general male population, it is no surprise that there is also a concern about the underdiagnosis of a certain demographic of men that may be particularly vulnerable to the development of eating disorders: male athletes.

Just as disordered eating habits and behaviors may be regarded as a pursuit toward better health and fitness among the general male population, these habits in the context of male athletes may be perceived as being an innate part of the activity that these athletes partake in. Additionally, such behaviors and habits may be deemed as being important for the sake of performance or success and may be overlooked, which places this demographic of men at an even greater risk of not just being underdiagnosed but also being directly or indirectly

encouraged to pursue these behaviors for the sake of success and performance, and this is reflected in recent data.

Studies have shown that there is an increasing prevalence of eating disorders and associated behaviors and habits among male athletes. In a study of about 124 male athletes as subjects, it was found that 18.5% of the population presented a clinical profile that was compatible with being diagnosed with an eating disorder (Baldo Vela et al., 2021). What this finding highlights is that approximately 22 of the 124 male athletes that were looked at did not have an eating disorder diagnosis despite meeting the criteria of a clinical diagnosis for an eating disorder. Additionally, one previous literature review on eating disorders highlighted the reality that, among male elite athletes, eating disorder prevalence rates of up to 32.5% were found (Karrer et al., 2020). These rates are notably higher than the prevalence rates of the general population, and the general male population which stands at approximately 10% (Murray et al., 2017). Therefore, such rates of prevalence among male athletes demonstrate that there is a justified need to explore eating disorders among this specific demographic, as there are gaps in our knowledge and understanding of some key components of eating disorders among this population.

With that being said, this literature review will focus on three main areas: the unique risk factors impacting athletes in comparison to the general population, differences in the presentation of eating disorders between male athletes and other individuals, and treatment options and their effectiveness.

What are the unique risk factors for athletes in comparison to the general population?

Another thing that makes athletes, in general, more vulnerable to developing eating disorders in comparison to non-athletes are the risk factors that are unique to this demographic.

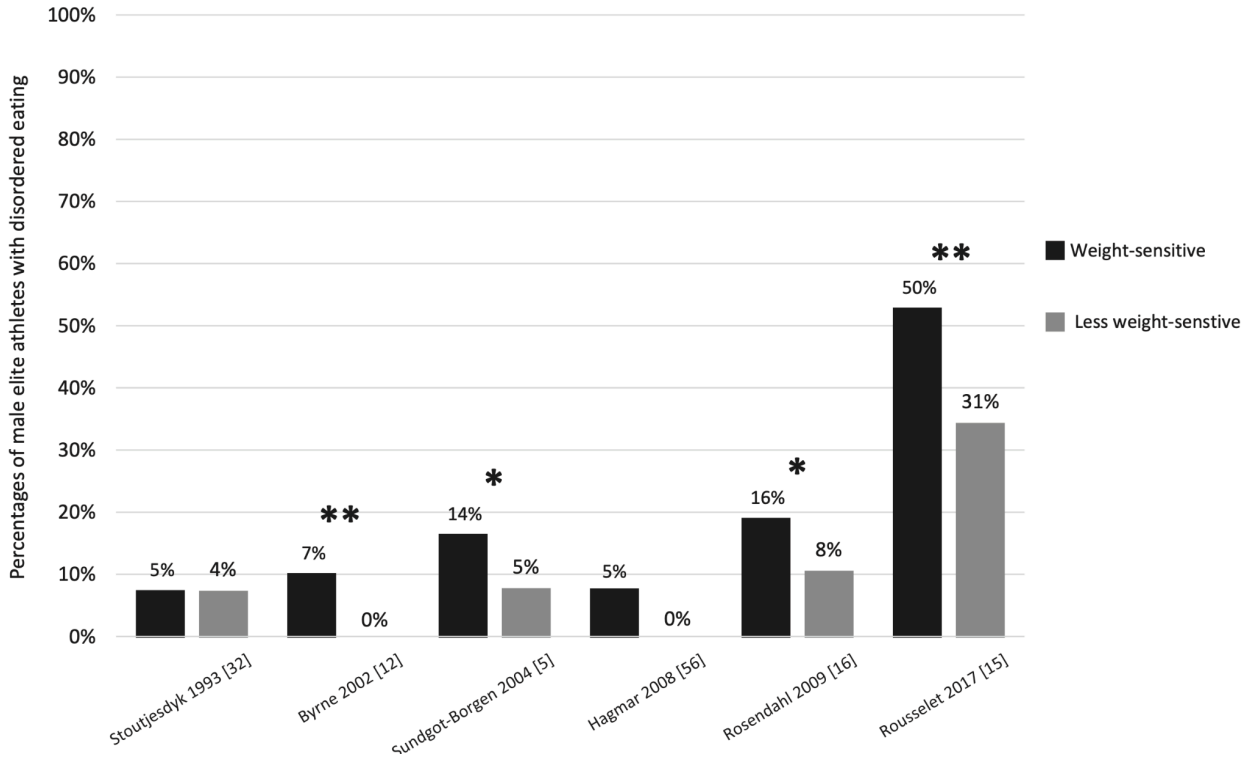
These risk factors tend to be related to certain things that individuals who are not athletes may not necessarily have to deal with in their daily lives for the most part. For athletes, on the other hand, these are things that they may struggle with regularly, especially if their athletic involvement constitutes a major aspect of their lives.

Sport Type

The type of sport that athletes participate in is one factor that may put them at an increased risk for developing eating disorders. For this review, the sport type has been reduced to two categories: weight-sensitive sports and less weight-sensitive sports. Weight-sensitive sports are those sports that tend to emphasize leanness or a certain type of muscularity ideal to enhance athletes' performance; these also tend to be sports within which there is an emphasis on weight classifications. On the other hand, less weight-sensitive sports are those sports that do not have such an emphasis surrounding the weight of athletes; such sports do not encourage or require the pursuit of any sort of body ideal in attempts to enhance performance. Weight-sensitive sports include sports like wrestling, swimming, dancing, and rowing among others while less weight-sensitive sports include tennis, table tennis, golf, and horseback riding among others.

A review of the literature indicates that male athletes who participate in sports that are classified as weight-sensitive almost always have a greater prevalence of disordered eating in comparison to male athletes who participate in sports that are considered to be less weight-sensitive. For example, Sundgot-Borgen et al. (2004) found that approximately 14 percent of male athletes who presented with disordered eating behaviors participated in sports classified as weight-sensitive compared to only 5% of male athletes who participated in less weight-sensitive sports (p. 28). Furthermore, more recently, Rousselet et al. (2017) found that approximately 50% of male athletes who presented with disordered eating habits and behaviors

were engaged in leanness-related sports in comparison to approximately 31% of male athletes presenting disordered eating behaviors and habits that were engaged in non-leanness-related sports (p. 66). Karrer et al. (2020) summarize these data and others quite clearly using a bar graph depicting the discrepancy in the prevalence of disordered eating between individuals in the two sport types.



These data suggest that involvement in sports where a certain body type is required or encouraged may lead to these athletes engaging in certain habits or behaviors to achieve these ideals because they are being led to believe that it is a necessary endeavor for the sake of performance.

Coaching Style

Secondly, coaching style is another factor that may place athletes at a greater risk of developing eating disorders. The way that a coach approaches the guidance of their athletes can

greatly impact the perception that these individuals have of themselves and their bodies. Specifically, the way that coaches choose to discuss a sensitive topic, such as weight, may have great implications for athletes. Biesecker et al. (1999) found that coaches tend to discuss the topic of weight in either one of two ways: in a performance-centered manner or a person-centered manner.

As the name suggests, a performance-centered approach to weight is an approach in which the coach discusses weight, particularly changes in weight (especially weight gain), in a manner that is primarily focused on the impact that an individual's weight has on how well they perform at their sport and does so in a manner that the athletes might perceive as threatening. On the other hand, a coach using a person-centered approach to weight discusses the athlete's physical and psychological well-being as the primary concern and pays little, if any, attention to the impact that athletes' weights have on performance or the team by extension. Bieseker et al. (1999) found that when coaches speak about the topic of weight in a performance-centered and threatening manner, the athletes reported more body image anxiety, fear of fat, and greater dieting intentions and scores of depression in comparison to athletes with whom coaches speak about weight in a more caring and person-centered manner. Such findings emphasize just how important it is for coaches to carefully approach such a sensitive topic as weight and to do so in a manner that prioritizes athletes' well-being over performance as it can have severe implications on eating behaviors.

Performance Enhancement

Finally, another risk factor for eating disorders that is unique to athletes is performance enhancement. Performance tends to be an important or even the single most important aspect of an athlete's sports involvement. Therefore, it is understandable that it burdens athletes with

tremendous amounts of pressure to be the best version of themselves in their sport by any possible means. Several scholars state that "the use of certain image and performance-enhancing drugs by professional and amateur athletes is often driven by underlying motivations, mainly performance enhancement and body image improvement" (Piacentino et al., 2017). One widely known category of performance-enhancing drugs is anabolic steroids, which we will dive deeper into in a subsequent section of the literature review.

However, this risk factor calls attention to the pressures that athletes are subjected to that differ from the pressures that individuals who are not athletes experience. Physical performance demands a lot from athletes and sometimes they experience great anxiety at the possibility of failing to meet these demands and the potential repercussions, especially if they are professional athletes for whom the stakes may be higher and the consequences may be more impactful to their financial circumstances and public image. Therefore, these individuals feel the need to pursue certain avenues, including the use of performance-enhancing drugs, weight control, and beyond, to ease their fears and anxieties and ensure a certain level of performance, and these behaviors and practices manifest quite differently within this demographic in comparison to others.

How does the presentation of eating disorders differ between male athletes and other individuals?

While there are several similarities in eating disorder presentation between males and females, eating disorder presentation among males is not entirely identical to eating disorder presentation among females. Therefore, male athletes may also present differently in comparison to other demographics. The underlying motivation toward disordered eating and eating disorders and its associated practices tend to explain the differences between male athletes and other individuals.

Muscularity Ideal vs. Thinness Ideal

The type of ideal that male athletes usually pursue differs from the ideal that other demographics, particularly females, pursue. Male athletes tend to want to achieve a muscularity ideal while other demographics pursue a thinness ideal. What this means is that male athletes strive to achieve a certain muscular physique that results in certain behaviors and practices that may be unique to the pursuit of such a body ideal; these tend to differ from the behaviors and practices that are involved when trying to achieve thinner body types. Perelman et al. (2022) captured this well when they stated:

> Athletes are likely to consider a body type "ideal" both in terms of performance and appearance. Body ideals differ between sports; the male gymnast ideal (e.g., small, low body fat) differs drastically from that of an offensive lineman in football (e.g., large, mix of muscle and body fat). Athletes who experience BD and strive for sport-specific body ideals may restrict caloric intake, leading to low energy availability. (p. 194)

Perelman et al. (2022) explain that athletes consider several factors in their pursuit of a certain body ideal, which may include performance and appearance goals. Furthermore, the specific sport that athletes play influences the type of physique that they pursue, which could be based on performance goals as well as expectations of themselves and from peers and coaches as discussed earlier. However, the authors also highlight an important reality, which is that certain male athletes may also pursue the thinness ideal if it is perceived as the ideal physique for their sport; in doing so, the authors demonstrate that it is not just females that pursue a thin physique but males as well and that there are certain male athletes for whom this physique is seen as optimal for performance as opposed to a muscular physique. The most important takeaway, however, is that both ideals can result in disordered eating behaviors and habits.

Muscle Dysmorphia

Grunewald and Blashill (2021) define muscle dysmorphia as involving a "preoccupation with the thought that one is not muscular enough, coupled with a pervasive fear of muscle loss. This preoccupation continues even if one is objectively muscular and may lead to withdrawal from social relationships, excessive exercise, disordered eating, and psychological distress" (p. 104). Muscle dysmorphia is largely prevalent among male athletes and this is related to the prevalence of male athletes that are striving to achieve a muscular ideal due to a belief that it will have positive implications on athletic performance and self-perception or body image.

Research has demonstrated that male athletes tend to score higher than female athletes on measures of muscle dysmorphia, as well as that athletes who have a primary focus on their appearance tend to have higher muscle dysmorphia scores than athletes who have a primary focus on their performance (Skemp et al. 2013). This finding further complicates the discussion by bringing into consideration the priorities of individual athletes and how those priorities will shape their perception of their bodies, highlighting that prioritizing one's performance as opposed to one's body may have some protection against the development of muscle dysmorphia. Beyond the expectations that come from their athletic involvement, males, in general, are also constantly fed examples of physiques in the media that may be unrealistic or very difficult to achieve. In one study that looked at how male students are impacted, in terms of their attitude toward their physical appearance, by media images of muscular men, the researchers found that students who were exposed to muscular images showed a significantly greater discrepancy between their perceived muscularity and the muscularity ideal that they desired (Leit et al., 2001).

Appearance and Performance-Enhancing Drugs

The use of anabolic steroids and other performance and appearance-enhancing drugs is very common among male athletes. Charest et al. (2021), in their literature review, found that collegiate athletes were 263% more likely than their peers to be occasional users of performance-enhancing substances. More specifically, however, other research, that looked at the fitness and dietary practices of a group of male and female bodybuilders, has shown that although both male and female athletes reported using performance-enhancing drugs, males were more likely to use such substances in comparison to females with the prevalence of use being approximately 48% among males and approximately 38% among females (Escalante et al., 2023).

The use of these substances has been reliably linked to a wide range of eating disorders. Piacentino et al. (2017) found that users of performance and image-enhancing drugs (PIEDs) were more likely than nonusers to be impacted by body image disorders or eating disorders independently from age, gender, and nationality, but not sport type or level of training. They further specified that "bodybuilders and competitive athletes were more likely to use PIEDs and to suffer from muscle dysmorphia, other body image disorders, anorexia nervosa, or bulimia nervosa" (Piacentino et al., 2017). Such findings bring attention to a pivotal fact, which is that there is an unquestionable link between the use of these substances and disordered eating and that certain demographics, such as athletes, may be more likely to not only use PIEDs but to suffer from eating disorders and muscle dysmorphia.

Bulk & Cut Cycles

Lavender et al. (2017) refer to the practice of bulking and cutting as "the periodic oscillation in dietary practices towards either muscular density or muscular leanness-related goals, respectively." This is a practice that is commonly used among male athletes and may be

more popular within certain sports in comparison to others, such as wrestling and bodybuilding. Malcolm (2023) also found that individuals with muscle dysmorphia may also make use of bulk and cut diets, which demonstrates the intertwined nature of these different ways that eating disorders tend to be presented in male athletes. The close relation between these symptoms and practices is understandable as they are usually driven by the same underlying desire for a muscular ideal. Understanding the presentation of eating disorders and disordered eating among male athletes is pivotal as it highlights the need for effective interventions to treat this demographic.

What are the available interventions and how effective are they?

As has been established, certain unique risk factors for eating disorders among male athletes exist and the presentation of eating disorders among male athletes can differ from the presentation of eating disorders among other demographics. Therefore, the existing interventions that are typically used within other demographics may not necessarily be as effective among male athletes as they have been with other demographics.

One example of an existing method of intervention that has been widely used among other demographics with varying levels of effectiveness is the Body Project. An explanation of the Body Project as provided by its creators is as follows:

> Body Project participants receive four one-hour group sessions that provide them with social support, opportunities for self-affirmation, and the skills needed to resist social pressure. The weekly sessions, which accommodate five to ten participants, include verbal, written, and behavioral exercises that attempt to create dissonance in participants by engaging them in a critique of the thin ideal. (Stice et al., 2012)

The Body Project is a body acceptance program that is aimed at helping individuals resist the pressure to pursue thinness, and it has been very effective among female samples in research studies, with very few studies including male participants (Kilpela et al., 2016). Consequently, there need to be interventions that are developed specifically for males and male athletes by extension. However, not many such interventions exist, which represents one current hurdle that male athletes have to deal with, but there are a few interventions that are being tested among members of this demographic, including a couple that draws inspiration from the original Body Project.

The Young Athlete Body Project (Sundgot-Borgen et al., 2024)

The Young Athlete Body Project is an altered version of the Body Project that was designed specifically for young male and female athletes who were of high school age. This version of the Body Project was updated to include sport-related and age-adapted language and cases due to the demographic with which it was being used. The figure below illustrates some of the results of this intervention.

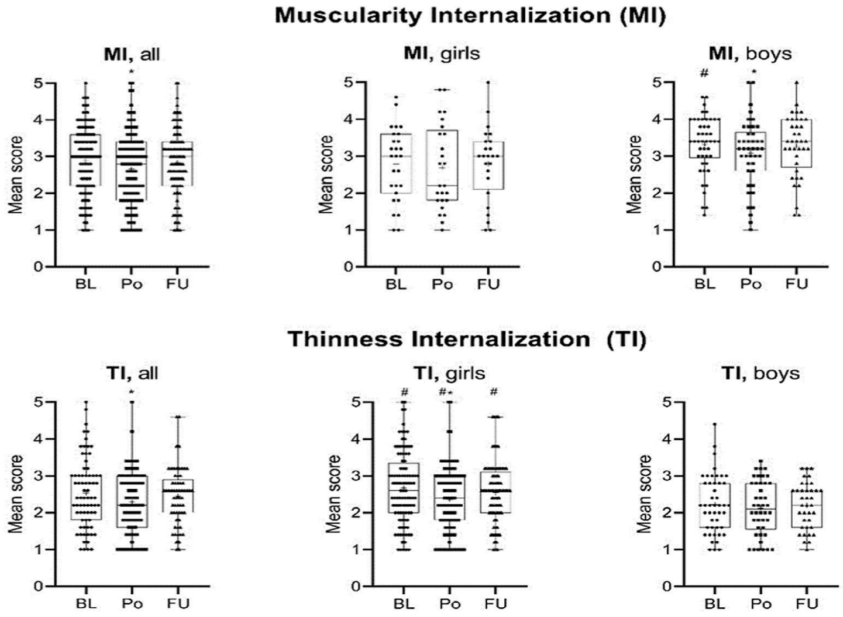


FIGURE 5 Level of body ideal internalization. The panel illustrates mean score at baseline (BL), postintervention (Po), and at 6-month follow-up (FU) on level of internalization of muscularity (top row) and thinness (bottom row) in total group (left hand), and in boys (right side) and girls (middle). + indicates mean score in box-and-whiskers-plot; *significant change from baseline; #significant higher scores than opposite sex.

The top panel of the figure summarizes the scores of the participants on a measure that looked at the internalization of muscularity ideals at baseline, after the intervention, and at a follow-up 6 months later. The box and whiskers plots indicate that when considering all participants (both boys and girls), the researchers observed a significant change in scores between baseline and following the intervention but no such significant change at the 6-month follow-up. When looking at all female participants and no male participants, the researcher observed no significant changes among any of the time points. However, when looking at all male participants and no female participants, the researchers observed a significant change in scores between baseline and following the intervention but no such significant change at the 6-month follow-up. These results indicate that the intervention was effective in reducing the internalization of muscularity ideals among male athletes but not female athletes and that there was only a short-term effect with no long-term indication of continued improvement.

The bottom panel of the figure summarizes the scores of the participants on a measure that looked at the internalization of thinness ideals at baseline, after the intervention, and at a follow-up 6 months later. The box and whiskers plots indicate that when considering all participants (both boys and girls), the researchers observed a significant change in scores between baseline and following the intervention but no such significant change at the 6-month follow-up. When looking at all female participants and no male participants, the researchers observed a significant change in scores between baseline and following the intervention but no such significant change at the 6-month follow-up. However, when looking at all male participants and no female participants, the researcher observed no significant changes among any of the time points. These results indicate that the intervention was effective in reducing the internalization of thinness ideals among female athletes but not male athletes and that there was

only a short-term effect with no long-term indication of continued improvement, which is identical to the observed effects for muscularity internalization. Overall, these results suggest that a mixed gender and athlete-targeted version of the body project as an intervention may be effective in the short term among high school-aged individuals.

The Male Athlete Body Project (Perelman et al., 2022)

The Male Athlete Body Project is an altered version of the Female Body Project that was designed specifically for male athletes. The Female Body Project was described as:

> An interactive, small-group, discussion-based, three-session manualized intervention that encourages participants to strive for the athlete-specific healthy ideal (defined as the way one's body appears when one is appropriately striving to simultaneously maximize physical and mental health, quality of life, and athletic performance) instead of an idealized body type. (Stewart et al., 2019)

The figures below illustrate some of the results of the Male Athlete Body Project.

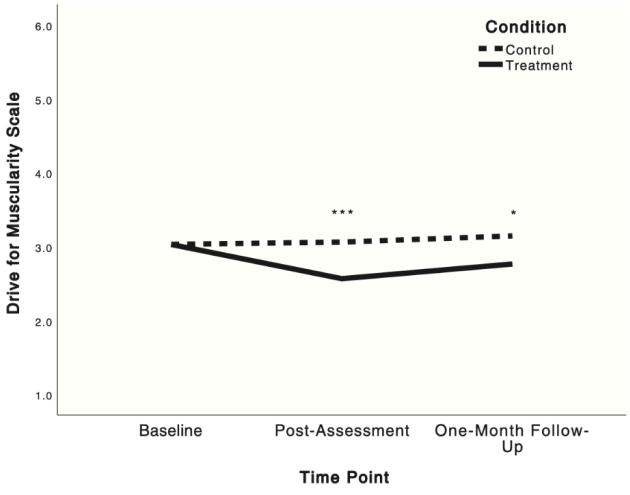


FIGURE 3 Comparing Conditions over Time on Drive for Muscularity Scores. *p < .05, **p < .01, ***p < .001

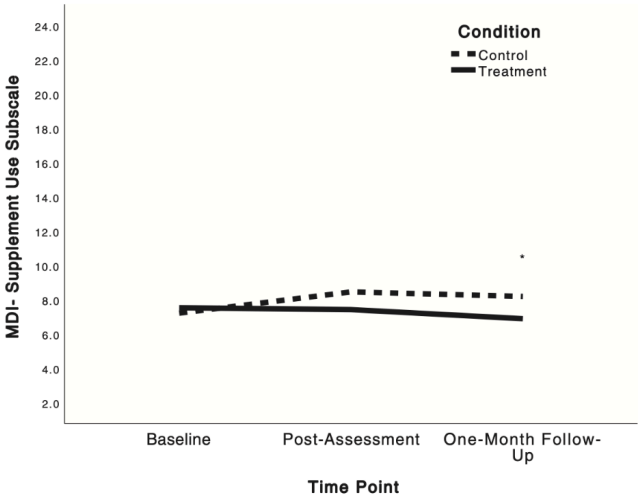


FIGURE 5 Comparing Conditions over Time on Muscle Dysmorphia Inventory: Supplement Use Subscale. *p < .05, **p < .01, ***p < .001

The graph on the left of the figure looks at the differences in changes in the drive for muscularity among participants at three time points: at baseline, after the intervention, and at a follow-up one month later between the control group and the treatment group. The results indicate that, compared to a control group, individuals who received the treatment reported significantly lower drive for muscularity at both post-assessment and at the one-month follow-up. The graph on the right of the figure looks at the differences in changes in the use of supplements among participants at three time points: at baseline, after the intervention, and at a follow-up one month later between the control group and the treatment group. The results indicate that, compared to a control group, individuals who received the treatment reported significantly lower use of supplements but only at the one-month follow-up. There was no significant difference between the two groups during the post-assessment period.

The figure below looks at the differences in changes in the internalization of muscularity ideals at baseline, after the intervention, and at a follow-up one month later between the control group and the treatment group. The results indicate that, compared to a control group, individuals who received the treatment reported significantly lower internalization of muscular ideals but only during the post-assessment period. There was no significant difference between the two groups at the one-month follow-up.

Overall, these results suggest that this intervention has significant short-term improvements in the internalization of muscularity ideals but significant long-term improvements in the use of supplements and a drive for muscularity. Therefore, this is an effective method of intervention for athletes but may be most useful in the pursuit of long-term improvements, which is typically the goal of patient care. It may be helpful to supplement this

intervention with another form of treatment that may help to make improvements in internalization a more long-term effect.

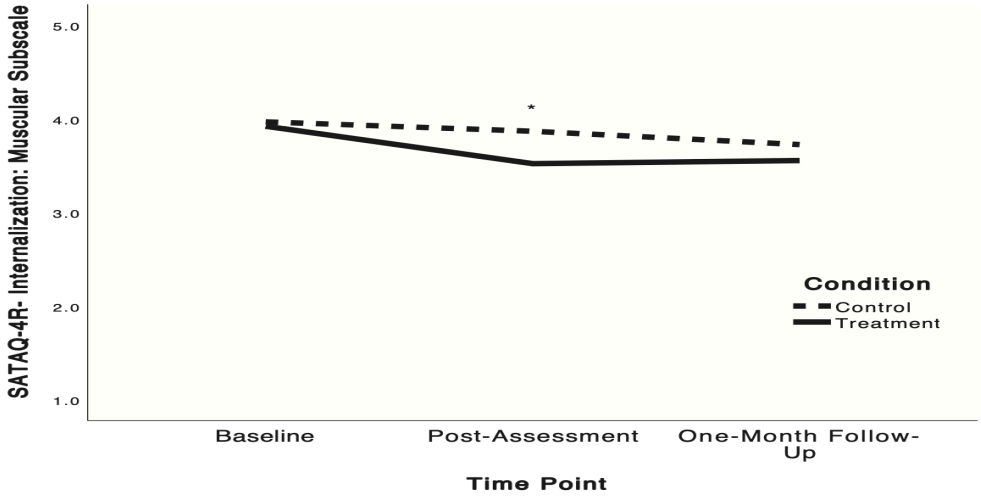


FIGURE 4 Comparing Conditions over Time on Sociocultural Attitudes Towards Appearance Questionnaire-4-Revised, Internalization: Muscular Subscale. *$p < .05$, **$p < .01$, ***$p < .001$

In addition to versions of the Body Project that aim to target the mentality at the foundation of eating disorders and disordered eating habits and behaviors, other interventions exist that target other practices that characterize eating disorders among male athletes and athletes in general. One example of such an intervention is the Adolescents Training and Learning to Avoid Steroids (ATLAS) program, which aims to reduce the use of performance and image-enhancing drugs among these individuals.

The Adolescents Training and Learning to Avoid Steroids (ATLAS) Prevention Program (Goldberg et al., 2000)

The ATLAS program is described by Goldberg et al. (2000) as an intervention program that includes "a discussion of sports nutrition, exercise alternatives to anabolic steroids and sport supplements, and the effects of substance abuse in sports, drug refusal role-playing, and the creation of health promotion messages." The table below summarizes the results of this

intervention among a sample of 3207 male athletes for three consecutive years from 1994 to 1996. The researchers looked at changes in a variety of variables at three time points: before the start of the football season (preseason), at the end of the season, and a follow-up one year later.

Table 1. Program Effects Preseason, End of Season, and at 1-Year Follow-up Analyzed by Subject and School*

		Control Group			Experimental Group			*P*			
			% Change in SD Units†			% Change in SD Units†		Preseason to End of Season		1-Year Follow-up	
Variables	SD‡	Mean Score, Preseason§	End of Season	1-Year Follow-up	Mean Score, Preseason§	End of Season	1-Year Follow-up	School Level	Subject Level	School Level	Subject Level
Intent to use AS	1.15	1.63	11.0	6.5	1.56	7.5	0.4	<.18	<.04	<.07	<.02
Nutrition behaviors	1.13	4.09	−4.5	−5.7	3.94	26.6	11.2	<.001	<.001	<.02	<.02
Use of school instead of private gym	2.49	1.44	13.5	−2.4	1.48	19.2	10.1	<.14	<.02	<.03	<.04
Strength training self-efficacy	1.19	5.81	−13.4	−6.9	5.56	21.6	31.7	<.001	<.001	.002	<.001
Perception of athletic competence	1.00	6.09	−10.7	−8.3	6.12	0.3	−2.9	.10	.003	<.09	<.02
Ability to turn down drug offers	1.41	6.00	−10.6	−7.3	6.02	−1.2	−1.8	.009	.004	<.21	<.03
Belief in media advertisements	1.29	2.89	0.6	−3.2	2.84	−28.4	−30.8	<.001	<.001	.004	<.001
Team as an information source	1.18	5.55	−14.7	−6.4	5.51	15.4	17.9	<.001	<.001	<.02	<.001
Peers as an information source	1.55	4.57	−3.2	4.8	4.56	41.4	38.1	<.001	<.001	<.001	<.001
Knowledge of effects of AS	4.68	10.19	−8.5	5.6	10.72	29.8	30.9	<.001	<.001	<.001	<.001
Knowledge of effects of alcohol	0.80	1.86	3.1	3.5	1.91	19.2	19.0	.004	<.001	.007	<.001
Knowledge of supplements/exercise	1.21	1.79	−8.4	1.6	1.87	61.7	44.3	<.001	<.001	<.001	<.001
Perceived coach tolerance of AS use	1.30	2.22	17.8	12.9	2.24	−3.7	−1.3	<.01	<.001	<.02	<.02
Perceived peer tolerance of drug use	1.89	3.25	5.5	25.6	3.38	−1.0	20.2	<.05	.35	.41	<.44
Normative beliefs about AS use	1.66	2.34	−8.5	−5.8	2.49	−15.5	−16.8	<.09	<.38	<.24	<.34
Self-esteem	1.16	5.94	−18.2	−5.8	5.94	−8.8	0.1	.04	<.02	<.12	<.06
Impulsivity	1.32	2.95	6.5	4.7	3.00	−9.1	−1.0	<.001	<.001	<.13	<.12
Perceived harm of AS use	1.31	5.79	−15.6	−17.6	5.81	6.6	4.6	.001	<.001	.004	<.001
Negative attitudes toward AS users	1.37	4.97	−6.9	−5.0	4.94	2.9	0.6	.02	.007	<.08	<.11
Perceived susceptibility to AS effects	2.14	5.96	−8.4	−7.4	5.98	10.4	7.3	<.001	<.001	<.02	.001
Knowledge of marijuana effects	0.68	2.36	2.5	0.4	2.40	17.2	10.4	.005	<.001	.003	<.01
Concern about what friends think	0.94	2.97	−13.0	−10.1	2.96	−2.9	−18.0	<.02	.003	<.45	<.30
Reasons for using AS	2.18	1.40	−15.6	−12.6	1.48	2.3	11.9	<.001	<.001	.001	.001
Reasons for not using AS	3.68	6.69	0.3	0.7	6.80	16.0	−0.3	.007	<.001	<.50	<.27
Cumulative supplement use (vitamins not included)‖	NA	33.2	38.8	47.3	30.5	35.6	41.4	<.23	<.15	.005	.009
Cumulative lifetime AS use‖	NA	1.5	2.5	3.4	1.0	1.5	1.7	<.12	<.04	.15	<.07
Illicit substance use (alcohol not included)	0.64	0.36	−5.8	14.2	0.37	0.9	2.1	<.04	<.01	.010	<.02
Alcohol and illicit drug use	0.88	1.08	−10.2	8.4	1.10	−3.6	−3.9	<.04	.009	<.02	<.04
Cumulative occurrences of DUI‖	NA	4.6	7.6	12.1	5.0	7.2	10.7	<.09	.13	<.08	.004

*AS indicates anabolic steroids; NS, not significant; DUI, driving under the influence. Pretest and posttest are based on subjects measured at both waves. Follow-up values are based on subjects measured at pretest and follow-up.

†Percent change in pretest SD units, based on the sample of participants at pretest-posttest and pretest follow-up.

‡SD for the pretest-posttest sample, control and experimental groups combined.

§Mean questionnaire item scores.

‖Cumulative lifetime AS use, cumulative supplement use, and cumulative DUI were determined by pretest use and new reported use at posttest and follow-up. All the students who were present at the pretest were dealt with as if they had stayed through posttest, and if the student used AS at an earlier wave, he was considered a user at a later wave. The percentage of cumulative lifetime AS use and DUI at the posttest was calculated based on all 3 cohorts (N=3207), whereas the percentage at the follow-up was based on cohorts 1 and 2 (N=2390).

Several significant findings stemmed from this intervention format. The researchers found that the male athletes who received the intervention treatment reported significantly lower measures of intent to use anabolic steroids at the end of the season ($p < 0.05$) and the follow-up one year later ($p < 0.03$) in comparison to the control group. Furthermore, the researchers found that there were significantly more ($p < 0.04$) new users of anabolic steroids in the control group than in the experimental group. These findings illustrate that the intervention is quite effective in reducing both the intent to make use of anabolic steroids and the use itself among this demographic.

In terms of general knowledge about the effects of exercise and the use of sports supplements, the researchers found that the athletes who received the intervention demonstrated a significant improvement in their knowledge of the effects of exercise and sports supplements both at the season's end and on long-term follow-up ($p < 0.001$). There was also evidence that the athletes who received the intervention reported significantly more confidence in their athletic abilities both at the end of the season ($p = 0.003$) and at the long-term follow-up ($p < 0.02$).

However, as the table indicates, there were also several differences between the experimental group and the control group that were not statistically significant. Importantly, it was observed that there were more new users of anabolic steroids in the control group at the follow-up one year after the intervention but this was not a statistically significant difference.

Overall, these results highlight that the ATLAS intervention program may be an effective form of treatment among male athletes, but specifically among football players as this was the population that comprised the study sample. The intervention is effective in improving several key behaviors that can be classified as indicative of disordered eating habits and behaviors or

that may point to an eating disorder itself: the desire to use or use of anabolic steroids and a lack of confidence in athletic abilities and performance.

Limitations

It is important to be cognizant of the limitations and shortcomings that are present throughout the existing research. Firstly, the sample size of some of the studies that were considered throughout this paper may be of some concern. Having smaller sample sizes can call into question the validity of the results that were found, especially when looking at prevalence rates and gender differences.

Furthermore, the generalizability of the Sundgot-Borgen et al. (2024) study may also be a concern as this was an intervention that targeted primarily high school-aged individuals and utilized a mixed-gender format. It is beneficial to have the information that this study provided us with. However, the format of the intervention may have hindered its efficacy as the mixed-gender setup may have yielded worse results than would have been obtained in a single-gender setup. The generalizability of the Goldberg et al. (2000) study is also a concern as the participants were entirely football players, which makes it difficult to use these findings to make informed decisions among athletes of other sports as the results that were found from that study may be specific to its specific demographic.

Additionally, the racial and ethnic makeup of the samples that were used in several of the studies discussed throughout this review was not necessarily representative of the general population as it was largely White/Caucasian. Therefore, this reduces the generalizability of the studies and findings should not just be assumed to be transferable to individuals that are of ethnicities and races other than the sample majority of these studies.

Future Research

Firstly, future research should aim to address the limitations that were listed above. Researchers should aim to use samples that are more representative of the general population (or the population with which they are mostly concerned) in areas such as ethnicity, race, class, sexual orientation, etc. as these are all factors that may interact with the variables that are being looked at within the studies and could tell so much about the findings. Additionally, it would be interesting if a follow-up to the young athlete body project study was done that explored the effectiveness of single-gender versions of the intervention that they developed. It may be discovered that female-specific and male-specific interventions more effectively treat eating disorders in comparison to mixed-gender ones.

Furthermore, it may be beneficial to explore the effectiveness of the ATLAS intervention among a more diverse sample of male athletes. The study discussed in this manuscript primarily looked at the effectiveness of the intervention among football players, which limits the generalizability of the study's findings. By expanding the research to include athletes from a large selection of sport types, we will be able to get a better picture of the effectiveness of this type of intervention among this demographic.

Conclusion

This literature review focused on three main areas within the literature on eating disorders among male athletes: the unique risk factors that they face in comparison to the general population, differences in the presentation of eating disorders between this demographic and other individuals, and the various available treatment options and their effectiveness. An extensive analysis of the literature revealed several important findings related to these three areas.

Firstly, a thorough exploration of risk factors revealed that factors such as coaching style, the type of sport, and performance enhancement are mainly observed among athletes in addition to other general risk factors that are seen among the general population. Therefore, athletes deal with unique struggles that may increase their vulnerability to developing disordered eating or eating disorders; this may put them at an even greater risk than the general population. Therefore, this increased risk combined with the increasing prevalence of eating disorders among males, in general, is indicative of the significantly higher prevalence of eating disorders among male athletes in comparison to the general population.

Furthermore, the literature highlighted that the presentation of eating disorders in male athletes tends to differ from the presentation in other demographics. Specifically, at greater rates in comparison to the general population, male athletes tend to strive for a muscular ideal, suffer from muscle dysmorphia, and engage in related fitness and nutrition practices such as bulking and cutting and making use of performance and image-enhancing substances. Some of these behaviors tend to be regarded as behaviors that are related to the pursuit of a healthy lifestyle by loved ones and healthcare professionals. Consequently, the nature of the presentation of disordered eating and eating disorders among male athletes has great implications, such as the underdiagnosis of the conditions among this demographic. However, despite the underdiagnosis of the conditions among male athletes, it is still important that there are effective interventions in place to treat those individuals who have been diagnosed.

Fortunately, a review of the existing literature has revealed that several interventions can be used to effectively treat these conditions among male athletes. Although the Body Project has been used primarily among female subjects, alterations of the intervention to make it inclusive of male athletes have yielded promising results with male athletes benefiting greatly from

participation in the program in both mixed-gender and single-gender versions of the intervention. Furthermore, another type of intervention targeting the use of steroids and other concerning behaviors and practices called the Adolescents Training and Learning to Avoid Steroids (ATLAS) has also yielded promising results in terms of improving the way that male athletes think of and approach the use of anabolic steroids and performance-enhancing drugs, reporting that male athletes experienced a reduction in the use of, and a desire to use, these substances.

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