



## Clinical observations

## Boys, Biceps, and Bradycardia: The Hidden Dangers of Muscularity-Oriented Disordered Eating

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## A B S T R A C T

The recognition of eating disorders (EDs) in males represents an ongoing challenge for physicians. This challenge is particularly complex in the case of EDs that are oriented toward muscularity, as opposed to thinness, which current diagnostic criteria do not accommodate. Nevertheless, EDs in males, and muscularity-oriented disordered eating (MODE) in particular, are increasingly prevalent and are likely to be encountered in clinical practice. We report the case of a 16-year-old male who presented with medical instability, requiring hospitalization, in the context of MODE. Importantly, this patient did not meet formal diagnostic criteria for a specific ED, and behavioral symptoms were deemed goal oriented in the context of high school wrestling pursuits. This case highlights the challenges of identifying MODE and the medical risks associated therein. Pediatricians are encouraged to screen for MODE in adolescent males reporting body image concerns.

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## IMPLICATIONS AND CONTRIBUTION

This case report illustrates the unique diagnostic challenges and the concomitant medical complexities surrounding eating disorder presentations oriented toward muscularity.

Eating disorders (EDs) are systematically overlooked in males. Less than 1% of all empirical research relating to EDs, to date, has focused on male presentations [1], and by default, the majority of clinical research informing current medical management guidelines, psychosocial treatments, and indices of symptom severity, has been conducted in exclusively female samples [2]. With emerging evidence suggesting important differences in ED presentations in males, current diagnostic and treatment guidelines therefore lack sensitivity in male patients with EDs [2]. Reflecting this finding, the prevalence of males engaging in disordered eating behaviors in community settings, approximately 25%–39% [3,4], significantly outweighs those presenting to clinical services, approximately 5%–10% [5,6]. Further still, those presenting to mental health services typically experience multiple

misdiagnoses before engaging specialist ED treatment [7], reflecting poor recognition of male ED by health-care providers and resulting in delayed treatment uptake. Given the well-demonstrated medical risk in those with ED, and evidence suggesting that males may experience greater medical risk [2], misdiagnoses, and a delay in treatment uptake is of grave concern.

Of particular importance, emerging trends reveal distinct patterns of ED symptoms in males that center around the pursuit of greater muscularity [8], which is consistent with current body ideals portrayed in males. Muscularity-oriented disordered eating (MODE) is distinct from “traditional” ED, such as anorexia nervosa (AN), in that behaviors are typically oriented toward (1) the development of greater musculature; (2) the development of greater muscle leanness, since adiposity is thought to obscure the visibility of muscularity; or (3) both [1]. Associated behaviors include a pervasive fear that one is not muscular enough, and rigid dietary and exercise practices oriented toward muscularity-related goals (i.e., the overregulation of protein consumption and the restriction of other dietary macronutrients, compulsive

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muscle-developing exercise). Crucially, this constellation of symptoms is comparable to AN in terms of the severity of body image disturbance and impairments to psychosocial functioning [9], and also demonstrates greater rates of suicidal ideation [2]. Further, this syndrome is also associated with the illicit use of synthetic muscle-enhancing agents [1,9].

With the increasing prevalence of male body dissatisfaction, and the salience of lean muscularity in male body ideals, data relating to the medical correlates of MODE are crucial in effectively managing the ongoing upsurge in clinical presentations. However, no data currently exist in reporting the medical correlates of MODE. Here we present the case of a 16-year-old male who demonstrated disordered eating behavior in the context of broader muscularity concerns.

## Case Report

Johnny was a 16-year-old male who presented to a specialized ED unit in the context of ongoing muscularity-oriented body image concerns and pervasive interruptions to normative dietary practices. Johnny was a high school wrestler and, approximately 1 year before presentation, had been encouraged by his coach to lose weight to wrestle in a lower-weight class. As such, Johnny began to eliminate “junk foods” that he occasionally enjoyed (i.e., chips and cheese) and tried to consume more foods he deemed rich in protein (i.e., more nonfat milk). Upon losing approximately 2.5 kg and reaching the lighter-weight class prescribed by his coach, Johnny noted receiving more compliments related to his lean and muscular appearance and vowed to intensify his dietary practices. During this time, Johnny reported becoming less concerned with his weight, and more concerned about the appearance of his muscularity, and began actively counting calories and protein consumption. Specifically, he began researching dietetic methods to enhance muscularity and began drinking up to 8 cups of milk each day, and bringing his own snacks to wrestling practice (i.e., small bag of almonds) while rejecting the food provided for the team (i.e., hot dogs). Johnny’s reported aim was to consume less than 2,000 cal/day, while “aiming to keep protein intake high” in hopes of achieving a more lean and muscular physique.

Over the next 9 months, Johnny’s weight was further reduced from 65.3 to 59.4 kg, and despite this weight loss, he was cleared to continue wrestling at his regular wrestling team “weigh-ins” (see Figure 1 for the patient growth chart). Johnny concurrently reported an increasing obsession with the visibility of his muscularity. He began weighing and charting the macronutritional content of all foods, stopped eating out at restaurants where he could not weigh his food, and reportedly stood at home instead of sitting, through fear of losing muscle tone in his legs. However, upon losing several wrestling tournaments, Johnny deemed that his dietary practices were not helping his performance, which, alongside his “miserable and irritable mood,” resulted in Johnny concluding that he should perhaps gain some weight back. He determined that any additional weight ought to be strictly muscle tissue, and accordingly, he further increased his protein intake (i.e., protein supplements and protein bars) and commenced a muscle-building exercise regime to support these goals. During his 16-year annual physical examination, his pediatrician noted that he had lost 5.9 kg since his prior visit, was restricting his intake, and was obsessing about his weight and muscularity. Johnny was referred to a specialist ED program.

## Psychiatric assessment

Upon psychiatric evaluation, Johnny did not score within the clinical range on formal measures of ED symptom severity (i.e., Eating Disorder Examination Questionnaire [10] Global Score = .71; Eating Disorder–15 [11] = 1.3). Further, in reflection of the notion that Johnny did not fear weight gain (“so long as it was all muscle”), he did not meet the diagnostic criteria for AN. The diagnostic interview revealed an overvaluation of his shape and weight, distorted body image, and attempts to reduce the overall dietary energy (to enhance muscle definition), alongside a willingness to gain weight, provided that “it was all muscle,” and the notion that an overregulation of protein consumption had curbed a potentially significant weight loss. As such, Johnny received a primary DSM-5 diagnosis of other specified feeding or ED [11].

## Medical assessment

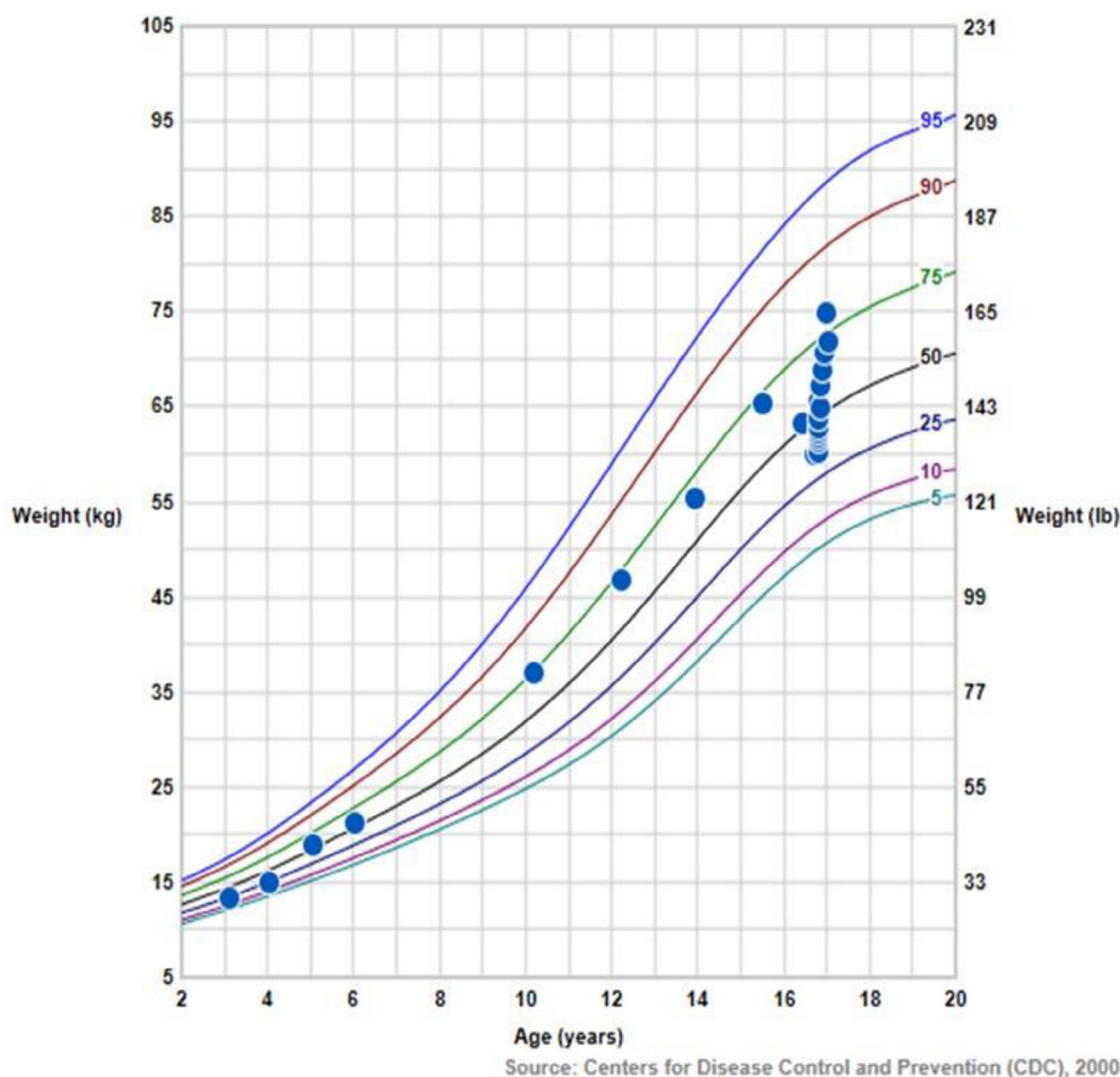
Upon medical assessment, Johnny’s heart rate was 45 beats per minute (bpm) and he was hospitalized for medical stabilization. During the first night of admission, his overnight heart rate nadir was 38. Further, Johnny demonstrated a marked orthostatic heart rate increase of 40 bpm (44–84). His temperature and blood pressure were within normal limits. A review of his previous growth curves revealed that he had been tracking at approximately the 75th percentile for weight and body mass index before the onset of his restrictive eating symptoms, but had dropped to the 30th percentile for weight at the time of presentation. His admission labs were notable for a normocytic anemia (hemoglobin of 12.2, MCV 91) with normal iron studies. He had a slightly elevated total cholesterol level (170) and normal triglyceride level (171). His testosterone was 244 (normal range 158–826) and thyroid studies (free T4 11, TSH 1.68) were normal.

Johnny was hospitalized for 7 days, during which time his daytime heart rate improved to over 50 bpm, his overnight heart rate improved to over 45 bpm, and his orthostasis resolved. His meal plan started at 3,000 kcal/day, which was advanced incrementally to 4,400 kcal/day by the time of discharge. He was discharged at a weight of 63.7 kg and was advised to abstain from wrestling and physical activity. Further to discharge, Johnny was followed up at regular intervals for medical and nutrition consultation follow-up, but declined psychosocial treatment. After several months, he resumed wrestling, at a higher-weight class, and had maintained his weight at the 75th percentile.

All identifying information has been altered to protect patient confidentiality.

## Discussion

This case highlights a 16-year-old male who presented to a specialist ED clinic in the context of MODE and required immediate hospitalization because of medical instability. Importantly, this patient did not meet formal criteria for a specific ED diagnosis and did not score in the clinical range on conventional measures of ED symptomatology. Further, his ED behaviors were heavily intertwined with wrestling practices and were not identified as problematic at repeated wrestling practice weigh-ins. In fact, these ED behaviors were deemed by his parents, his coach, and his peers to be goal oriented and harmless behaviors. This case highlights (1) the evolving nature of ED behaviors in males, (2) the difficulty in detecting these behaviors within a diagnostic framework oriented toward recognition of thinness-oriented



**Figure 1.** An illustration of Johnny's weight growth curve trajectory. Johnny's weight historically tracked at the 75th percentile until age 15, at which point he began to restrict food intake after being encouraged by his wrestling coach to lose weight to wrestle in a lower-weight class. Although losing approximately 8.5 kg over 9 months, the patient simultaneously attempted to maximize his muscularity and maintain an elevated protein intake. The patient was hospitalized with acute bradycardia at approximately 59 kg.

ED, and (3) the medical dangers associated with such behaviors.

Poor recognition of EDs in males contributes to the substantial medical risk in this population, with for instance, over 50% of adolescent males with ED initially demonstrating vital sign instability that requires immediate hospitalization [5]. Further clouding detection, male patients with EDs typically demonstrate less severe deficits in fat mass [12], likely reflecting the lesser emphasis on body fat as opposed to muscularity. However, with current diagnostic criteria for ED making explicit reference to significantly low bodyweight, a fear of weight gain, and behaviors that interfere with weight gain [11], the recognition of disordered eating behaviors oriented toward muscularity, as opposed to thinness, can be especially challenging. Certainly, more research on the medical correlates of MODE and ultrahigh protein diets would be instructive. For instance, although male patients with ED typically demonstrate a lower heart rate than female

patients with ED [13], little is known as to the potentially discrepant cardiac risk profile accompanying thinness versus MODE. With evidence suggesting an increasing prevalence of male ED, and muscularity-oriented ED in particular, physicians may be increasingly expected to identify such cases and to provide appropriate treatment.

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