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Driven Exercise Among Treatment-Seeking Youth with Eating Disorders

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Abstract

Purpose—This study evaluated the prevalence and clinical significance of driven exercise (DE) in treatment-seeking youth.

Methods—Participants were 380 consecutive referrals to a pediatric eating disorder program (90.8% female; M age=14.9±2.2). Spearman's rho correlations examined the relation between DE frequency, and Beck Depression Inventory (BDI) and Eating Disorders Examination (EDE) Global Severity scores. ANOVA compared those reporting only DE, only vomiting, or both DE and vomiting on the aforementioned measures.

Results—51.3% of participants (n=193) reported DE in the past 3 months, with an average of 21.8 (*SD*=32.6) episodes. Frequency of DE was related to EDE global severity score (Spearman's rho=.46; *p*<.001) and BDI Total Score (Spearman's rho=.33; *p*<.001). Participants reporting both vomiting and DE had the highest EDE global severity and BDI total scores.

Conclusions—DE is associated with greater eating disorder and depressive symptomatology, especially when paired with vomiting. The findings highlight the importance of assessing for DE in youth presenting for eating disorder treatment.

Keywords

driven exercise; adolescent eating disorders; compensatory behaviors

1. Introduction

Compensatory behaviors are common features of anorexia nervosa (AN), bulimia nervosa (BN), and eating disorder not otherwise specified (EDNOS; American Psychological Association, 2000). Driven Exercise (DE) refers to activity that is intense and has a compulsive quality; a person who engages in DE may describe feeling compelled to exercise or having a strong negative reaction if prevented from exercising (Fairburn & Cooper, 1993). There has been controversy in the eating disorders literature regarding the use of a

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quantitative (i.e., exercise which exceeds normal expectations in duration, intensity, and/or frequency) or qualitative (exercise that takes priority over other activities, requires maintenance of a rigid schedule, involves detailed record keeping, and/or is related to extreme guilt or anxiety when not performed) dimensions to denote clinical significance, with some research suggesting that the nature of exercise has better predictive value than the quantity thereof (Adkins & Keel, 2005; Davis & Fox, 1993; Wyatt, 1997). DE is associated with the development and maintenance of eating disorders in adult females (Davis et al., 1997). DE is also a strong predictor of poor treatment outcome in adult eating disorder patients (Bratland-Sanda et al., 2010; Strober, Freeman, & Morrell, 1997) and is associated with depression symptoms (Penas-Lledo, Vaz Leal, & Waller, 2002). Despite the consensus that DE is associated with negative health sequelae in adult eating disorder populations, there is little empirical data regarding the significance of DE in pediatric and adolescent eating disorder populations.

Eating disorders in children and adolescents are important to identify rapidly and treat effectively in order to prevent or minimize chronicity and negative physical and psychosocial health outcomes. Despite findings that DE is prevalent in youth with eating disorders (Eddy, Celio Doyle, Rienecke Hoste, Herzog, & Le Grange, 2008; Machado, Machado, Goncalves, & Hoek, 2007) the current body of evidence regarding the correlates and prognostic significance of DE pertains mainly to adult females with AN or BN diagnoses (Brewerton, Stelfox, Hibbs, Hodges, & Cochrane, 1995; Penas-Lledo, Vaz Leal, & Waller, 2002; Shroff et al., 2006); virtually no research has examined its significance in pediatric populations.

The purpose of the current study is to fill this gap in the literature by examining the prevalence and correlates of DE in a sample of children and adolescents seeking treatment for eating disorders. We hypothesized that, consistent with adult studies (Davis et al., 1997; Penas-Lledo, Vaz Leal, & Waller, 2002), rates of DE would be greater in those with AN. We also hypothesized that, consistent with adult studies (Mond, Hay, Rodgers, & Owen, 2006; Penas-Lledo, Vaz Leal, & Waller, 2002), DE would be associated with greater levels of eating disorder severity and depressive symptoms. Finally, given the high levels of eating disorder and depressive psychopathology associated with self-induced vomiting (Dalle Grave, Calugi, & Marchesini, 2009), we expected DE to be associated with lower levels of eating disorder and depressive psychopathology than other forms of compensatory behaviors.

2. Methods

2.1. Participants

Data were collected from children and adolescents presenting for an initial eating disorder evaluation at the Eating Disorders Program at the University of Chicago Medical Center. Participants were 380 children and adolescents, aged 7 to 18 (M age=14.9±2.2), who met criteria for AN (40.8%; n =155), BN (13.9%; n =53), or EDNOS (45.3%; n =172). Participants were mostly female (90.8%; n =345), and most described themselves as White (72.1%; n =274).

2.2. Procedure

Participants completed questionnaires and a semi-structured interview during a three-hour baseline assessment at the University of Chicago Medical Center. All data were collected before participants initiated treatment. Written consent for patients over 18 years of age or parental/guardian consent and adolescent assent for patients under 18 years of age were obtained. This study was approved by the Institutional Review Board.

2.3. Physical Assessment

The weight and height of each participant were measured by a trained research assistant using a calibrated digital or balance-beam scale. All patients were weighed in light, indoor clothing.

2.4. Measures

2.4.1. Eating Disorder Examination—The Eating Disorder Examination (EDE; Fairburn & Cooper, 1993) is a semi-structured investigator-based interview measuring cognitive and behavioral symptoms related to eating disorders. Cognitive symptoms of eating disorders (e.g., fear of weight gain, overevaluation of shape and weight) are assessed for the past 28 days using a 7-point Likert scale, with higher scores indicating more severe eating disorder pathology. Behavioral symptoms of eating disorders (e.g., dietary restriction, self-induced vomiting) are evaluated through a series of diagnostic questions. Higher scores indicate higher frequency of driven exercise or self-induced vomiting. Specifically, DE is assessed through questions such as: “Over the past four weeks have you exercised as a means of controlling your weight, altering your shape or amount of fat, or burning off calories? Have you felt driven or compelled to exercise?” (Fairburn & Cooper, 1993). Self-induced vomiting is assessed through the question: “Over the past four weeks have you made yourself sick as a means of controlling your shape or weight?” (Fairburn & Cooper, 1993). Global severity scores are determined from the average of the four EDE subscales: Restraint, Eating Concern, Shape Concern, and Weight Concern. Scores on the EDE have demonstrated high test-retest reliability (Grilo, Masheb, Lozano-Blanco & Barry, 2003; Rizvi, Peterson, Crow, & Agras, 2000) and interrater reliability (Grilo, Masheb, Lozano-Blanco & Barry, 2003). The EDE has been utilized in multiple studies of pediatric samples with diagnoses of AN, BN, or EDNOS (Eddy, Celio Doyle, Rienecke Hoste, Herzog, & Le Grange, 2008; Hoste & Le Grange, 2008).

2.4.2. Beck Depression Inventory—The Beck Depression Inventory (BDI) Beck, 1987) is a 21-item self-report inventory designed to assess severity of depressive symptoms. Scores range from 0–63. Scores over 18 indicate moderate to severe depressive symptoms. The BDI has good psychometric properties (Barrera, & Garrison-Jones, 1988) and shows strong associations with clinical depression (Kashani, Sherman, Parker, & Reid, 1990). The BDI has also been utilized in multiple studies with pediatric eating disorder samples (Lock et al., 2010; Zaitsoff, Celio Doyle, Rienecke Hoste, & Le Grange, 2008).

2.5. Data Analysis

Frequency of driven exercise was calculated using descriptive statistics. Spearman’s rho correlations and Mann-Whitney U-tests (to account for the non-normality of DE frequency in the full sample) were used to examine relations between DE frequency and demographic variables (i.e., age, BMI, sex, and race/ethnicity). Spearman’s rho correlations were also used to examine the relation between driven exercise frequency, and BDI and EDE Global Severity scores. A Kruskal-Wallis Test was conducted to examine the frequency of driven exercise episodes among the three diagnostic groups (AN, BN, or EDNOS). One-way ANOVAs and chi-square tests were used to compare groups reporting different forms of compensatory behaviors (i.e., driven exercise only; vomiting only; or both driven exercise and vomiting) on demographic variables. One-way ANCOVAs with simple contrasts, controlling for age and gender, were also used to compare these three groups in terms of BDI and EDE Global Severity scores. We also considered including race/ethnicity and BMI in these ANOVAs but they did not significantly contribute to any of the models and thus were removed from the final analyses.

4. Results

Across diagnostic groups, 51.3% of participants ($n=193$) reported DE in the past 3 months. These participants reported an average of 21.8 ($SD=32.6$) episodes of DE over the past 3 months. Participants with BN reported more frequent DE (Mean rank=205.5) than those with AN (Mean rank=185.8) or EDNOS (Mean rank=190.1), although the difference was not significant ($\chi^2=1.44$; $p=.49$). Frequency of DE episodes was significantly related to EDE Global Severity Score (Spearman's $\rho=.46$; $p<.001$) and BDI Total Score (Spearman's $\rho=.33$; $p<.001$). DE frequency was unrelated to sex [$Z(380)=-.02$; $p=.98$], race/ethnicity [$Z(377)=-.14$; $p=.89$], age (Spearman's $\rho=.04$; $p=.42$), and BMI (Spearman's $\rho=.07$; $p=.21$).

Participants who reported DE as their sole form of compensatory behavior ($n=217$) were compared to those reporting self-induced vomiting as their sole form of compensatory behavior ($n=66$) and those reporting both DE and self-induced vomiting ($n=95$) (see Table 1). These three groups differed significantly across demographic variables: those reporting DE only were comprised of significantly more males and were more likely to be White (as opposed to a racial/ethnic minority) than the other two groups ($ps<.05$). Moreover, those reporting only DE were significantly younger and had significantly lower BMIs than the other two groups ($ps<.001$), who did not differ from one another. There were significant between-group differences in terms of EDE Global Severity Score [$F(2, 377)=36.70$; $p<.001$]. Post-hoc LSD tests indicated that all three groups significantly differed from one another on EDE Global Severity Score (all $ps<.001$); those who reported DE and self-induced vomiting endorsed the highest levels of EDE Global Severity ($M=3.5\pm1.1$), followed by those who reported only self-induced vomiting ($M=2.7\pm1.5$) and those who reported only DE ($M=1.8\pm1.5$). There were also significant groups differences in terms of BDI Total Score [$F(2, 279)=12.41$; $p<.001$], with participants who reported DE and self-induced vomiting endorsing significantly greater depressive symptoms than those who reported only self-induced vomiting ($p=.006$) and those who reported only DE ($p<.001$); those who reported self-induced vomiting only did not significantly differ in terms of depressive symptoms relative to those who reported DE only ($p=.19$).

5. Discussion

The present study aimed to examine the prevalence and diagnostic significance of DE in children and adolescents presenting for eating disorders treatment. DE was quite prevalent in our sample, occurring in approximately half of participants regardless of diagnostic group. Consistent with findings in adult populations (Bratland-Sanda et al., 2010; Penas-Lledo, Vaz Leal, & Waller, 2002), higher frequencies of compensatory exercise were related to greater eating disorder psychopathology and depressive symptoms. This finding may be related to animal literature that found associations between greater use of exercise and increased vulnerability to stress (Treasure & Owen, 1997). This connection between exercise and stress may be related to a maladaptive means of managing an emotional state. DE frequency was not related to eating disorder diagnosis, sex, race, BMI, or age.

Participants who reported DE as their sole compensatory behavior were comprised of significantly more males and non-minorities, and were also significantly younger with lower BMIs than the other two groups. These differences are consistent with previous findings from a national survey that reported minority adolescent males are more likely to use self-induced vomiting and laxatives for weight control than their non-minority counterparts (Lowry, Galuska, Fulton, Weschler, & Kann, 2002). The younger age of the group may support previous studies that suggest that DE has a role in the development and maintenance of eating disorders (Davis et al., 1997; Davis, Kennedy, Ravelski, & Dionne, 1994), such

that the use of only DE as a compensatory behavior may be a precursor to greater eating disorder severity or increased usage of compensatory behaviors if not treated. It is also plausible that younger children are monitored more frequently by caregivers than their adolescent peers, creating the need for a compensatory behavior that appears more socially acceptable, such as exercise.

The findings also suggest that children and adolescents with eating disorders who engage in both DE and self-induced vomiting are the most severe in terms of eating disorder and depression symptoms, followed by those who report only self-induced vomiting, and those who report only DE as compensatory behaviors. The American Academy of Pediatrics reports on the dangers of self-induced vomiting in children and adolescents, specifically noting concerns over dehydration, orthostatic symptoms, and complications from significant deficits in potassium levels (Rosen, 2010). Given the concern over the consequences of self-induced vomiting, along with the associations with eating disorder pathology found in this study, the importance of DE is highlighted by the finding that self-induced vomiting combined with DE is associated with a more severe symptom profile than self-induced vomiting alone.

Our findings that DE is associated with higher levels of severity of eating disorder and depression psychopathology, coupled with the medical complications associated with eating disorders and compensatory behaviors in children and adolescents (Katzman, 2005; Lask, 2000), speaks to the need for thorough assessment of compensatory behaviors in children and adolescents presenting with eating disorder symptoms. The findings suggest that DE, especially when paired with self-induced vomiting, may be important in determining severity of symptoms in pediatric eating disorder samples. This is especially important for pediatricians who are at the forefront in terms of the initial recognition of eating disorders. As exercise is usually deemed as a healthy behavior, there may be a tendency by pediatricians to not properly assess exercise behaviors, as well as a failure to recognize DE as pathological. This could have significant medical and psychological consequences for youth presenting with DE.

The present study contributes to the literature on the role of DE in eating disorders by investigating the prevalence and correlates of DE in a pediatric sample. There were several strengths to this analysis, specifically a large and diverse sample assessed with well-validated measures. Yet limitations also warrant acknowledgement. Since few participants in our sample endorsed other compensatory behaviors (i.e., laxative or diuretic misuse), we were unable to examine how DE compares to compensatory behaviors outside of self-induced vomiting. Further, these data are cross-sectional, precluding conclusions about causality. Our assessment of psychological correlates of DE was limited to eating-related and depressive symptomatology; future studies should explore the relation between DE and other psychological factors (e.g., anxiety, interpersonal functioning), as well as the role of DE in treatment outcome in children and adolescents. Additionally, it would be beneficial to extend this research to better understand DE's relation to duration of illness in children and adolescents with eating disorders.

In summary, the findings of the present study suggest that DE is present in approximately half of children and adolescents presenting for eating disorders treatment, and appears to be associated with psychopathology irrespective of diagnostic group. Our findings emphasize the need for rapid identification of youth endorsing such symptoms. As we were only able to compare DE to self-induced vomiting, it is unclear how DE may differ in terms of clinical importance from other compensatory behaviors, such as laxative misuse. Future research should examine the onset of DE relative to other psychological symptoms, and explore the role of DE in treatment outcome among youth.

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Highlights

- Driven exercise in about half of children and adolescents presenting for treatment.
- Driven exercise associated with greater eating disorder and depressive symptoms.
- Driven exercise most severe when paired with self-induced vomiting.
- Important to assess for driven exercise in youth with eating disorders.

Table 1

Comparison of compensatory groups: Differences across demographic and psychosocial variables ($M \pm SD$, unless otherwise indicated)

Variable	Exercise only ($n=217$)	Vomit only ($n=66$)	Exercise and vomit ($n=95$)	Test Statistic
<i>Demographic Variables</i>				
Age	14.3 (2.4) ^a	15.7 (1.9) ^b	15.6 (1.4) ^b	$F(2,377)=19.4^{***}$
Female, % (n)	87.1 (189/217)	95.5 (63/66)	96.8 (92/95)	$\chi^2(2, N=378)=9.6^{**}$
Ethnicity, % (n)				
White	78.7 (170/216)	66.7 (44/66)	63.4 (59/93)	$\chi^2(2, N=375)=9.2^*$
Minority	21.3 (46/216)	33.3 (22/66)	36.6 (34/93)	
Body mass index	19.15 (6.59) ^a	21.60 (4.29) ^b	21.42 (3.86) ^b	$F(2,375)=7.9^{***}$
<i>Psychosocial Variables</i>				
Global EDE Score	1.8 (1.5)	2.7 (1.4)	3.5 (1.1)	$F(2,276)=36.7^{***}$
BDI Total Score	15.0 (12.9)	18.5 (12.2)	24.3 (11.5)	$F(2,278)=12.3^{***}$

Note: Differing letters indicate significant differences. EDE=Eating Disorder Examination; BDI=Beck Depression Inventory

*
 $p < .05$

**
 $p < .01$

***
 $p < .001$