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Triggers for eating disorder onset in youth with anorexia nervosa across the weight spectrum

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ABSTRACT

To aid in more targeted eating disorder (ED) prevention efforts, we sought to identify sociodemographic and weight-related risk factors for identified triggers for the onset of anorexia nervosa (AN) in youth. We conducted a retrospective chart review of youth admitted for medical treatment of AN between January 2015 and February 2020. From multidisciplinary admission notes, we extracted patient-reported reasons for diet/exercise changes. We used qualitative thematic analysis to identify ED triggers, then categorized each trigger as binary variables (presence/absence) for logistic regression analysis of risks associated with each trigger. Of 150 patients, mean (SD) age was 14.1(2.3) years. A total of 129 (86%) were female and 120 (80%) were Non-Hispanic White. Triggers included environmental stressors (reported by 30%), external pressures of the thin/fit ideal (29%), internalized thin/fit ideal (29%), weight-related teasing (19%), and receiving health education (14%). Younger age was associated with higher odds of weight-related teasing ($p = .04$) and health education ($p = .03$). Males had greater odds of internalized thin/fit ideal than females ($p = .04$). Those with premorbid body mass indices ≥85th percentile for age and sex had greater odds of reporting positive reinforcement ($p = .03$) and weight-related teasing ($p = .04$) than those with weights <85th percentile. We use these findings to detail potential targets for advancing ED prevention efforts.

Clinical implications

- The thin or fit ideal remains a common trigger for eating disorders in youth
- Unintentional weight changes should be closely monitored in youth

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- Early adolescents may be especially vulnerable to "health" education
- Positive reinforcement of weight loss may reinforce disordered eating.

Introduction

Anorexia nervosa (AN) is a condition that can affect people of all ages, genders, races, ethnicities, body shapes, and weight statuses (Deloitte Access Economics, 2020). When diagnosed with AN, individuals are often delineated into a diagnosis of AN or atypical AN (AAN) based on whether their presenting weight is considered underweight or not (American Psychiatric Association, 2013). Individuals with AAN have all of the features of AN, but weight remains in a 'normal' or elevated range despite significant weight loss. While the diagnosis differs based solely on the presenting weight status, the physical and psychological complications of AN and AAN are generally the same (Walsh et al., 2022). Thus, for the purposes of this study, AN and atypical AN will hereafter be referred together as AN (unless otherwise specified).

Given the seriousness of the medical and psychological consequences caused by the effects of malnutrition and compensatory behaviors like purging (Cass et al., 2020; Udo et al., 2019), understanding what may increase an individual's risk of developing AN is critical. There are several well-known triggers for the onset of AN, especially for individuals who are underweight, such as a desire to achieve the thin ideal (Barakat et al., 2023; Chen & Couturier, 2019) and wanting to have optimal sports performance (Sundgot-Borgen, 1994). However, previous studies were largely performed on underweight female patients, and few studies have re-examined eating disorder (ED) triggers in the last decade, especially since the inclusion of AAN in the Diagnostic and Statistical Manual of Mental Disorders, 5th edition. This is a critical gap for many reasons. First, the updated definition of AN in the 5th Edition Diagnostic and Statistical Manual from 2013 allowed for better recognition and diagnosis of AN in individuals of higher weights as well as in males. Secondly, the rapid growth of social media has continued, and social media has been shown to not just cause body dissatisfaction, but also provide a plethora of pro-AN and pro-dieting content (Möri et al., 2022; Pruccoli et al., 2022; Turner & Lefevre, 2017). Lastly, there has been a concerted anti-obesity public health effort in response to the growing rates of obesity in the past few decades (World Health Organization, 2022), which have inadvertently led to increased messages promoting weight stigmatization and a drive for thinness—known risk factors for developing eating disorders (Bristow et al., 2020, 2022).

In particular, we now understand that as much as 40% of adolescents and young adults (AYA) with AN had weights classifiable as 'overweight' or 'obesity' prior to their weight loss (Lebow et al., 2015; Matthews, Kramer, et al., 2022; Meierer et al., 2019). This population of patients with AN and premorbid elevated weights (body mass indices [BMI] ≥85th

percentile for age-and-sex in youth ≤19 years of age) may have longer duration of illness, lose more weight over a shorter period of time, and have equally, if not more, dangerous complications of malnutrition than those who were previously normal weighted (Garber et al., 2019; Lebow et al., 2015; Meierer et al., 2019; Whitelaw et al., 2018). They also frequently experience increased weight stigma (Matthews, Kramer, et al., 2022; Mensinger, 2021) and are particularly vulnerable to complications of AN. As they often defy the stereotype of an individual with a restrictive ED, they are at increased risk of underdiagnosis and lack of treatment, resulting in greater and more rapid weight loss than those without premorbid BMIs ≥85th percentile (Lebow et al., 2015; Lin et al., 2022). Given the unique experiences of individuals with AN and a history of higher weights, it is especially important for us to identify ED triggers specific to this population, as it can provide evidence to support more targeted prevention techniques.

Similarly, males with AN are often underdiagnosed and are less likely to receive treatment (Sweeting et al., 2015). When they do seek treatment, it is often only after significant amounts of weight loss leading to medical instability (Matthews et al., 2019; Matthews, Gordon, et al., 2022). Despite the growing understanding that AN can present in males, few ED prevention programs exist that specifically target the male sex, and the development of these programs is hindered by the paucity of knowledge for how to tailor prevention methods for this population.

Lastly, the incidence of AN has been increasing for youth early in adolescence (Van Eeden et al., 2021), and more evidence has documented the prevalence of AN in children younger than 10 years old (Merikangas et al., 2010; Rozzell et al., 2019). For these children and young adolescents, it is unknown if their motivation to lose weight was different than older adolescents. Without this knowledge, current ED prevention techniques may be ineffective for these youth.

Given the broadened understanding of the variability in weight, sex, and age in which AN can present, it is all the more important for us to examine how these factors may be associated with ED triggers, in order to support more targeted prevention and intervention efforts. We first sought to examine self-reported triggers for the onset of behaviors consistent with AN in youth medically hospitalized for medical stabilization. We also examined sociodemographic (e.g., gender, age) and weight-related factors (e.g., premorbid weight status) associated with increased risk of each trigger, in order to understand their potential associations with AN onset in different subgroups. This is a critical gap in current knowledge and may aid in more effective and targeted prevention efforts. Although we used an inductive qualitative method to allow common

themes to emerge from the data, we hypothesized certain themes would emerge reflecting known triggers such as weight stigma, "healthy" or "fit" ideals, and peer and social media influence. Additionally, given the increased efforts to fight childhood obesity, we also hypothesized that those with premorbid BMIs ≥85th percentile would be more likely than those with premorbid BMIs <85th percentile to report physicians recommending weight loss as an ED trigger.

Methods

Study description

We conducted a retrospective, cross-sectional electronic chart review of patients admitted to a large, tertiary, free-standing children's hospital in the Eastern United States, for the treatment of medical complications of AN between January 2015 through February 2020. Potential participants were identified using ICD-10 billing codes AN, atypical AN, and Other Specified Feeding and Eating Disorder (the umbrella diagnosis that encompasses atypical AN). During hospital admission, all patients are seen by a multidisciplinary treatment team of adolescent medicine physicians, psychologists, and dietitians. Patients were included in this study if the psychology admission note gave a Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013) diagnosis of AN or atypical AN. Patients were included if it was their first hospital admission and they required medical stabilization (e.g., for bradycardia, hypotension, syncope, or severe malnutrition). Patients were excluded if they were >19 years of age or were already weight restored.

Data extraction

Electronic medical records were reviewed to obtain demographic data (age, gender, race/ethnicity), weight history (admission weight and BMI percentile, previous growth trajectory, amount of weight loss, time of weight loss), and ED history (length of symptoms, previous treatment). The percentage of total body weight loss was then calculated from the highest weight minus lowest weight, divided by highest weight. Rate of weight loss was calculated as the total weight loss (highest weight minus lowest weight) divided by the time of over which the patient reported they lost weight.

To obtain patient-reported triggers for changing their diet or exercise behaviors, we reviewed and extracted excerpts only from the subjective portions of the psychology, medicine, and nutrition admission notes. These patient-reported triggers included triggers that were directly reported by the

patient as well as triggers that parents reported on behalf of their children (e.g., reporting that their child had been teased for their weight just prior to dieting).

Thematic analysis

Using the Braun and Clarke qualitative thematic approach (Braun & Clarke, 2006), we created initial codes that matched the extracted data, and then organized them into broader themes. Subsequent revisions led to more concise themes. To ensure reliability and consistency, all data were double coded by two independent reviewers. Inconsistent coding between the two reviewers was later examined with the two reviewers by a third reviewer in order to arrive at a consensus, often through re-reviewing the patient chart. All theme names and definitions emerged throughout the process of inductive analysis. After finalizing each theme, the frequency of each ED trigger was counted. A patient may have endorsed multiple themes, and these were counted independently.

Quantitative analysis

Demographic characteristics were analyzed using descriptive statistics and reported as means or frequencies. Differences in the age, sex, and race/ethnicity by premorbid weight status were analyzed using chi-square analyses for categorical variables and independent t-tests for continuous variables. To understand the association between patient characteristics (i.e., age, gender, race/ethnicity, and premorbid weight status) and each ED trigger, we treated each theme as a dichotomous variable (presence or absence of the ED trigger) to create binary logistic regression models. Of note, the results included nominal p-values and these were not corrected for multiple comparisons. All data were analyzed using IBM SPSS v28. The study was approved by the Hospital Institutional Review Board and informed consent was waived given the retrospective study design.

Results

Sample characteristics

Demographic characteristics

A total of 150 patients, ages 9–19 years were identified. The mean (SD) age was 14.1 (2.3) years. The majority were female sex at birth ($n = 129$ [86%]) and Non-Hispanic White (120 [80%]) (Table 1).

Table 1. Sample characteristics ($N = 150$).

	Mean (SD) or n (%)
Age	14.1 (2.3) years
Sex	
Female	129 (86.0%)
Male	21 (14.0%)
Race/Ethnicity	
White	120 (80.0%)
Black	3 (2.0%)
Asian	10 (6.7%)
Hispanic	10 (6.7%)
Multiracial	7 (4.7%)
Premorbid BMI Status	
<85th percentile	115 (76.7%)
≥85th percentile	35 (23.3%)
Admission Diagnosis	
AN (≤5th percentile BMI)	79 (52.7%)
AAN (>5th percentile BMI)	71 (47.2%)

Note. SD = standard deviation; BMI = body mass index.

Weight characteristics

Premorbid weight groups were determined by the midpoint for their previous growth trajectory (e.g., if a patient grew anywhere from the 65th to 85th percentile for BMI, then the midpoint BMI percentile would be the 75th percentile). The cutoff between 'normal' vs. 'overweight/obesity' was based on Centers for Disease Control and Prevention growth charts; 115 (77%) had premorbid weights classified as 'normal' (<85th percentile for BMI), and 35 (23%) had premorbid weights classified as "overweight/obesity" (≥85th percentile) (Table 1).

Males had significantly higher odds than females of having premorbid 'overweight/obesity' classifications (OR = 4.81, 95%CI 1.83–12.66; X^2 (1) = 11.52, $p < .001$). We also assessed for any significant differences in amount and rate of weight loss based on premorbid weight status. We found that those with premorbid 'overweight/obesity' classifications lost a mean 4.4% (95%CI 0.16–8.72 [$p = .04$]) more of their total body weight than those with premorbid 'normal' weight (22% vs. 18%), and at a rate that was 5.6 pounds per month (95%CI 1.0–10.2 [$p = .02$]) more rapid than those with premorbid 'normal' weight (11.4 vs. 5.7 pounds/month). There was no significant difference in premorbid weight by age or race/ethnicity.

Triggers for eating disorder onset

A total of 140 (93%) patients had at least one ED trigger reported by the patient and/or their parent(s) and thus were included in the final analysis. Prior to analyzing the frequencies of each theme, the ED trigger themes were delineated into main themes, subthemes, and additional themes of note. Main themes had the most clear and cohesive definitions. Subthemes were defined as themes that fit well inside a main theme but were of particular clinical

Table 2. Themes identified for eating disorder triggers.

Theme	Definition	N (%)	Example excerpt(s)
Main themes			
Environmental Changes	Changes to school, living (family member leaving or divorce), loved ones (death or illness), friend problems, treatment team changes.	42 (30)	*Switching to a more challenging school environment.* *Her dad being diagnosed with lung cancer.*
External pressures of the thin ideal	Pressures and comments from others (family, friends, peers, social media) to diet, lose weight, or be fit/ exercise. Positive reinforcement.	41 (29.3)	*A friend making comments that she was eating too many cookies.* *Mom commenting on how people who do gymnastics are skinny.*
Internalization of thin ideal	Having body image concerns or perceiving themselves to be "too" large/heavy or fat/out of shape.	40 (28.6)	*He found himself looking in the mirror and seeing "an obese person" and was upset about it and knew he needed to change to make himself healthier.*
Healthy Eating Education	Getting education on "healthy" eating/ lifestyle in a class or from an authority figure (e.g. physician comments on weight/health).	19 (13.6)	*Father also believes that the school started emphasizing healthy eating.* *Reading a National Geographical article about sugar.*
Desire to eat or "live" healthy	Deciding to start calorie counting, working out, or doing other "healthy eating" or activity.	30 (21.4)	*Wanting to adopt A healthier diet such as eating fruits and vegetables and fewer carbs. Mom believes healthy eating and food-related Instagram accounts have contributed.*
Weight-related Teasing/ Bullying	Getting teased/bullied or receiving a negative comment (e.g. called "fat") about their body shape, size, or what they were eating.	27 (19.3)	*She had a rough year where people talked about her behind her back, they talked about her body, weight, and other things. So, she decided to make herself happier by "being healthier" and exercising.*
Sports Performance Motivation/ Competition	Wanting to get better, be more competitive, or maintain a sport or activity, or restrictive eating surrounding change in a sport/ activity.	24 (17.1)	*[Patient] remembers wanting to eat healthier, get stronger and be more in shape because she felt like she would get short of breath in softball.*
Mood Concerns	Mood changes or stress (uses the word stress) leading to appetite/exercise changes.	15 (10.7)	*Getting rejected from her top college, caused a significant emotional set-back, resulting in further exacerbation of her restrictive eating behaviors.*
Subthemes			
Positive Reinforcement (subtheme for external pressures of the thin ideal)	Receiving encouragement or compliments about changes in appearance and/or diet/exercise.	12 (8.6)	*Her godmother commenting that her face looked skinny and that she looked great compared to last year when she looked so chubby.*
Physician Comment (subtheme for external pressures of the thin ideal)	Healthcare provider commenting on weight or health leading to body image concern and/or change in diet/exercise.	9 (6.4)	*Dad believes hearing her weight percentile at pediatrician visit which also caused her to compare it with her 14 years old sister.*
Additional themes of note			
Unintentional weight change	Preceding weight loss/gain or diet changes for other reasons (vacation, illness, appetite, etc.).	17 (12.1)	*Both mom and patient report that her trigger was developing a stomach bug.* *Mom thinks after she started gaining weight due to birth control.*
Victimization and Trauma	Bullying (unrelated to weight or not specified), rape, abuse.	8 (5.7)	*Her father pushing her in the bathroom* *A girl in dance was mean to her and said mean things.*
Family/sibling competition	Needing to compete or out do someone's diet or exercise.	5 (3.6)	*Finding out she weighed 10 pounds more than her twin at their yearly physical.*

interest that we wished to assess independently. Additional themes of note were clinically important to share, but the definitions were either too broad or unclear due to a lack of clarifying information in the notes.

Main themes

Eight main themes were identified (Table 2). Forty-two patients (30%) reported experiencing a change to their social or physical environment (e.g., transitioning schools, parental divorce, or a terminal or other medical diagnosis in family members); 41 (29%) reported external pressure of the thin or fit ideal (e.g., others making comments on the way they looked or what they ate, social media that seemed to prize an ideal image, positive reinforcement following weight loss); 40 (29%) stated it was their own internalized perception about their weight and body shape; 30 (21%) wanted to practice "healthy" living; 27 (19%) experienced weight-related teasing; 24 (17%) reported initially changing their physical activity for a sport; 19 (14%) said they received education about healthy food, exercise, or lifestyle habits (e.g., from health class, a coach, or a physician); and 15 (11%) reported mood changes (e.g., feeling more stressed or depressed).

Subthemes

We had particular interest in two subthemes (Table 2) within "external pressures of the thin or fit ideal." The first was positive reinforcement about exercise and/or dieting that inadvertently encouraged disordered behaviors, which was reported by 12 (9%) patients. The second was physician comments about weight, which was reported by nine (6%) of patients. Notably, the physician comments were not uniformly recommended to lose weight. Although some (2 out of 9) specifically reported that their primary care physician (PCP) recommended losing weight, two patients reported it was a physician discussing their diagnoses of pre-diabetes and diabetes, and the rest of the patients (5 out of 9) only reported that their PCP made a comment about their weight status (e.g., "[The PCP] commented their weight was greater than the 90th percentile;" "It was after a doctor's visit where she was told that her weight was low, and she subsequently began weighing herself to monitor;" "... being told she was overweight at the Pediatrician's office" and "Hearing at her annual physical that she had gained weight consistent with puberty").

Additional themes of note

Three other clinically important triggers for ED behaviors were noted but were not clearly delineated so were not considered main themes (Table 2). Seventeen participants (12%) reported unintentional weight changes preceding the purposeful weight loss (e.g., weight loss or gain from medication, puberty, illness, or travel/vacation). Eight (6%) reported a traumatic

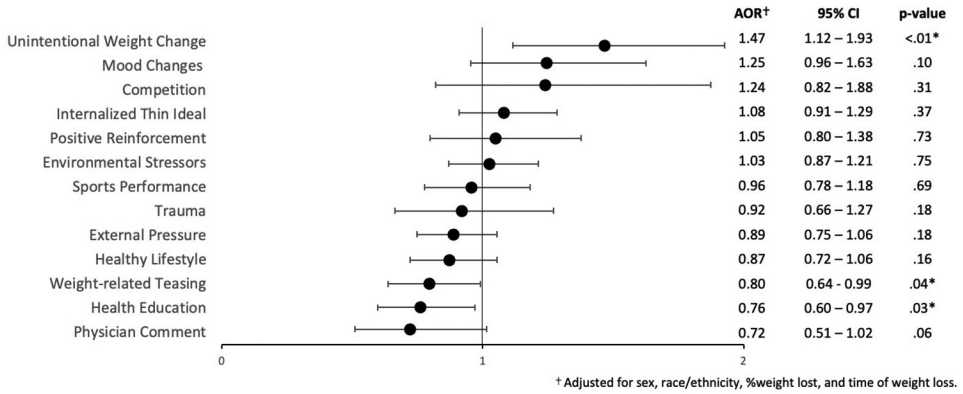

Figure 1. Adjusted odds ratios of eating disorder triggers for every year older.

experience (e.g., rape, abuse, or bullying without specifying weight). And lastly, 5 (4%) reported feeling competitive, needing to outdo someone else's diet or exercise regimen.

The association between age, gender, race/ethnicity and eating disorder triggers

Using binary logistic regression models, we assessed the association between age, gender, and race/ethnicity and each of the ED trigger themes. Each model included all three demographic variables and the percentage of total weight loss and time of weight loss (to represent severity of malnutrition and length of illness). Of note, due to low sample sizes in non-white, non-Hispanic groups, race/ethnicity was treated as a binary variable (non-Hispanic white vs. Hispanic or non-white).

Age

Regression analyses showed that for every year younger, patients had 1.31 times the odds of reporting health education (95% CI: 1.03–1.67 [p=0.027]) and 1.26 times the odds of weight-related teasing (95% CI 1.01–1.57 [p=0.041]) as triggers for their ED behaviors when controlling for gender, race/ethnicity, and amount and time of weight loss. A similar trend was seen with younger age and physician comments about weight, but this did not reach statistical significance (OR 1.39; 95%CI 0.98–1.96 [p=0.061]). For every year older, patients had 1.47 times the odds of reporting a preceding unintentional weight change as a trigger for their ED (95%CI 1.12–1.93 [$p = .006$]). There were no other significant findings between age and the remaining ED triggers (Figure 1).

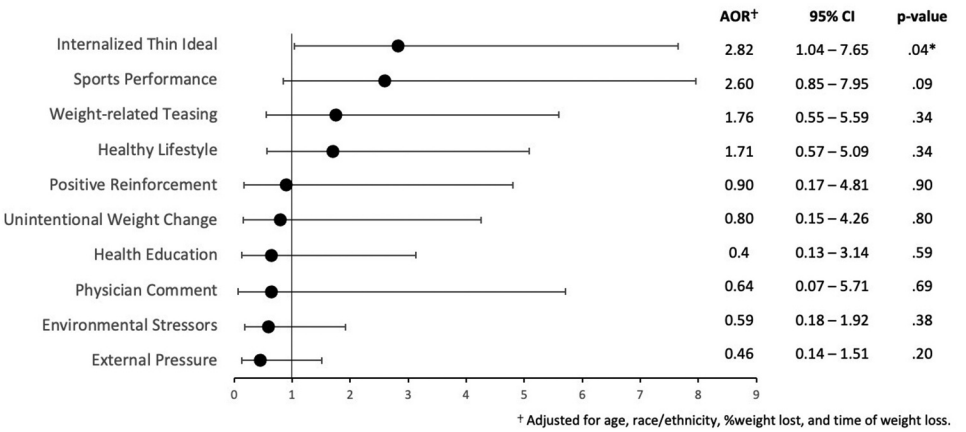

Figure 2. Adjusted odds ratios of eating disorder triggers for male vs. female.

Gender

Regression analyses showed that compared to females, males had 2.82 times the odds of reporting internalized thin or fit ideal as an ED trigger (95% CI: 1.04–7.63 [p=0.042]), when controlling for age, race/ethnicity, and amount and time of weight loss. There were no other significant findings between age and the remaining ED triggers (Figure 2). Of note, results from the models for Trauma, Competition, and Mood Triggers were uninterpretable due to a lack of power from a very small sample size reporting these triggers.

Race/ethnicity

We did not find any significant associations between race/ethnicity and the ED triggers.

The association between premorbid weight status and eating disorder triggers

Using logistic regression models, we assessed the association between premorbid weight classification and each of the ED trigger themes while controlling for sex, race/ethnicity, amount of weight loss, and time of weight loss. Percentage of total weight loss and time of weight loss were included to represent illness severity and duration of illness.

Compared to those with premorbid 'normal' weights, those with premorbid 'overweight/obesity' classification had 4.54 times the odds of reporting positive reinforcement about weight loss (95% CI: 1.15–17.97 [$p = .03$]) and 3.36 times the odds of weight-related teasing (95% CI: 1.23–9.16, $p = .04$) as triggers for their ED. There were no significant differences between the other ED triggers and premorbid weight status (Figure 3).

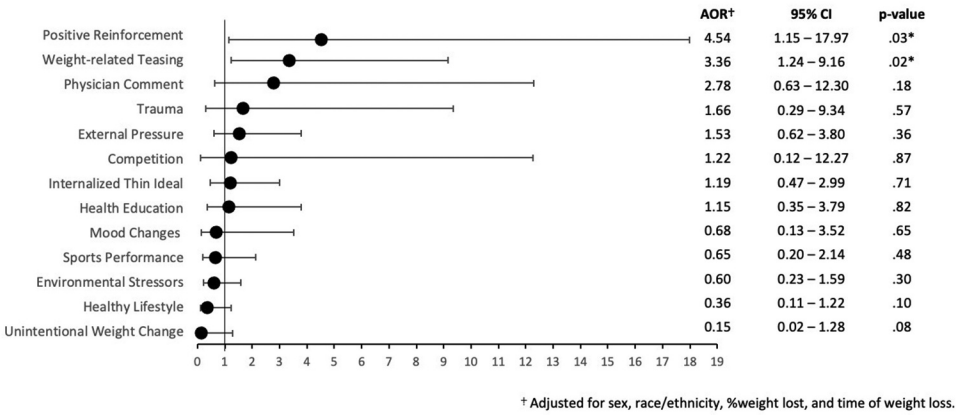

Figure 3. Adjusted odds ratios of eating disorder triggers for premorbid 'overweight/obesity' vs. premorbid 'normal' weights.

Discussion

ED prevention areas of focus

This study aimed to identify a comprehensive list of common, self-reported triggers for the onset of AN among youth across the full spectrum of premorbid weights, ages, and sex. The study found that individuals with AN may experience a range of internal and external risk factors putting them at an elevated risk for the development of a restrictive ED, highlighting the need to consider various domains of one's well-being when developing preventative efforts.

We believe that our findings can provide the following areas of focus for health care providers, caregivers, and public health groups when considering ED prevention:

Supporting adolescents and young adults through planned and unplanned life changes

Our findings suggest that the experience of physical or social *environmental changes or stressors* (e.g., change to school or living arrangement, disruptions in relationships) was the most common trigger for AN. This is consistent with the literature which has shown that experiencing stressful life events or transitional events, such as changes in school (e.g., leaving home to attend college for the first time), changes in interpersonal relationships (e.g., breakup, parental divorce), or a loss of support may precipitate the onset of EDs (Berge et al., 2012). To regulate the negative affect experienced from stressful life events, individuals may end up engaging in risky disordered eating behaviors (Loth et al., 2008). Relatedly, *mood changes*, should also be monitored closely. Depression and anxiety are common among individuals with EDs (Hughes et al., 2013), and depression may be associated with more severe ED symptoms

(Brand-Gothelf et al., 2014) and negatively influence ED recovery (Eskild-jensen et al., 2020). Therefore, parents, healthcare providers, and/or educators should consider how to increase monitoring and provide support to AYAs through life transitions or unexpected changes.

Decreasing messages of thin/fit ideals in media, society, health, and medicine

Unsurprisingly, *external pressure* and *internalization of thin/fit ideals* were identified as two common ED triggers, which is consistent with existing literature (Hawkins et al., 2004; Thompson & Stice, 2001). In particular, this present study found that AN could be triggered by pressures or comments from family, peers, and social media to lose weight, diet, or be fit/exercise. Notably, two subthemes emerged as well, including positive reinforcement about weight loss and physicians making comments about weight. *Weight-related teasing/bullying*, another main theme identified in our study, has also been consistently shown to predict disordered eating (e.g., fasting, dieting, binging), thoughts, and behaviors (e.g., purging, and use of diet pills, laxatives, and diuretics) in AYA (Hooper et al., 2021; Obeid et al., 2022; O'Hara et al., 2016). However, our study was able to highlight that younger adolescents may be especially sensitive to this weight-related teasing. Furthermore, we found that these external pressures can come from a variety of sources, such as family, friends, coaches, and even physicians, putting youth at risk for ED behaviors. Therefore, public health interventions should focus on decreasing stigmatizing weight-related messages. An emerging and promising target area has been developing ED prevention methods through social media (McLean et al., 2017), as the thin ideals seen in media are associated with body dissatisfaction and disordered eating behaviors (Anschutz et al., 2008), and damaging, pro-anorexia and pro-ED messages are quite prevalent in social media (Branley & Covey, 2017).

Redefining "healthy" and standardizing health education, especially for children and younger adolescents

The *desire to eat or be healthy* and *receiving 'healthy eating' education* were identified as triggers, and younger individuals were found to be especially influenced by information about healthy eating and lifestyle. Due to increased focus on weight outcomes for children, public health measures have included promoting healthy eating and exercise in school (Centers for Disease Control and Prevention CDC, 2011). Although these are important for general health, the curricula are not specific and it is unclear if the education is appropriate for growing children who have different nutritional needs than adults, and how much weight stigma and fat phobia may be unintentionally taught. Furthermore, research has repeatedly demonstrated that too much focus on exercise and "healthy"-ness can be a risk factor for ED, and fads such as extreme fitness or "clean eating" can be dangerous, significantly increasing

ED risk (Uriegas et al., 2021). More research is needed to understand how education on health, healthy eating, and healthy lifestyle might negatively impact youth across the developmental stages.

Consistent monitoring of athletes' eating and exercise at all ages

Patients reported changing their diet/exercise to maintain or *improve their sports performance* or to become more competitive. EDs are highly prevalent in athletes, estimated to be up to 19% of male athletes and 45% of female athletes across the world (Bratland-Sanda & Sundgot-Borgen, 2013). Athletes feel pressure to perform and have an ideal body, which may lead to disordered eating and behaviors (Stoyel, Delderfield, et al., 2021; Stoyel, Stride, et al., 2021). Our cohort were largely athletes in middle school or high school who were already feeling this pressure. We must find ways to monitor for disordered behaviors in our athletes early on and consistently throughout their careers, as disordered eating in youth athletes is associated with poor bone health and higher rates of injury, hormonal dysfunction, and poor mental health (Gusfa et al., 2022; Kontele & Vassilakou, 2021; Ravi et al., 2021; Tenforde et al., 2021; Wiebe et al., 2021).

Providing close monitoring for unintentional weight changes

Unintentional weight changes (i.e., weight losses or gains from reasons, such as medication, puberty, illness, or travel) were commonly reported as triggers by our cohort and their parents. Previous research suggested that unintentional weight loss due to illness, medication side effects, surgery, or grief may be as powerful a trigger as intentional restricting for AN (Brandenburg & Andersen, 2007). Our results also suggest that the older the individuals are, the higher the likelihood of developing ED behaviors after unintentional weight changes. This may be because poor body image is more susceptible to weight changes among older adolescents, and body dissatisfaction is a risk factor for AN (Sattler et al., 2020). Therefore, unintentional weight losses or gains should not be overlooked, but be monitored closely (e.g., not waiting until the next annual physical) to ensure individuals do not inadvertently develop disordered eating behaviors despite having no identified ED concerns prior to the unintentional weight loss.

Targeting youth with higher weights in an treatment and prevention efforts

In our cohort of AYA with AN, nearly a quarter had premorbid 'overweight/obesity' classifications. And those with premorbid 'overweight/obesity' had greater percentage and faster rate of weight loss than those without premorbid weights characterized as 'overweight/obesity,' potentially placing them at higher risk of complications related to AN (Garber et al., 2019; Lin et al., 2022). This subpopulation was also found to have experienced more *weight-based teasing* prior to their weight loss and report more *positive reinforcement* after their weight loss, increasing their risk of ED behaviors. This is consistent with other studies

which show that youth with higher BMIs experience more weight-related teasing, poor body image, and more disordered eating than their peers with lower BMIs (Matthews, Kramer, et al., 2022; Obeid et al., 2022).

Promisingly, The Body Project, a group intervention program designed to help high-school girls reduce body dissatisfaction, internalized thin ideals, and overall ED symptomatology has been shown to be effective in reducing risk of ED onset for AYA (Stice et al., 2006, 2008). However, few have implemented this solely in AYA with higher weights, and one randomized controlled trial felt modifications for this population would be necessary for effective prevention (Olson et al., 2018). Therefore, premorbid weight status should be considered when treating AN and when developing targeted ED prevention efforts.

Improving the recognition of body dissatisfaction and EDs in males

One-fifth of our cohort of hospitalized patients was male, which is a similar to other studies of hospitalized youth with AN (Matthews, Kramer, et al., 2022). Despite the increasing prevalence of EDs in males (Mitchison et al., 2014), it continues to be underrecognized (Gorrell & Murray, 2019). Furthermore, our finding that males were more likely to have premorbid 'overweight/obesity' weight classifications than females, and may further increase their risk of experiencing weight stigma and then having a delayed diagnosis after developing AN. Additionally, we found that males may be especially vulnerable to the effect of the internalization of thin/fit ideals, even more so than our female population. This is aligned with the literature suggesting that males also experience body dissatisfaction and desire for not just the thin-ideal but also the fit/muscular ideal and that these are correlated with ED tendencies (Gorrell & Murray, 2019; Ralph-Nearman & Filik, 2018).

Prevention techniques, such as the aforementioned The Body Project, have been effective in decreasing ED risk when modified for males, such as decreasing drive for thinness and muscularity (Brown et al., 2017). However, group prevention programming such as this is limited only to those who have signed up to participate. Especially, while EDs are still underrecognized in males, we must be more intentional about identifying some global techniques or messaging strategies that can reach males in our ED prevention and treatment efforts.

Study strengths and limitations

Strengths

Our study was able to systematically assess for various types of ED triggers among youth medically hospitalized for AN. We were also inclusive of a younger age range, rather than just older adolescents and young adults, and included patients with a wide range of weight statuses. Furthermore, our innovative mixed-methods analysis allows us to identify triggers using data

provided by patients and their families and in turn, understand the association between the identified ED triggers and sample characteristics. Our findings add to the evidence base that can aid prevention efforts for AN in AYA with premorbid higher weights, an underrecognized population. Our study also had a clearly defined cohort, all who received a full psychological evaluation from PhD psychologists and received confirmed DSM diagnoses of AN or AAN. We were aided by the multi-disciplinary evaluations that added additional data regarding potential ED triggers.

Limitations

Our study used a cross-sectional, retrospective design. Therefore, when gathering data from medical records, a lack of a reported ED trigger did not necessarily mean patients did not experience that trigger. Also, although we only extracted data from the subjective sections of the note, we cannot control for provider bias which may have led them to ask specific questions of certain patients (e.g., only asking patients with higher weights about weight-related teasing).

The participants were also predominantly non-Hispanic White and female sex at birth, limiting the generalizability of the findings to other racial and ethnic groups as well as sexual identities. Future research in this area would benefit from using a longitudinal study design with a more diverse population to better understand the triggers for the onset of ED. Additionally, larger sample sizes would add to the robustness of our findings; notably, the confidence intervals were quite wide for some of our findings for sex and premorbid weight, highlighting the smaller sample sizes of males and those with higher BMIs, respectively.

Lastly, the data were collected at the beginning of the COVID-19 pandemic and we elected not to include clinical information of patients admitted after February 2020. Given that our most common trigger is environmental changes, future research is needed to further understand the role of COVID-19 in the development of EDs. In fact, it is well documented that COVID-19 contributed to a rise in EDs (Hartman-Munick et al., 2022; Lin et al., 2021), and so it would be helpful to investigate ways to promote resilience and prevent EDs in youth experiencing significant life changes.

Conclusion

Our results suggest that individuals may experience various types of triggers for their ED behaviors. Our paper is novel in highlighting implications for improving clinical practice. It is necessary for healthcare providers to assess various internal and external risk factors for EDs and monitor unintended weight changes closely. It is also important for clinicians to note unique triggers for those with premorbid 'obesity/overweight,' younger patients, and

male patients. Continued assessment of our listed ED prevention areas of focus and the risk factors for ED onset will greatly guide preventative efforts and improve treatment approaches.

Acknowledgments

For the purpose of this paper, we refer to body mass index (BMI) numbers as opposed to the diagnosis of 'overweight or obesity,' given research that highlights how these terms can be stigmatizing. Where needed, we referred to weight classifications in quotes: 'overweight/obesity' and 'normal.'

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