



Body image and body change behaviors associated with orthorexia symptoms in males

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ABSTRACT

In recent years, Orthorexia Nervosa has received increasing attention as a form of restrictive disordered eating driven by concerns related to “healthy eating” as opposed to weight and shape concerns. To date, however, data on the correlates of orthorexia in men are lacking, particularly pertaining to the relationship between orthorexia and muscularity-related dimensions. A sample of 103 ($M_{age} = 19.84$) male college students completed an online questionnaire reporting on orthorexia symptoms, eating pathology, drive for muscularity, exercise dependence, and internalization of the thin and athletic ideals. Correlational analyses and linear regression models were used to explore relationships between orthorexia and variables of interest. Findings revealed positive relationships between high levels of orthorexia symptoms and eating pathology, exercise dependence, thin and athletic internalization, and behavioral dimensions of drive for muscularity. The results of this study extend our understanding of the correlates of orthorexia symptoms among young men and highlight their association with other dimensions of eating pathology as well as dysfunctional exercise. In addition, concerns related to healthiness may overlap with muscularity-related concerns, perhaps due to the conflation between health and muscular appearance in social constructions of male body ideals.

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1. Introduction

The understanding of eating disorders among men has lagged behind that in women, in part due to a historical focus on the pursuit of thinness and weight control as core components of Anorexia Nervosa and Bulimia Nervosa (Striegel-Moore et al., 2009; Wijbrand, 2006). This has led to the under-recognition of eating disorders in men, for whom concerns frequently center more around muscularity as opposed to thinness, and presentations may more frequently include over exercise as a compensatory method of weight control (Danielsen, Bjørnelv, Bratberg, & Rø, 2018; Frederick et al., 2007; McCreary & Sasse, 2000; Strother, Lemberg, Stanford, & Turberville, 2012). Recently, research has described a new disorder termed Orthorexia Nervosa, in which concerns focus on controlling eating for health reasons rather than for appearance purposes (Bratman, 1997; Donini, Marsili, Graziani, Imbriale, & Cannella, 2004; Gleaves, Graham, & Ambwani, 2013). Despite a growing body of research focused on the exploration of orthorexia, there remains a lack of

research on the associations between orthorexia and other eating disorder symptoms, particularly in men—a gap that this study aims to fill.

Coined Orthorexia Nervosa in 1997, the disorder includes a pathological obsession with the pursuit of healthy eating (Bratman, 1997). Since then, diagnostic criteria have been proposed, focusing on the restrictive and rigid aspects of eating behaviors within orthorexia that result in impairment and distress (Donini et al., 2004; Donini, Marsili, Graziani, Imbriale, & Cannella, 2005). Orthorexia arose within a sociocultural context that emphasizes individual responsibility and moral obligation to preserve health and prevent disease, a discourse called healthism (Crawford, 1980). Within the framework of healthism, physical health becomes a proxy for moral goodness. The body serves as a signal of a person's character, reflective of their habits and conferring social status (Gimlin, 2002). Thus, within orthorexia, food choices and eating behaviors are framed as “health” choices, thus orthorexic eating patterns may be reflective of the pressure to maintain health and moral implications of engaging in health-directed behaviors. Further, orthorexia may serve as a means to help individuals manage their anxieties as they navigate an ever more complex modern food system (Rangel, Dukeshire, & MacDonald, 2012; Rodgers & Sonnevill, 2018).

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Given that Orthorexia Nervosa is not formally recognized as a DSM-5 disorder, one of the important areas of future research identified in the budding literature on this topic is the examination of the relationship between orthorexia symptoms and other eating disorder symptomatology. However, to date, data on these relationships among men are lacking. In mixed gender samples, preliminary evidence for an association between drive for thinness, bulimic symptoms, and general disordered eating patterns has emerged (Brytek-Matera, Fonte, Poggiogalle, Donini, & Cena, 2017; Parra-Fernandez et al., 2018). These data provide support for an association between orthorexia symptoms and other eating disorder symptomatology, although the mixed samples limit our understanding of these relationships among men. Thus, further investigation into the relationship between orthorexia and other eating disorder symptoms in male populations is warranted.

Even fewer data are available regarding the relationship between the symptoms of orthorexia and behaviors that may be specifically relevant in the context of eating disorders among men, particularly muscularity-oriented behaviors and exercise-related concerns. Again, initial evidence comes from mixed gender samples. Among German gym members, orthorexia was associated with exercise addiction, with exercise addiction characterized by the general components of addiction, including salience, tolerance, conflict, and withdrawal (Rudolph, 2018). In addition, among a clinical sample of 111 men with a range of diagnoses that included orthorexia, it was found that excessive exercise was a frequent component of eating disorder presentations (Weltzin et al., 2012). These findings suggest the importance of examining the relationship between orthorexia and exercise behaviors.

Regarding the relationships between orthorexia and muscularity-oriented concerns and behaviors, to our knowledge no data are currently available. While the definition of orthorexia describes health concerns rather than appearance concerns as the core of orthorexic psychopathology, the documented relationship with drive for thinness among women suggests that weight and shape concerns may still be present (Parra-Fernandez et al., 2018). Among men, weight and shape concerns frequently manifest as drive for muscularity, resulting from the internalization of the socially constructed mesomorphic ideal (Girard, Chabrol, & Rodgers, 2018). However, the relationships between orthorexia and muscularity-related concerns have yet to be investigated.

The aims of the current study were therefore to extend our understanding of the relationship between orthorexia symptoms and other eating disorder symptoms, including weight and shape aspects that are relevant to eating disorders among men, namely internalization of the athletic ideal and drive for muscularity, as well as dysfunctional exercise behaviors, among a sample of young men.

2. Method

2.1. Participants and procedure

Undergraduate students between the ages of 18–25 and enrolled at a large, private university in the northeastern United States were recruited via flyers and online advertisements to complete an online survey on the Qualtrics survey platform. They were offered the opportunity to enter into a raffle for one of five \$100 gift cards.

A total of 113 male-identifying students participated in the study, of whom $n = 103$ provided complete data on the ORTO-7 and were therefore included in the analyses ($M_{age} = 19.84$, $SD = 1.71$). Mean BMI for the sample was 23.34 ($SD = 3.26$, $Range: 15.78–33.00$).

2.2. Measures

Participants completed self-report measures assessing orthorexic tendencies, eating disorder pathology, and body image concerns.

2.2.1. Orthorexia symptoms

Orthorexia symptoms were assessed using the ORTO-7 (Møller, Apputhurai, & Knowles, 2019), which is a 7-item version of the original 15-item scale (Donini et al., 2005). The ORTO-7 was developed and validated among an English-speaking sample, and shown to possess a strong and stable factor structure. The items assess attitudes and behaviors associated with orthorexia including attention to calorie content, preoccupation with food and its impact on health, and the impact of food rules on psychosocial functioning. Example items that illustrate the focus on health as opposed to other types of eating concerns include “Are your eating choices conditioned by your worry about your health status?”, and “Do you think that the conviction to eat only healthy foods changes your life-style (frequency of eating out, friends, etc?)”. Items are scored on a 4-point scale from 1 (*Always*) to 4 (*Never*), and scale scores were reversed such that higher scores indicated higher levels of orthorexia attitudes and behaviors. As reported by Møller et al. (2019), in their sample the ORTO-7 demonstrated good psychometric properties with the single-factor structure revealing a good fit to the data, $GFI = .97$, $CFI = .96$, $RMSEA = .06$, better than any of the other models proposed to date that they tested first. In addition, they reported good internal reliability with $\alpha = .83$, again higher than the internal reliability of the other structures of the ORTO that they tested. Moreover, they proposed a cut-off score of 19 or lower (using the original scoring) to represent high levels of symptomatology, and probable orthorexia nervosa.

Although underpowered, for the purpose of providing additional support for the ORTO-7, an exploratory factor analysis was conducted in our sample. Findings supported a univariate structure, with the principle factor explaining 36 % of the variance. All factor loadings were $> .50$. The inter-item correlation matrix revealed that the majority of the items were inter-correlated with small to moderate effect sizes, ranging from $r = .09$ to $r = .43$. Furthermore, examination of the item-total indices revealed that deleting any of the seven retained items would result in a lower alpha value, with values ranging from .64 to .68. In our sample ($\alpha = .70$), thus the 7-item solution was retained.

2.2.2. Eating disorder symptoms

The Eating Disorder Diagnostic Scale (EDDS; Stice, Fisher, & Martinez, 2004) is a brief scale that can be used as a continuous measure of eating disorder symptoms. Comprising of 22 items, the scale includes questions such as, “Over the past 3 months, have you had a definite fear that you might gain weight or become fat?”, and “How many times per week on average over the past 3 months have you made yourself vomit to prevent weight gain or counteract the effects of eating?” Validation studies in female populations have suggested good to excellent internal consistency ($\alpha = .89–.94$; Krabbenborg et al., 2012; Stice, Telch, Rizvi, & Haynes, 2000), with one study of male veterans also suggesting good internal consistency ($\alpha = .89$; Arditte Hall, Bartlett, Iverson, & Mitchell, 2017). Internal consistency in this sample was good ($\alpha = .83$).

2.2.3. Exercise dependence

The Exercise Dependence Scale (EDS-21; Hausenblas & Symons Downs, 2000) assesses driven or addictive exercise. Exercise dependence is characterized by maladaptive exercise attitudes and behaviors, such as increased tolerance, withdrawal symptoms, and lack of control, that lead to clinical impairment or distress. In the 21-item scale, respondents indicate the frequency with which they

engage in exercise-related beliefs and behaviors, for example, “I exercise longer than I intend,” and “I exercise despite persistent physical problems.” The EDS-21 has been validated in university student samples and shown to demonstrate acceptable test-retest reliability, excellent internal consistency ($\alpha = .93$), and concurrent validity in mixed-gender samples. Internal consistency as measured by Cronbach's alpha was excellent in this sample ($\alpha = .93$).

2.2.4. Drive for muscularity

The Drive for Muscularity Scale (DMS) assesses attitudes and behaviors related to muscularity (McCreary, Sasse, Saucier, & Dorsch, 2004). The 15-item DMS is comprised of two subscales: Muscle-Oriented Body Image and Muscle-Oriented Behavior, each with good internal reliability of $\alpha = .88$ and $\alpha = .81$ respectively (McCreary et al., 2004). A sample item from the Muscle-Oriented Body Image subscale is, “I think that my arms are not muscular enough,” and a sample item from the Muscle-Oriented Behavior subscale is, “I try to consume as many calories as I can in a day.” In the current sample, internal consistency was good for both subscales. ($\alpha = .88$ for Muscle-Oriented Body Image and $\alpha = .83$ for Muscle-Oriented Behavior).

2.2.5. Appearance-ideal internalization

The Internalization Scale from the Sociocultural Attitudes Toward Appearance Questionnaire-4 (SATAQ-4; Schaefer et al., 2015) measures the degree to which men and women internalize unattainable cultural body ideals. It has two 5-item subscales scored on a 5-point Likert scale: Thin/Low Body Fat Internalization (e.g., “I want my body to look very thin”) and Muscular/Athletic Internalization (e.g., “I think a lot about looking muscular”). An examination of the factor structure, reliability, and validity in college age men showed acceptable psychometric properties, with $\alpha = .75$ and $\alpha = .90$ for the thin and athletic subscales respectively (Schaefer et al., 2015). In this sample, internal consistency for the Thin/Low Body Fat subscale was acceptable ($\alpha = .72$), and internal consistency for the Muscular/Athletic subscale was good ($\alpha = .87$).

2.3. Data analyses

Missing data were few, and inspection of the data revealed that when they occurred none of the measure had been completed, due to drop off during the survey completion. Therefore, missing values were not replaced, and the number of responses varied from $n = 103$ for the ORTO-7 and $n = 89$ for the EDSQ. Following examination of descriptive data, zero-order correlations were computed among the study variables. Finally, linear regression models were conducted to examine the relationships between sociocultural variables and orthorexia symptoms accounting for disordered eating and excessive exercise.

3. Results

The mean score for the ORTO-7 in this sample of college men was 15.34 ($SD = 3.77$, Range: 7–25). Higher scores are indicative of greater orthorexic tendencies. Means and standard deviations for the ORTO-7 as well as other measures of interest are presented in Table 1. Using the cut-off score proposed by Moller et al. (2019) 43.7 % ($n = 45$) participants reported symptom levels consistent with probable orthorexia.

Findings from the correlational analysis between the ORTO-7 and measures of eating disorder pathology, body image concerns, and BMI are summarized in Table 1. Overall, small to large effect relationships were found between levels of orthorexia symptoms and eating disorder symptoms and related factors. Specifically, a strong positive relationship emerged between orthorexia symptoms and global eating disorder traits as well as

exercise dependence ($r = .535$, $p < .001$, and $r = .519$, $p < .001$, respectively). Regarding drive for muscularity, moderate positive relationships were found between orthorexia symptoms scores and both the attitudinal and behavioral components of drive for muscularity ($r = .313$, $p < .001$ and $r = .468$, $p < .001$, respectively). Finally, small to moderate positive correlations emerged between orthorexia symptoms and thin-ideal internalization and athletic-ideal internalization ($r = .235$, $p = .02$, and $r = .375$, $p < .001$, respectively). A small, positive, but non-significant correlation was found between orthorexia symptoms and BMI in this sample ($r = .129$, $p = .188$).

To evaluate the relationship between sociocultural variables and orthorexia symptoms, above and beyond the shared variance with other elements of disordered eating and excessive exercise, two linear regression analyses were conducted. In the first, thin/low body fat internalization and athletic internalization scores, as well as both the attitudinal and behavioral components of drive for muscularity were entered as predictors of orthorexia symptoms. The overall model was significant, $F(2, 95) = 5.97$, $p < .001$, $R^2 = .21$. Both thin/low body fat internalization, $\beta = .27$, $p = .01$, partial $r = .26$, and behavioral drive for muscularity, $\beta = .37$, $p = .002$, partial $r = .31$, emerged as significant predictors. In a second regression analysis, the same sociocultural predictors were included controlling for eating disorder symptoms and exercise dependence. Here again the overall model was significant, $F(2, 88) = 14.37$, $p < .001$, $R^2 = .51$. The eating disorder symptom and exercise dependence variables entered into the first block together accounted for 48 % of the explained variance in orthorexia symptoms, and were each independent significant predictors, $\beta = .48$, $p < .001$, partial $r = .51$, and $\beta = .33$, $p < .001$, partial $r = .38$ respectively. When entered into the second block, however, the sociocultural variables failed to significantly increase the explained variance in orthorexia symptoms, R^2 change = .03, $p = .28$. None of the four variables emerged as significant independent predictors: thin/low body fat internalization, $\beta = -.11$, $p = .26$, partial $r = -.12$, athletic internalization, $\beta = .14$, $p = .23$, partial $r = .13$, attitudinal drive for muscularity, $\beta = .06$, $p = .50$, partial $r = .08$, behavioral drive for muscularity, $\beta = .04$, $p = .72$, partial $r = .04$.

4. Discussion

The aim of the present study was to examine the relationship between orthorexia symptoms and other dimensions of eating disorders among a sample of college young men. Overall, our findings provide additional support for an association between orthorexia symptoms and other types of eating disorder behaviors, including dysfunctional exercise behaviors (Parra-Fernandez et al., 2018; Rudolph, 2018). Furthermore, they extend the extant literature by providing evidence of a positive relationship between orthorexia symptoms and dimensions of muscularity-related disorders. This is a novel finding and suggests that concerns related to healthy eating and concerns related to increasing muscularity tend to co-occur.

Consistent with previous findings from male and mixed gender samples (Brytek-Matera et al., 2017; Parra-Fernandez et al., 2018), in our sample orthorexia symptoms were positively associated with other dimensions of eating pathology. As empirical data accumulate regarding the nature of orthorexia and its distinction from and potential overlap with other forms of eating disorders, it is important to explore these relationships. Previous research among Italian (Brytek-Matera et al., 2017) and Spanish (Parra-Fernandez et al., 2018) university students revealed small effect sizes for the association between orthorexia symptoms and other eating disorder symptomatology. Interestingly, in our sample, the magnitude of this relationship was somewhat larger, with a large effect size.

Table 1
Means, Standard Deviations, and Correlations Between ORTO-7 and Eating Disorder Symptom Measures in College Men (N = 103).

	BMI	Eating disorder symptoms	Exercise Dependence	Muscularity Body Image	Muscularity Behaviors	Thin Internalization	Athletic Internalization
Mean	23.9	17.9	42.8	26.9	16.8	14.8	16.7
SD	4.6	17.2	17.0	8.2	7.2	3.8	4.6
Orthorexia (r)	.11	.64**	.55**	.17	.38**	.29*	.29*

** Correlation is significant at $p < .01$.

* Correlation is significant at $p < .05$.

It may be that in the U.S. context, high levels of concern around a healthy diet are more tightly associated with concerns related to shape and weight, thus increasing the overlap between orthorexia symptomatology and other types of eating disorder symptoms.

Also somewhat discrepant from the previous literature, in our sample over 40 % of participants met the previously established cut-off value for probably orthorexia nervosa. Data from male samples are rare. However, it is notable that Moller et al. (2019) reported that in their sample of Australian men only 11 % met the cut-off score. The higher levels of concern in our sample may be partially due to developmental issues, as college may be a time of increased concerns related to the establishment of health eating patterns (Lavender, De Young, & Anderson, 2010). However, this discrepancy may also be due to cultural differences, and reflect perhaps the fact that base levels of health-oriented concerns related to eating might be higher in the U.S. context as compared to other countries.

Other authors have emphasized the importance of including muscularity-related behaviors in conceptualizations (Murray, Griffiths, & Mond, 2016) and assessments of eating disorders among men (Murray et al., 2019). Consistent with this, our findings suggested that muscularity-oriented behaviors, although not body image, were positively associated with orthorexia symptoms. Similarly, previous research has described an association between drive for muscularity and the use of muscularity-oriented eating behaviors and dietary supplements (e.g., Chittester & Hausenblas, 2009) as well as anabolic steroids (e.g., Cafri, van den Berg, & Thompson, 2006). Thus, young men who are invested in increasing muscularity may engage in a range of restrictive and rule-driven eating patterns, including those that align with messaging around “healthy” eating. In addition, increasing evidence has emerged for the conflation between health and a lean-and-muscular appearance for men in social discourse, which may also account for the relationship between drive for muscularity and orthorexia symptoms identified here (Dworkin & Wachs, 2009).

In addition, and consistent with research from other cultural contexts (Rudolph, 2018), our findings revealed an association between orthorexia symptoms and dysfunctional exercise behaviors. These findings highlight the importance of considering orthorexia symptoms and disordered eating driven by health-related concerns when conceptualizing the spectrum of eating disorders among men. Furthermore, the strong association with dysfunctional exercise behavior suggests that, among college men, orthorexia symptoms may be driven by concerns related to maintaining a healthy lifestyle. Previous work has described how pressure to attain or maintain a “healthy weight” and increasing social pressure to engage in eating and exercise behaviors may result in excessive concerns and paradoxically be harmful rather than health promoting (Rodgers, 2016).

In our sample, bivariate analyses revealed small magnitude positive relationships between orthorexia symptoms on the one hand, and internalization of both the thin ideal and the athletic ideal, suggesting that these concerns may be related to the investment in social appearance ideals. However, these relationships were no longer evident when controlling for the association between orthorexia symptoms and other forms of disordered eating. Thus,

it may be that the relationships with internalization of appearance ideals should be interpreted more within co-occurrence between orthorexia symptoms and disordered eating, than a relationship characteristic of orthorexia symptoms. It would be interesting in future research to explore the relationship between orthorexia symptoms and endorsement of beliefs related to the health benefits of specific diets.

Our study includes a number of limitations, the first of which is the somewhat small sample size, although it is noteworthy that the sample was adequate to detect the small to large effects that emerged. In addition, our sample was restricted to college students, which may limit the generalizability of the findings. Also, our study did not include a measure of muscle mass or perceived muscularity, which would have provided additional useful information. Moreover, while the ORTO-7 revealed acceptable psychometric properties in the present sample, it is notable that more broadly speaking, this measure, as well as other measures of orthorexia symptoms, has been criticized, and that the development of reliable, valid, and sensitive measures of orthorexia is still ongoing (Meule et al., 2020). Overall, measures of eating pathology that are appropriate for men are few due to a historical neglect of male eating disorders, and the absence of items capturing the specific characteristics of disordered eating among men in measures developed and normed among female populations (Murray et al., 2016). In the context of the assessment of orthorexia symptoms, it may be useful to consider gender and ensure that efforts to develop measures explicitly consider how these tools may perform among male populations. Finally, the current study was cross-sectional, which precludes from examining the directionality of relationships. It will be interesting in future work to explore for example whether eating disorder behaviors and concerns related to food and eating might take on different presentations at different time points, either developmentally, or in reaction to sociocultural pressures.

Nevertheless, our findings make an important contribution to the extant literature by increasing our understanding of the correlates of orthorexia symptoms among male college students. Our findings suggest that orthorexia symptoms are distinct from other forms of eating disorder symptoms and weight and shape concerns, yet related. This supports both attempts to clarify and characterize orthorexia as a potential distinct diagnostic entity, as well as the fact that different aspects of eating related concerns may cluster together. Efforts to bridge the gap in our knowledge of eating disorders among men should include a focus on orthorexia-type disorders and should consider how investment in appearance ideals may contribute to eating and exercise patterns that are rigid and restrictive, not only as related to weight control but also concerns around healthiness.

CRediT authorship contribution statement

Mika White: Conceptualization, Funding acquisition, Project administration, Writing - original draft. **Rachel Berry:** Data curation, Formal analysis, Writing - original draft, Project administration. **Rachel F. Rodgers:** Conceptualization, Funding acquisition, Supervision, Writing - review & editing.

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