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Comparing Eating Disorder Characteristics and Treatment in Self-Identified Competitive Athletes and Non-Athletes from the National Eating Disorders Association Online Screening Tool

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Abstract

Objective: We compared eating disorder (ED) characteristics and treatment seeking behaviors between self-identified competitive athletes and non-athletes in a large, community-based sample.

Method: During the 2018 National Eating Disorders Awareness Week, 23,920 respondents, 14.7% of whom identified as competitive athletes, completed the National Eating Disorders Association online screen. Data were collected on demographics, disordered eating behaviors, probable ED diagnosis/risk, treatment history, and intent to seek treatment.

Results: The sample was predominately White (81.8%), female (90.3%), and between 13–24 years (82.6%). Over 86% met criteria for an ED/subthreshold ED, and of those, only 2.5% were in

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Data Availability Statement:

Data for the current study are available upon request.

treatment. Suicidal ideation was reported in over half of the sample. Athletes reported a significantly greater likelihood of engaging in and more frequent excessive exercise episodes than non-athletes. Athletes also reported a significantly lower likelihood of engaging in and less frequent binge-eating episodes compared with non-athletes. Athletes were more likely to screen positive for an ED/subthreshold ED than non-athletes, but percentages across all probable ED diagnoses were similar. No significant differences between athletes and non-athletes emerged on treatment history or intention to seek treatment post-screen (less than 30%).

Discussion: Although the distribution of probable ED diagnoses was similar in athletes and non-athletes, symptom profiles related to disordered eating behavior engagement and frequency may differ. Athletes may be less likely to seek treatment due to stigma, accessibility, and sport-specific barriers. Future work should directly connect survey respondents to tailored treatment tools and increase motivation to seek treatment.

Keywords

eating disorders; disordered eating behaviors; athletes; online screen; treatment seeking

Introduction

Eating disorders (EDs) affect up to 5% of the population (Hudson et al., 2007; Smink, van Hoeken, & Hoek, 2012), and athletes often report a higher prevalence of EDs than non-athletes (Joy, Kussman, & Nattiv, 2016; Sundgot-Borgen & Torstveit, 2004; Thompson & Sherman, 2010). Specifically, one review reported that up to 8% of male-identified athletes and up to 33% of female-identified athletes screened positive for an ED (Bratland-Sanda and Sundgot-Borgen 2013). In addition, the prevalence of disordered eating behaviors (i.e., not threshold diagnoses) was higher in athletes than in non-athletes (up to 19% in male athletes and up to 45% in female athletes; Bratland-Sanda & Sundgot-Borgen, 2013). Despite widespread sports participation in the community at all competitive levels, most studies focus on elite and collegiate athletes, possibly due to the ease of recruiting through professional sport and college institutional channels (Thompson & Sherman, 2010). Findings in high-level and collegiate athletes are briefly summarized below for context; however, studies of community-based athlete samples (e.g., high school athletes, intramural athletes, “weekend warriors,” and older athletes beyond their peak elite status) across ED characteristics and treatment seeking are lacking.

Among high-level athletes, reported ED prevalence and disordered eating behavior frequency are typically higher than in non-athletes (e.g., Byrne & McClean, 2002; Thompson & Sherman, 2010; Torstveit, Rosenvinge, & Sundgot-Borgen, 2008). Reports on collegiate athletes are mixed. Although female collegiate athletes have demonstrated a higher prevalence of EDs and ED symptomatology than male-identified collegiate athletes (e.g., Krebs et al., 2019), it is less clear if the prevalence in collegiate athletes exceeds that of non-athlete collegiate students (Greenleaf et al., 2009; Johnson, Powers, and Dick, 1999). Across ED behaviors, one of the only studies comparing college athletes, independent exercisers, and non-exercisers observed greater severity of ED symptomatology at higher levels of sport participation (Holm-Denoma et al., 2009). Among other sport-specific ED

risk factors, support for the association between *identifying* as an athlete and more severe ED psychopathology is growing (e.g., Palermo & Rancourt, 2019).

Treatment Barriers and Treatment Seeking in Athletes

In addition to well-established barriers to mental health treatment, including high cost, lack of availability and accessibility, stigma, and low perceived need (Eisenberg, Downs, Golberstien, & Zivin, 2009; Eisenberg, Nicklett, Roeder, & Kirz, 2011; Mojtabai et al., 2012), almost half of individuals with EDs do not recognize that their disorder warrants treatment (Gratwick-Sarll, Mond, & Hay, 2013; Mond, Hay, Rodgers, & Owen, 2006). Compounding these barriers to treatment, athletes experience rigorous training schedules, frequent travel for events, greater stigma around mental health than non-athletes (Gulliver, Griffiths, & Christensen, 2012), normalization of disordered eating behaviors, unsafe weight loss practices, and amenorrhea (Alwan et al., 2019; Currie, 2010; Thompson & Sherman, 2010). Factors such as lack of time, fear that seeking treatment demonstrates weakness (López & Levy, 2013; Reardon & Factor, 2010), and the perception that engaging in disordered eating behaviors and low weight will enhance performance (Martinsen, Bratland-Sanda, Eriksson, & Sundgot-Borgen, 2010; Werner et al., 2013) may also reduce treatment seeking. Despite the negative impact EDs have on athletic performance (e.g., low energy availability, dehydration, muscle loss, and high rates of injuries; El Ghoch et al., 2013; Thein-Nissenbaum et al., 2011), little information is available on treatment seeking behaviors, particularly in community athletes.

Screening Athletes for Eating Disorders

Online screening tools can reach large numbers of participants (Fitzsimmons-Craft et al., 2019) and deliver earlier access to interventions (Franko et al., 2013; Mountjoy et al., 2014; Rosen, 2010). The National Eating Disorders Association's (NEDA; the largest U.S. non-profit for EDs) online screen is the first large-scale dissemination of a digital ED screen. In its first six months in 2017, over 71,000 adults aged 18 to 65+ across the United States completed the screen (Fitzsimmons-Craft et al., 2019). However, large-scale digital screening has yet to be harnessed to examine differences between athletes and non-athletes in a community sample.

In the current study using NEDA's online screening tool, we assessed differences between self-identified competitive athletes and non-athletes in a community sample on: 1) the likelihood of engaging in and frequency of disordered eating behaviors; 2) ED diagnosis, evaluated by ED diagnostic and risk categories; and 3) treatment seeking behaviors, measured by current treatment status, intention to seek treatment, and intended treatment modalities following screen completion.

Methods

Procedure

This was an observational study using data from NEDA's online screening tool during the 2018 National Eating Disorders Awareness Week (February 26, 2018-March 4, 2018) when almost 25% of annual screens are completed through NEDA's website. Promotion of the

screening tool was conducted via social media and emails through ad campaigns, NEDA's helpline, and media articles. No specific recruitment strategies targeting athletes were implemented. Respondents accessed the confidential screen by going to NEDA's website (<https://www.nationaleatingdisorders.org/screening-tool>). The screen was only offered in English, and a disclaimer at the beginning of the screen stated that it was intended for individuals ages 13 and older. Following completion, respondents received feedback based on their risk or probable diagnosis, referral information, and optional questions on future treatment seeking.

Participants

Data were collected only from respondents who submitted their screen (n=26,659). Respondents were excluded if they 1) were under age 13 (n=325); 2) lived outside the U.S. (n=2,041); 3) did not provide a current weight and/or height (n=176); reported a current weight (<50 pounds or >625 pounds), height (<48 inches or >84 inches), or BMI values (<10 kg/m² or >100 kg/m²) outside expected ranges (n=14; Fitzsimmons-Craft et al., 2019); 5) reported disordered eating behaviors outside expected ranges (more than 500 episodes of binge eating, vomiting, diuretic/laxative use, excessive exercise, fasting in the previous three months; n=60); or 6) did not report age, race, or gender which were included as covariates (n=123). Our total analytic sample comprised 23,920 observations.

Measures

Demographics: Respondents completed items about age, gender, relationship status, current household income, race, ethnicity, and whether they were part of a special population (e.g., competitive athlete, veteran or active military, LGBTQ+). No specific definition of competitive athlete was provided, and all further mentions of athletes reference this designation. Frequency of suicidal thoughts over the past two weeks was also assessed with four response options: "not at all," "several days," "more than half the days," and "nearly every day." Those who endorsed any suicidal thoughts were directed to call 911 or the Crisis Call Center in the feedback portion of the screen.

Probable Diagnostic and Risk Categories and Disordered Eating Behaviors: To determine risk and probable diagnostic category, we used the 18-item Stanford Washington-Eating Disorders Screen (SWED; Graham et al., 2018), which demonstrates good sensitivity (ranges from 0.68 for subthreshold-BN to 0.90 for AN) and specificity (ranges from 0.79 subthreshold-BED to 0.99 AN) for DSM-5 ED diagnoses. Responses categorized individuals using a hierarchical algorithm into one of the following diagnostic groups: (1) AN; (2) BN; (3) BED; (4) sub-threshold BN (subBN); (5) sub-threshold BED (subBED); (6) unspecified feeding or eating disorder (UFED); (7) avoidant/restrictive food intake disorder (ARFID); (8) at risk for an ED, defined as high weight and shape concerns with no other reported symptoms; or (9) no risk for an ED. Specific information on the items and diagnostic algorithm can be found elsewhere ([Center for m2Health website](#); Graham et al., 2018). Throughout the remainder of the paper, any mention of screening positive for an ED or subthreshold ED indicates that it is a *probable* diagnosis. Disordered eating behaviors (binge eating and compensatory behaviors used to control weight and/or shape including vomiting, diuretic/laxative use, excessive exercise, and fasting) were also self-reported as

part of the SWED. In the item text, definitions were provided for binge eating (“*eating what most people would regard as an unusually large amount of food at one time with loss of control*”), excessive exercise (“*i.e. pushed yourself very hard; had to stick to a specific exercise schedule no matter what—for example even when you were sick/injured or if it meant missing a class or other important obligation; felt compelled to exercise*”), and fasting (“*intentionally not eaten anything at all for at least 24 hours in an attempt to prevent weight gain or to lose weight*”).

Treatment Seeking: Respondents indicated current treatment status by reporting either current ED treatment, prior treatment, or no treatment. After respondents completed the screen and received feedback, two optional items evaluated intention to seek treatment: “Do you intend to seek professional help and/or take any steps to address these concerns?” (response options: “definitely not,” “probably not,” “probably,” and “definitely”), followed by a checklist of treatment modalities they might pursue (e.g., medical doctor, support group). See Fitzsimmons-Craft et al. (2020) for more information on treatment seeking items.

Data Analysis

Analyses were conducted using Statistical Analysis Software (SAS) version 9.4 (2014). P-values were corrected for multiple testing using False Discovery Rate (FDR; Benjamini et al, 2001); corrected values (q-values) <.05 were considered significant. Descriptive statistics were conducted for demographic questions, disordered eating behaviors, ED diagnostic and risk categories, and current treatment status for the full sample, and for athletes and non-athletes. Sample means and standard deviations are reported for continuous and count variables. Given the large sample size, respondents with missing data were excluded for each analysis.

After Winsorizing the top .05% of the disordered eating behavior variables to account for skewed distributions (Salkind, 2010; see footnote of Table 1 for a more detailed description), we evaluated differences in mean frequencies of disordered eating behaviors (binge eating, fasting, vomiting, excessive exercise, and diuretic/laxative misuse) between athletes and non-athletes in the total sample with adjusted permutation t-tests to account for convenience sampling (see Westfall et al., 1999 and Gagne et al., 2012 for more information). To compare *the likelihood of engaging in* disordered eating behaviors across the two groups, we conducted logistic regressions using dichotomized versions of these variables (scored as 0 for no reported episodes in the last three months and 1 for any number of reported episodes in the last three months). Age, race, and gender were entered into models as covariates because athletes differed from non-athletes on these variables (all p 's <.01). To evaluate differences in *frequencies* of disordered eating behavior episodes between athletes and non-athletes, we conducted negative binomial regressions only including those who reported at least one episode of that behavior.

Descriptive statistics captured diagnostic and risk category frequencies for the whole sample and by athlete status. Because the SWED provides probable diagnoses, we regrouped the diagnostic categories into three outcomes: EDs/subthreshold EDs (AN, BN, BED, subBN,

subBED, ARFID, PD, and UFED), at risk for an ED, and no risk for an ED. To evaluate whether identifying as an athlete was associated with ED/subthreshold ED, a chi-square test followed by a multinomial regression were conducted using the regrouped diagnostic variable, accounting for age, race, and gender.

Finally, to evaluate differences in current treatment in those with an ED/subthreshold ED by athlete status, we conducted a logistic regression using two outcomes: current treatment versus a combined no treatment or prior treatment group. We report descriptive statistics for the optional intention to seek treatment questions. These were completed by 6.3% of the sample ($n=1,495$), and some cell sizes had <5 participants. We also conducted an exploratory chi-square test using a combined “probably” and “definitely” group (intent to seek treatment) and combined “probably not” and “definitely not” groups (no intent to seek treatment) to compare intent to seek treatment between athletes and non-athletes.

Results

The total number of respondents who completed the screen and met inclusion criteria was 23,920. Of those, 3,509 (14.7%) identified as an athlete.

Sample Description

Table 1 presents age, gender, annual income, race, ethnicity, and endorsement of any suicidal thoughts. The mean BMI for the sample was 24.6 kg/m^2 ($SD = 6.5 \text{ kg/m}^2$). Overall, the sample consisted of predominantly White females between 13–24 years old. Over half (53.5%; $n=12,791$) indicated they thought about suicide several days, more than half the days, or nearly every day in the past two weeks.

Aim 1 Results: Disordered Eating Behaviors and Suicidal Ideation

Table 2 presents the frequencies of Winsorized disordered eating behaviors for the entire sample, athletes, and non-athletes, and results from the adjusted permutation t-tests. Athletes reported significantly more episodes of excessive exercise (10.97 versus 5.46) and fewer episodes of binge eating (8.38 versus 9.91) and diuretic/laxative use (1.37 versus 1.82) over the past three months than non-athletes.

Table 3 presents results from the logistic regression models for each dichotomized disordered eating behavior. Identifying as an athlete was significantly associated with an increased likelihood of engaging in excessive exercise ($q<.001$) and a decreased likelihood of engaging in binge eating ($q<.001$) and fasting ($q<.001$), accounting for age, gender, and race. No significant difference between athletes and non-athletes was observed for vomiting and diuretic/laxative use.

Table 3 also presents results for the negative binomial regression models illustrating differences in frequencies of disordered eating behaviors between athletes and non-athletes who reported *at least one episode* of the respective behavior over the past three months. Identifying as an athlete was significantly associated with more frequent episodes of excessive exercise and less frequent episodes of binge eating after accounting for age, gender, and race. More specifically, athletes engaging in binge-eating report 10% fewer

episodes than non-athletes, accounting for age, race, and gender. Similarly, athletes engaging in excessive exercise report 40% more frequent episodes than non-athletes, accounting for age, race, and gender.

Although suicidal ideation was frequent in both groups, significantly fewer athletes (50.5%) reported any suicidal ideation compared to non-athletes (54.0%), $\chi^2(3, N=23,920) = 15.72$, $q=.003$.

Aim 2 Results: Diagnostic and Risk Categories

Table 4 presents the results of diagnostic and risk categories for the entire sample, athletes, and non-athletes. Over 86% of the total sample screened positive for an ED/subthreshold ED. The distribution across diagnostic and risk categories was similar in athletes and non-athletes; the greatest percentage difference was in for athletes (7.5%) and non-athletes (10.4%) who were at risk for an ED.

There was a significant difference between athletes and non-athletes in the distribution across the regrouped diagnostic categories, $\chi^2(2, N=23,920) = 27.05$, $q<.001$. There was a significant difference between athletes and non-athletes in the distribution across the regrouped diagnostic categories from the multinomial regression model, $\chi^2(2, N=23,920) = 27.05$, $q<.001$. Post-hoc pairwise comparisons provided additional information on the sample diagnostic characteristics. When comparing ED/subthreshold ED and at-risk groups to the no risk group (the referent), results indicate that athletes had 30% fewer positive screens for an ED/subthreshold ED ($q<.001$) and 40% fewer positive screens for at-risk ($q<.001$) than non-athletes. When comparing ED/subthreshold ED group to the at-risk group (the referent), athletes had 18% more positive screens for an ED/subthreshold ED than non-athletes ($q=.030$).

Aim 3 Results: Treatment History and Intent to Seek Treatment

In the total sample, 2.3% had received prior ED treatment, 9.8% were currently in treatment, and 87.9% had not received any treatment for an ED. Figure 1 presents the treatment status for all respondents, athletes, and non-athletes who screened positive for an ED/subthreshold ED. Identifying as an athlete was not associated with current treatment status ($q=.094$).

Finally, we reviewed intentions to seek treatment and preferred treatment modalities after respondents received tailored feedback. Of the 20,727 respondents who screened positive for an ED/subthreshold ED, 1,383 (168 were athletes) completed the optional questions. Figure 2 illustrates the distribution of intention to seek treatment for individuals who screened positive for an ED/subthreshold ED, athletes, and non-athletes. After receiving feedback based on their probable diagnosis, 78.0% of athletes and 71.0% of non-athletes reported that they would “probably not” or “definitely not” seek treatment; the difference was not statistically significant, $\chi^2(1, N=1,383) = 3.91$, $q=.332$.

Table 5 provides descriptive results on treatment modalities for athletes and non-athletes who screened positive for an ED/subthreshold ED and completed the item on intention to seek treatment. Generally, respondents who indicated they were likely to seek treatment reported they would seek help from a mental health professional or a medical doctor.

Discussion

The current study reached a large sample of community-based, self-identified competitive athletes using an online ED screening tool. Individuals who took the screen clearly had a reason to be interested in EDs as only 3.4% of respondents screened at the no risk level and should be considered when interpreting results.

Disordered Eating Behaviors and Suicidal Ideation

Binge eating was the most common disordered eating behavior reported (approximately 75% reported at least one episode in the previous three months). The mean number of binge episodes was lower for athletes than non-athletes, and identifying as an athlete was associated with a reduced likelihood and frequency of binge eating. Previous studies have reported higher frequencies of binge eating in athletes than non-athletes, particularly at higher levels of competition (Holm-Denoma et al., 2009) and in sports emphasizing leanness (Thompson & Sherman, 2010); however, others concurred with our findings suggesting less frequent binge eating (e.g., Fortes et al., 2014). More detailed descriptions of athletes' sport and level of competition may help reconcile these observations in future studies.

Excessive exercise and fasting were the most common compensatory behaviors, with approximately 50% engaging in these behaviors at least once over the previous three months. Athletes reported almost double the number of excessive exercise episodes as non-athletes, and they had a greater likelihood and frequency of excessive exercise episodes. Excessive exercise may be more frequent in athletes given their regular training regimens and, in some cases, to meet weight class requirements or improve aesthetics for judged sports. They may also be more likely to endorse excessive exercise due to social desirability or positive reinforcement from coaches, teammates, and support staff, which in turn may reduce treatment seeking if excessive exercise is mischaracterized or applauded. Of note, the definition of excessive exercise in the SWED, although generally accepted by researchers and clinicians, may be problematic for athletes who often train in spite of illness or injury. Several terms are used to describe maladaptive exercise, (e.g., exercise dependence, compulsive or excessive exercise), reflecting differences in conceptualizations and symptom presentations (e.g., Adkins & Keel, 2005; Scharmer et al., 2020). Thus, it is important that future studies clearly highlight the intent of the exercise and differentiate maladaptive exercise as part of ED psychopathology from an athlete's training regimen.

Athletes also reported reduced likelihood of engaging in fasting than non-athletes. Findings are consistent with literature suggesting more weight control methods in non-athletes through fasting, vomiting, and diuretic/laxative to improve appearance rather than performance (Martinsen, Bratland-Sanda, Eriksson, & Sundgot-Borgen, 2010; Werner et al., 2013). The negative effects of energy deficit sport performance may reduce the likelihood of athletes engaging in these behaviors. Athletes also reported fewer mean diuretic/laxative use episodes, possibly due to the negative impacts such medications may have on nutrient uptake, energy levels, and sport performance. Although results were significant, the small difference found may not be clinically meaningful.

Finally, unexpectedly, over 50% of the sample endorsed suicidal ideation, with fewer athletes reporting any suicidal ideation than non-athletes. Despite several studies reporting associations between EDs and suicidal ideation (Franko & Keel, 2006; Pisetsky et al., 2013; Runfola et al., 2014; Yao et al., 2016), the extent to which the current sample reported suicidal ideation was much higher, underscoring the severity of illness for those completing the NEDA screen and the need for combined ED and suicide prevention and intervention for athletes and non-athletes alike.

Diagnostic and Risk Categories

The sample demonstrated a high frequency of probable and subthreshold EDs, in keeping with prior publications on the NEDA screen (Fitzsimmons-Craft et al., 2019). Significant differences emerged between athletes and non-athletes across ED diagnostic and risk categories, with the greatest difference in the at risk for an ED group. Athletes demonstrated a higher likelihood of a probable ED/subthreshold ED mirroring prior research (e.g., Thompson & Sherman 2010), and treatments and prognoses may differ across athletes and non-athletes considering the varying symptom presentations and risk and maintenance factors unique to each group. However, the small differences in ED diagnostic frequencies observed in this sample may be less clinically relevant than the more concerning observations that over half the sample reported suicidal ideation and almost 90% of the sample screened positive for an ED/subthreshold ED.

Treatment History and Intention to Seek Treatment

The number of respondents who reported current treatment who also screened positive for an ED/subthreshold ED was very low. Although intention to seek treatment did not differ between athletes and non-athletes, over 75% of athletes who received feedback about a probable ED or subthreshold ED reported no intention to seek treatment. This underscores the importance of increasing education about EDs, evaluating readiness to change and motivation, and improving treatment accessibility.

Taken together, athletes and non-athletes from the community who completed the NEDA screen generally had comparable frequencies of EDs, despite significant differences across grouped diagnostic and risk categories. Similarly, significant differences existed both in the likelihood and frequency of disordered eating behaviors, suggesting that ED profiles differ slightly between athletes and non-athletes; however, this is overshadowed by how few athletes and non-athletes were in treatment (*or intended to seek treatment*) despite the presence of both eating pathology and suicidal ideation. Fewer athletes were inclined to seek treatment after the screen, possibly reflecting reticence due to stigma, prioritizing performance over health, and/or lack of availability of and access to resources, among other potential barriers to treatment.

Strengths and Limitations

Strengths of the current study included large sample size and reach capturing many individuals with an ED/subthreshold ED. The screen was brief, confidential, and free, thus reducing potential barriers to information seeking. The screen was delivered by NEDA—a

prominent and trusted ED advocacy organization—potentially providing a safe outlet to explore one’s risk for an ED.

Limitations include self-identification as an athlete rather than a specific definition. Although this was intentional to reach as many athletes as possible, we were unable to characterize level of athletic engagement. Future studies should include more questions for the athlete respondents (e.g., current level of competition, sport, average hours of training per week, etc.) to further characterize this group. Bot responses may have been inadvertently included. However, we excluded observations when values were extreme (often consistent with bot responses, <2% of original raw data), so the number of bot responses included were likely low. Respondents could also complete the survey more than once. A response authenticator could reduce the likelihood of including both bot responses and repeat observations in future implementations. The large sample size suggests that some tests that reached significance could be overpowered, despite correcting for skewed distributions and multiple tests. Finally, the percentage of the sample that completed the optional intent to seek treatment and treatment modality items was quite small.

Future Directions

Tracking treatment uptake after screen completion in athletes will provide critical information for streamlining community-based screens and facilitating treatment seeking. Given that three-quarters of respondents did not seek treatment two months following completion of the NEDA screen (Fitzsimmons-Craft et al., 2020), future uses of the screen may include increasing education and motivation for behavioral change and pairing respondents with immediate access to providers and tailored programs based on their ED presentation, a strategy of significant value for community-based athletes without direct access to providers through school-based athletic departments, professional teams, or sport governing bodies. Additionally, using screens to assess individuals from target populations, like athletes, and including measures developed specifically for such populations (e.g., the Eating Disorders Screen for Athletes; Hazzard et al., 2020) will provide opportunities to tailor ED prevention and treatment programs to their unique needs. Over 95% of athletes and non-athletes with an ED/subthreshold ED were not in treatment at the time of screening. Thus, it is imperative we improve access to evidence-based care, engage with respondents of online ED screens to directly connect them to resources and treatment options, and use study results to tailor care for unique populations including athletes.

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Conflict of Interest Statement:

Claire Mysko and Lauren Smolar both work for the National Eating Disorders Association as CEO and as Senior Director of Programs, respectively. CM Bulik reports: Shire (grant recipient, Scientific Advisory Board member); Idorsia (consultant); Pearson (author, royalty recipient). No other authors have conflicts to disclose.

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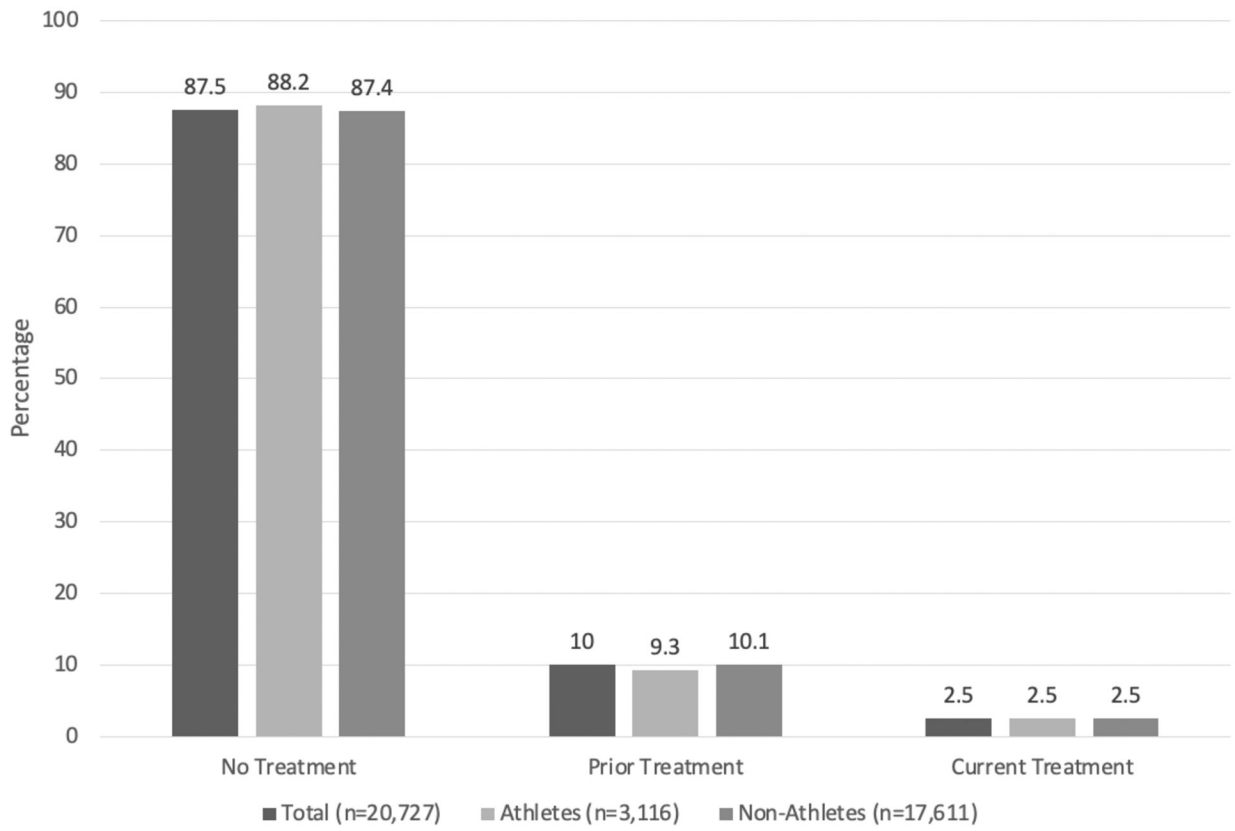


Figure 1:
 Treatment Status for Athletes and Non-Athletes who Screened Positive for an Eating Disorder/Subthreshold Eating Disorder

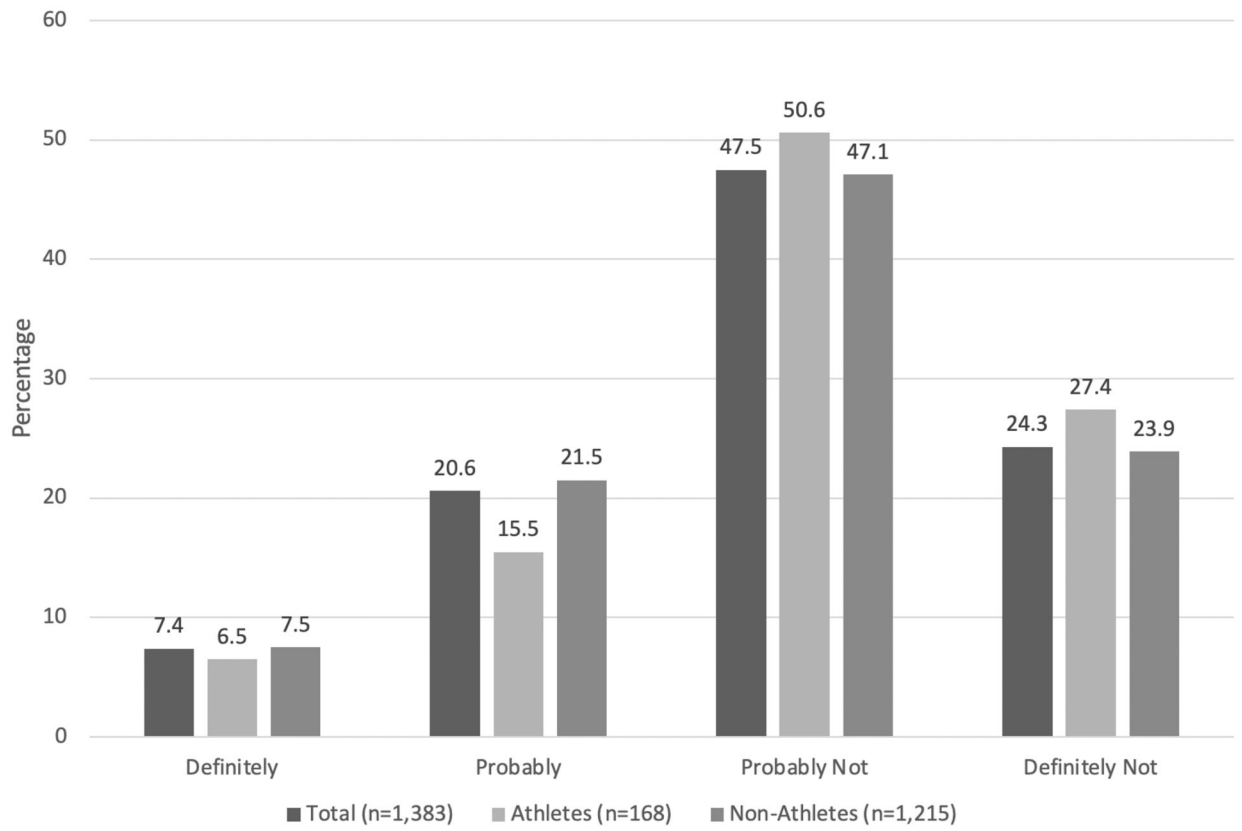


Figure 2:
 Histogram of Responses for Intention to Seek Future Treatment for Individuals who Screened Positive for an Eating Disorder or Subthreshold Eating Disorder

Table 1:

Demographic Characteristics for Athletes, Non-athletes, and the Total Samples

		Athletes n=3,509 % (n)	Non-athletes n=20,411 % (n)	Total n=23,920 % (n)
Age (years)	13–17	57.3 (2,011)	35.3 (7,196)	38.5 (9,207)
	18–24	37.1 (1,301)	45.3 (9,251)	44.1 (10,552)
	25–34	3.9 (138)	12.0 (2,440)	10.8 (2,578)
	35–44	1.1 (37)	3.7 (757)	3.3 (794)
	45–54	0.4 (15)	2.1 (426)	1.8 (441)
	55–64	0.1 (5)	1.3 (272)	1.2 (277)
	65+	<0.1 (2)	0.3 (69)	0.3 (71)
Gender	Female	92.0 (3,227)	90.0 (18,374)	90.3 (21,601)
	Male	4.9 (171)	4.7 (960)	4.7 (1,131)
	Non-binary/third gender/ prefer to self-describe	3.1 (111)	5.3 (1,077)	5.0 (1,188)
Race	American Indian/Alaska Native	0.6 (21)	0.9 (176)	0.8 (197)
	Asian	3.2 (112)	4.0 (816)	3.9 (928)
	Black/African American	1.7 (61)	2.7 (542)	2.5 (603)
	Native Hawaiian/Pacific Islander	0.6 (20)	0.2 (48)	0.3 (68)
	White	82.9 (2,910)	81.5 (16,644)	81.8 (19,554)
	More than one race	7.4 (259)	5.9 (1,209)	6.1 (1,468)
	Other	3.6 (126)	4.8 (976)	4.6 (1,102)
Annual Household Income	\$0–19,999	13.8 (468)	21.3 (4,191)	20.2 (4,659)
	\$20,000–39,999	10.2 (344)	16.9 (3,327)	15.9 (3,671)
	\$40,000–59,999	12.9 (437)	15.5 (3,038)	15.1 (3,475)
	\$60,000–79,999	14.5 (492)	13.3 (2,612)	13.5 (3,104)
	\$80,000–99,999	13.3 (450)	9.4 (1,858)	10.0 (2,308)
	\$100,000–149,999	17.4 (589)	12.8 (2,523)	13.5 (3,112)
	\$150,000+	17.8 (603)	10.8 (2,118)	11.8 (2,721)
Hispanic	9.7 (338)	11.1 (2,253)	10.9 (2,591)	
LGBTQ+	21.1 (739)	26.1 (5,321)	25.3 (6,060)	
Living with a Disability	2.6 (91)	4.0 (809)	3.8 (900)	
Endorsed Any Suicidal Ideation	50.5 (1,772)	54.0 (11,019)	53.5 (12,791)	

Table 2: Means of Disordered Eating Behaviors Episodes Over the Previous 3 Months for Total Sample, Athletes, and Non-Athletes, and Results from T-Test with Adjusted Permutations Q-Values.

Disordered Eating (DE) Behavior	Total Sample			Results from T-Test with Adjusted Permutation Q-Values			
	Mean (SD)	Range	Respondents Reporting at least 1 Episode of DE Behavior % (n)	Athlete Mean (SD)	Non-athlete Mean (SD)	t-value	q-value
Binge Eating	9.69 (18.72)	0-270	74.85 (17,903)	8.38 (16.44)	9.91 (19.08)	4.46	<.001
Vomiting	3.41 (15.01)	0-300	26.05 (6,231)	3.08 (13.04)	3.47 (15.32)	1.39	.211
Diuretics/Laxatives	1.76 (8.50)	0-170	16.95 (4,053)	1.37 (7.03)	1.82 (8.72)	2.92	.006
Excessive Exercise	6.27 (14.97)	0-150	48.52 (11,596)	10.97 (19.59)	5.46 (13.86)	20.27	<.001
Fasting	5.21 (12.58)	0-150	50.70 (12,068)	5.17 (12.54)	5.23 (12.58)	0.24	.826

q-values (p-values adjusted for multiple tests using False Discovery Rate correction and, in this case, were adjusted using permutation methods) and associated means (SDs) that are bolded are significant results.

All means, SDs, and ranges represent sample after using Winsorizing technique where data points above >3 SDs are converted to the value at 3 SD above the mean, thereby limiting the effects of spurious outliers. Given skewed data distributions and a large portion of the sample reporting 0 episodes for each disordered eating behavior, we used the mean and SDs for the subset of respondents who reported at least 1 episode of the respective behavior and converted the data points above 3 SDs to equal the highest data point not considered an outlier.

Table 3:

Logistic Regression and Negative Binomial Regression Models Comparing Athletes and Non-athletes Across Disordered Eating Engagement and Episode Frequency

Disordered Eating Behavior	Logistic Regression Model			Negative Binomial Regression Model*		
	Sample Size (n missing)	Odds Ratio [95% CI]	q-value	Sample Size Reporting at Least 1 Episode in Past 3 Months	Incidence Rate Ratio [95% CI]	q-value
Binge Eating	23,920 (0)	0.85 [0.78, 0.92]	<.001	17,903	0.91 [0.87, 0.95]	<.001
Vomiting	23,920 (0)	0.92 [0.84, 1.00]	.071	6,231	0.97 [0.88, 1.06]	0.545
Diuretics/Laxatives	23,907 (13)	0.97 [0.87, 1.07]	.545	4,053	0.91 [0.82, 1.02]	.140
Excessive Exercise	23,899 (21)	2.30 [2.13, 2.49]	<.001	11,596	1.40 [1.32, 1.47]	<.001
Fasting	23,805 (115)	0.78 [0.73, 0.85]	<.001	12,068	0.99 [0.94, 1.05]	.826

q-values and associated odds ratios or parameter estimates that are bolded are significant results after FDR corrections.

* Negative binomial regression models only included the subset of the sample that reported at least 1 episode of the respective disordered eating behavior. Therefore, there were no missing data in each negative binomial regression model.

df=degrees of freedom, CI= Confidence Interval

Percentage (n) of the Total Sample, Athletes and Non-Athletes in Each Diagnostic and Risk Category

Table 4:

Probable Diagnosis/Risk Category	Total % (n)	Athletes % (n)	Non-Athletes % (n)
Any ED	86.7 (20,727)	88.8 (3,116)	86.3 (17,611)
AN	5.6 (1,338)	6.5 (227)	5.4 (1,111)
BN	8.8 (2,121)	9.2 (322)	8.8 (1,799)
BED	3.1 (758)	1.7 (60)	3.4 (698)
Subthreshold BN	26.9 (6,427)	28.9 (1,013)	26.5 (5,414)
Subthreshold BED	4.5 (1,071)	3.3 (115)	4.7 (956)
PD	1.2 (280)	1.0 (37)	1.2 (243)
Unspecified ED	31.4 (7,515)	33.6 (1,179)	31.0 (6,336)
ARFID	5.2 (1,217)	4.6 (163)	5.2 (1,054)
At risk	9.9 (2,376)	7.5 (264)	10.4 (2,112)
No risk	3.4 (817)	3.7 (129)	3.4 (688)

AN = anorexia nervosa; BN = bulimia nervosa; BED = binge-eating disorder; PD = purging disorder; ARFID = avoidant/restrictive food intake disorder.

The diagnostic and risk categories are listed in a hierarchical manner with AN at the top and no risk at the bottom; respondents were assigned to one diagnostic/risk category based on their reported symptoms.

Table 5:

Percentage (n) of Intended Treatment Modalities for Athletes and Non-Athletes who Screened Positive for an Eating Disorder or Subthreshold Eating Disorder

Treatment Modality	All who responded to intention to seek treatment item (n=1,383)		All who responded “probably” or “definitely” to intention to seek treatment item (n=390)	
	Athletes % (n) n=168	Non-Athletes % (n) n=1,215	Athletes % (n) n=37	Non-Athletes % (n) n=353
Mental health professional	19.6 (33)	19.4 (236)	64.9 (24)	52.4 (185)
Medical doctor	7.7 (13)	10.5 (127)	21.6 (8)	28.3 (100)
NEDA helpline	1.2 (2)	4.0 (49)	2.7 (1)	9.9 (35)
Online program	6.6 (11)	6.8 (82)	13.5 (5)	11.6 (41)
Support group	3.6 (6)	5.6 (68)	13.5 (5)	13.9 (49)
Other	7.1 (12)	5.9 (72)	5.4 (2)	6.8 (24)