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College of Arts & Sciences Senior Honors Theses. Paper 218.
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Assessing Perfectionism as a Predictor of Exercise Dependency over Time

Sarah E. Ernst

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Abstract

Exercise is generally thought to be beneficial for physical and mental health; however, when done in excess, exercise can lead to damaging physical, psychological, and social health consequences. This type of exercise is known as exercise dependency and is frequently associated with eating disorder pathology. Perfectionism (high standards and evaluative concerns) is a risk factor for eating disorders and is also associated with exercise dependency. However, no studies have examined longitudinal relationships between perfectionism and exercise dependency. The current study used a sample of adolescent females ($N = 444$) from a Southeastern United States high school, and participants completed measures of eating disorder symptomology, perfectionism, and exercise dependency at baseline and one month time points. Multiple regression analysis was conducted. Cross-sectionally, both high standards and evaluative concerns perfectionism were associated with exercise dependency. In the longitudinal model, only high standards perfectionism was a predictor of exercise dependency symptoms. The results suggest that while high standards perfectionism is widely considered adaptive, it may be a contributing factor to later development of exercise dependency. By understanding the factors contributing to exercise dependency, health and fitness professionals can screen for perfectionism in sports to identify athletes at risk for later development of exercise dependency. This relationship suggests high standards perfectionism could serve as a potential target in preventing the development of exercise dependency.

Lay Summary

Exercise is widely considered to be beneficial for an individual's psychological and physical wellbeing. However, in some cases, exercise can develop into a negative pattern of behavior that leads to problems with physical, mental, and emotional health. This pattern is termed exercise dependency, and shares symptoms with substance abuse and addiction. Exercise dependency is also a symptom of eating disorders.

Perfectionism is another common symptom in individuals with an eating disorder. Past research has shown that there are two dimensions: high standards (an adaptive type associated with the setting and achieving of goals) and evaluative concerns (a maladaptive type associated with self-criticism over mistakes). Perfectionism is associated with exercise dependency, but studies have been inconsistent in finding which dimension is most related. Research has yet to test the longitudinal relationship between perfectionism and exercise dependency in an adolescent sample. This study used a multiple regression analysis to look at whether evaluative concerns perfectionism or high standards perfectionism predicted exercise dependency over time, while accounting for baseline exercise dependency and eating disorder symptoms.

Our results found that, at the same time point, both evaluative concerns and high standards perfectionism were associated with exercise dependency. However, at the one-month time point, only high standards perfectionism predicted exercise dependency symptoms. The results demonstrate that while many people consider high standards to be a beneficial trait, this behavior may develop into a maladaptive pattern when standards for exercise are set too high. Understanding the risk factors for exercise dependency is important, and enables health and fitness professionals to screen for risk factors in adolescents, particularly those who exercise frequently or participate in sports.

Assessing Perfectionism as a Predictor of Exercise Dependency over Time

Regular exercise is beneficial for both psychological and physical health outcomes (Strohle, 2009). However, exercise can develop into a problematic behavior when done in excess or when its function is used to change bodily appearance. This function of exercise is commonly seen in eating disorders and is often used to compensate for food intake (Meyer, Taranis, Goodwin, & Haycraft, 2011). When an individual exercises to the extent that there is harm to their personal and social wellbeing (Szabo, Griffiths, Marcos, Mervo, & Demetrovics, 2015), this usage of exercise is termed *exercise dependency*.

Exercise dependency shares similarities with substance abuse and addiction (Adams & Kirkby, 2002), which was first recognized by Veale (1995). In the context of substance abuse, dependency refers to tolerance, withdrawal, and impaired daily functioning (Allegre, Souville, Therme, & Griffiths, 2006). Exercise dependency is characterized by the following key symptoms: preoccupation with exercise routines, symptoms of withdrawal when unable to exercise, tolerance (increased exercise needed for same effects), lack of control (inability to exercise less), reduction in other activities (as a result of time spent exercising), excessive amount of time spent exercising, and exercising for longer periods than intended (Hausenblas & Downs, 2002a; Berczik et al., 2012; Costa, Hausenblas, Olivia, Cuzzocrea, & Larcan, 2015). Various terminology has been used in defining this set of behaviors (e.g., dependency, excessive, compulsive, addiction), and the literature has been mixed on which is the most appropriate term. Specifically, Cook and Hausenblas (2008) note that using the different terms to describe the same concepts leads to ambiguity, misconception, and potential errors in interpretation. This study will use the term '**exercise dependency**' to refer to these maladaptive exercise patterns

because it is the most widely used term that accurately characterizes the occurrence of these behaviors (Szabo et al, 2015).

Exercise dependency is a common eating disorder behavior associated with detrimental physical and psychological consequences (Berczik et al., 2012; Meyer et al., 2011) and has a lifetime occurrence rate of up to 84% in eating disorder patients (Dalle Grave, Calugi, and Marchesini, 2008b). Exercise dependency is associated with increased severity of eating disorder symptoms, most notably in dietary restraint (Monell, Levallius, Fosen Mantilla, & Birgegard, 2018). Within eating disorders, exercise is often used as a compensatory behavior, similar to purging or laxative use (Rohde, Stice, & Gau, 2017). For example, when an individual with an eating disorder eats a meal, they might experience urges to exercise in order to ‘burn off’ the calories ingested. Additionally, individuals with eating disorders may exercise when they experience negative emotions (De Young & Anderson, 2010), and these individuals likely use exercise as a maladaptive coping strategy to manage their anxiety associated with eating or body dissatisfaction (Bardone-Cone et al., 2016). In regards to adolescents with eating disorders, up to 44% of individuals engage in compulsive exercise (Levallius, Collin, & Birgegard, 2017). In a population of adolescents with anorexia nervosa, individuals who used compulsive exercise to avoid negative affect demonstrated higher levels of severity (Noetel et al., 2016). Further, exercise dependency is associated with an earlier onset of eating disorder pathology and higher levels of severity (Shroff et al., 2006). Overall, exercise dependency may serve as an early predictor of later development of disordered eating behaviors.

Healthy adolescents participating in sports exhibit increased risk for later development of exercise dependency and eating disorders (Goodwin, Haycraft, & Meyer, 2016). Specifically, a desire to be leaner to improve sports performance predicts an increase in eating disorder

symptoms in a one-year longitudinal study (Krentz & Warschburger, 2014). Adolescents with higher levels of compulsive exercise are more likely to have higher eating disorder pathology, as well as experience higher levels self-criticism (Forsen Mantilla, Levallius, Monell, & Birgegard, 2018). These results suggest that exercise dependency in student athletes may be a gateway to developing other eating disorder symptoms, and understanding factors contributing to exercise can inform prevention efforts.

Perfectionism is a known risk factor for the development of eating disorders (Bardone-Cone et al., 2007) and is implicated in exercise dependency. Research proposes there are two models of perfectionism (Dunkley, Blankstein, Masheb, & Grilo, 2006; Hewitt, Flett, Turnbull-Donovan, & Mikail, 1991): high standards (adaptive) which is related to healthy function (DiBartolo, Frost, Chang, LaSota, & Grills, 2004) and evaluative concerns (maladaptive), which is related to negative outcomes such as depression or anxiety (DiBartolo, Li, & Frost, 2008; Levinson and Rodebaugh, 2016). High standards perfectionism is defined as setting high standards for oneself and pursuing them despite negative consequences and basing one's self-worth off the perceived level of achievement (Shafran, Cooper, & Fairburn, 2002), while evaluative concerns perfectionism is defined as an excessive self-criticism over making mistakes and parental influences on perfectionistic tendencies (DiBartolo, Li, & Frost, 2008). One study demonstrated that a combination of high personal standards perfectionism and high evaluative concerns (classified maladaptive type) was most strongly related to eating disorder symptoms in an adolescent population when compared to pure high standards or pure evaluative concerns (Boone, Soenens, Braet, Goossens, 2010). Finally, one study found that evaluative concerns, but not high standards, perfectionism positively predicted eating disorder symptoms in an adult eating disorder sample over time (Levinson et al., 2013; Levinson & Rodebaugh, 2016). The

results of these studies indicate that both types of perfectionism may contribute to eating disorder pathology.

Perfectionism is also associated with higher exercise dependency symptoms. In fact, studies have demonstrated that higher rates of exercise dependency are also linked with higher levels of perfectionism (Costa, Coppolino, & Oliva, 2015; Hall, Hill, Appleton, & Kozub, 2009; Downs, Hausenblas, & Nigg, 2004); however, results have been inconsistent in defining the relationship between the dimensions of perfectionism and exercise dependency. Researchers have found a positive association between maladaptive perfectionism and exercise dependency symptoms (Costa, Coppolino, & Olivia, 2016; Hagan & Hausenblas 2003; Hausenblas & Downs 2002b; Downs, Hausenblas, & Nigg, 2004). A study by Taranis and Meyer (2010) found that high standards perfectionism is associated with compulsive exercising in a population of female exercisers. Additionally, they found that judging oneself for not meeting high standards (for amount or quality of exercise) and high levels of self-criticism may partially explain the relationship between high standards perfectionism and exercise dependency (Taranis & Meyer, 2010). In the context of athletics, one study found that more competitive sports were associated with higher level of perfectionistic striving (Rasquinha, Dunn, & Dunn, 2014), suggesting that the competitive environment of sports may contribute to higher perfectionistic strivings. Another study found that cross sectionally, high standards, pursuit of goals perfectionism, and concern over mistakes were uniquely associated with exercise dependency in adult athletes (Hall, Kerr, Kozub, & Finnie, 2007). However, research has yet to specifically assess the longitudinal relationship between perfectionism and exercise dependency in adolescents.

Understanding the relationship between perfectionism and exercise dependency, two common eating disorder symptoms, may be useful in understanding how to prevent exercise

dependency in eating disorders, a symptom shown to increase eating disorder severity. Additionally, understanding this relationship will be helpful in advancing our understanding of potential risk factors of exercise dependency in an adolescent population. The current study will examine whether high standards and evaluative concerns perfectionism are uniquely associated with exercise dependency and whether they predict exercise dependency over time. I hypothesize that, cross-sectionally, both evaluative concerns and high standards perfectionism will be uniquely associated with exercise dependency symptoms. I hypothesize that longitudinally, both evaluative concerns perfectionism and high standards at time one will predict exercise dependency at time two over and above exercise dependency at time one, while also accounting for baseline eating disorder symptomology. The results of this study may have implications for assessment and treatment of exercise dependency.

Methods

Participants

Participants were 444 female students from a Southeastern all-female high school in the United States who participated in an eating disorder prevention program. Participants completed a series of measures online before and after the intervention. Participants ranged from 14 to 17 years of age ($M = 15.18$ years, $SD = 0.62$). The majority of the participants were European American (82.8%, $n = 390$), with other ethnicities represented including: African American (4.9%, $n = 23$), Hispanic (4.5%, $n = 21$), Multiracial (3.2%, $n = 15$), Chinese (1.7%, $n = 8$), American Indian (1.3%, $n = 6$), and Asian (1.0%, $n = 5$). Most participants were in their sophomore year of high school (76.2%, $n = 361$), but also included freshman (23.2%, $n = 110$), juniors (0.2%, $n = 1$), and seniors (0.4%, $n = 2$).

Measures

Exercise Dependence Scale- Revised (EDS-R; Hausenblas & Downs, 2002b). The EDS-R is a 21-item measure of excessive exercise. Items are based on a 6-point Likert scale, ranging from 1 (*Never*) to 6 (*Always*). The measure includes seven subscales: Withdrawal (*I exercise to avoid feeling irritable*), continuance (*I exercise despite recurring physical problems*), tolerance (*I continually increase my exercise intensity to achieve the desired effects/benefits*), lack of control (*I am unable to reduce how long I exercise*), reduction in other activities (*I would rather exercise than spend time with my friends/family*), time (*I spend a lot of time exercising*), and intention effects (*I exercise longer than I intend*). The EDS-R is shown to have good test-retest reliability and convergent validity (Downs, Hausenblas, & Nigg, 2004). The global score was calculated for this study. Internal consistency was excellent in our sample ($\alpha = 0.96$).

Eating Disorder Examination-Questionnaire (EDE-Q IV; Fairburn & Beglin, 1994). The EDE-Q is a 41-item self-report measure of eating disorder attitudes and behaviors occurring over the last 28 days. The answers are based upon a 7-point Likert scale, ranging from 0 (*No days*) to 6 (*Every day*). The EDE-Q contains 4 subscales: restraint (*Have you gone for long periods of time (8 hours or more) without eating anything in order to influence your shape or weight?*), shape concern (*How dissatisfied have you felt about your weight?*), eating concerns (*Have you had any episodes of binge eating?*), and weight concerns (*Have you vigorously exercised as a means of controlling your weight, altering your shape or amount of fat, or burning off calories?*) For this study, the EDE-Q global score was used to measure overall eating disorder symptoms. The EDE-Q has demonstrated good reliability, validity, and internal consistency (Mond, Hay, Rodgers, Owen, & Beumont, 2004). Internal consistency in this sample was excellent ($\alpha = 0.94$).

Frost Multidimensional Perfectionism Scale (FMPS; Frost, Marten, Lahart, & Rosenblate, 1990). The FMPS is a 35-item inventory that measures dimensions of perfectionism on a five-point Likert scale, ranging from 1 (*Strongly Disagree*) to 5 (*Strongly Agree*). The subscales include personal standards (PS; *It is important that I be thoroughly competent in everything that I do*), parental expectations (PE; *My parents set very high standards for me*), Parental Criticism (PC; *As a child, I was punished for doing things less than perfectly*), doubts about actions (DA; *Even when I do something very carefully, I often feel that it is not done quite right*), concern over mistakes (COM; *If I fail at work/school, then I am a failure as a person*), and organization (*I am a neat person*). To measure evaluative concerns in this study, concern over mistakes, parental criticism, doubts about actions, and parental expectations subscales are used to generate the maladaptive evaluative concerns (MEC) composite score (DiBartolo, Frost, Change, LaSota, & Grills, 2004). To measure high standards, the PS subscale will be used. The FMPS has been shown to demonstrate good convergent and discriminant validity, as well as internal consistency (Frost et al., 1990). Internal consistency was excellent for the MEC perfectionism subscale ($\alpha = 0.95$) and good for the PS perfectionism subscale ($\alpha = 0.87$).

Data Analysis

Multiple regression analysis was conducted using the Statistical Package for the Social Sciences (SPSS) software Version 25. Two models were tested: cross-sectional and longitudinal. In the cross-sectional model, baseline MEC perfectionism, PS perfectionism, and eating disorder symptoms were entered as correlates and exercise dependency at time 1 was entered as an outcome variable. In the longitudinal model, baseline PS perfectionism, MEC perfectionism, eating disorder symptoms, and baseline exercise dependency were entered into the model as predictors of time two exercise dependency symptoms.

Results

Descriptive Statistics and Zero Order Correlations

Please see Table 2 for descriptive statistics. MEC, PS, eating disorder symptoms, and exercise dependency were all positively correlated at Time 1 ($p < .01$). Time 2 exercise dependency symptoms were positively associated with all Time 1 factors ($p < .01$).

Cross-Sectional Models

Please see Table 3 for all regression results. In the cross-sectional model ($F [3, 432] = 39.62, p < .001, R^2 = .22$), eating disorder symptoms ($p < .001$, part $r = 0.18$), high standards ($p < .001$, part $r = 0.18$), and evaluative concerns ($p = 0.02$, part $r = 0.10$) were all uniquely associated with exercise dependency.

Prospective Models

See Table 4 for all regression results. In the prospective model ($F [4, 349] = 38.67, p < .001, R^2 = .31$), personal standards ($p = .03$, part $r = 0.10$) and baseline eating disorder symptoms ($p = .01$, part $r = 0.11$), but not evaluative concerns ($p = 0.23$, part $r = -0.06$) uniquely predicted exercise dependency at time 2, while accounting for baseline exercise dependency ($p < .001$, part $r = 0.40$).

Discussion

This study tested how evaluative concerns and high standards perfectionism both cross-sectionally and longitudinally were associated with and predicted exercise dependency symptoms in an adolescent female population. Consistent with our hypothesis, both the evaluative concerns and the high standards dimensions of perfectionism were uniquely associated with exercise dependency at the same time point (Longbottom, Grove, & Dimmock,

2012). This finding suggests that individuals who have higher exercise dependency symptoms also have higher standards and higher evaluative concerns perfectionism. These findings are consistent with previous literature suggesting that both dimensions of perfectionism are correlated with exercise dependency at the same time point (Hall et al., 2007).

Longitudinally, high standards, but not evaluative concerns perfectionism, predicted exercise dependency one month later, which partially supports our hypothesis. This result indicates that individuals who have higher levels of high standards perfectionism are more likely to have higher symptoms of exercise dependency over time. This finding is important because while high standards perfectionism has been widely considered beneficial in motivating individuals to exercise and maintaining exercise routines, it may also serve as a risk factor for exercise dependency.

In considering the motivation driving individuals to exercise, high standards perfectionism is an important factor in the self-efficacy and persistence of completing physical activity (Longbottom, Grove, & Dimmock, 2010). While high standards perfectionism is normally considered an adaptive trait, our results demonstrate that it may develop into a maladaptive exercise tendency. If standards for exercise are set too high and an individual estimates their worth based on their ability to meet unrealistic standards, this may partially explain why personal standards perfectionism contributes to exercise dependency (Taranis & Meyer, 2010). For example, if an adolescent is participating in a sport, they may strive to be the best or achieve success. While high standards perfectionism may initially be beneficial in helping an individual maintain their exercise routine, they may set increasingly higher goals and spend more time exercising despite fatigue or injuries as the individual desires to become more competent. Setting these high goals may drive the individual to spend more time practicing or focusing on the sport,

reducing time spent on other activities, like academic or social requirements. This increased exercise may begin to impair their social and psychological wellbeing, which could result in the development of exercise dependency. By recognizing the profile of an individual vulnerable to exercise dependency, school administrators and sport coaches can develop interventions targeted at an adolescent population.

The results demonstrated that, over one month, evaluative concerns perfectionism was not a significant predictor of exercise dependency. Evaluative concerns perfectionism includes doubts about actions, concern over mistakes, parental criticism, and parental expectations. If an individual were high in evaluative concerns perfectionism, they may feel shame or guilt for not exercising, but they may not feel the same pressures to increase time spent exercising to achieve their goals as someone with high standards perfectionism. Similarly, if an adolescent experiences pressure from their parents to meet a goal in an athletic or sporting event, they may feel shame or experience other negative emotions (e.g., anxiety or doubt) for not meeting the goal. Although they may experience higher levels of psychological distress, these emotions on their own are not likely to increase drive for exercise. Evaluative concerns perfectionism has been shown to predict eating disorder cognitions and beliefs (Levinson et al, 2013). Due to this, the evaluative concerns perfectionism subscale may contribute to other symptoms related to exercise dependency (e.g., overvaluation of weight and shape or concern over making a mistake), which may partially explain why this subscale was significant in the cross-sectional analysis.

The results of this study have several key implications. The results of this study suggest that both evaluative concerns and high standards perfectionism should be assessed for in adolescents participating in sports and/or exercise. Additionally, by administering screenings for perfectionism, health and fitness professionals working with these individuals may be better able

to monitor individuals for later development of exercise dependency symptoms. The presence of both exercise dependency and perfectionism may indicate a need to screen adolescents for eating disorders. Targeting early symptoms of eating disorder pathology may help prevent later development of an eating disorder. This study demonstrated that while high standards perfectionism is most often considered the most beneficial dimension, it should still be considered as a potentially harmful factor in the context of exercise. Perfectionism may be beneficial in helping individuals maintain their exercise routine; however, it may also put them at risk for later development of exercise dependency. By accounting for high standards perfectionism, better prevention programs can be developed for adolescents participating in sports to prevent the development of exercise dependency.

This study identifies several questions for future research. One question that needs to be addressed is if high standards perfectionism serves as a shared vulnerability for the development of eating disorders and exercise dependency. Based on the results of the cross-sectional analysis, future studies should investigate the role of both high standards and evaluative concerns perfectionism in maintaining exercise dependency. Studies should also aim to determine if individuals with an eating disorder who exhibit higher levels of high standards perfectionism are more likely to have exercise as one of their compulsive behaviors. Additionally, future research should aim to further understand how high standards and evaluative concerns perfectionism relate to exercise dependency in adolescent athletes competing at a professional or high-competition level and if the results of this study are replicable in this population. Because eating disorders are prevalent in professional athletes, understanding how perfectionism and exercise dependency function in this population will be important for preventing eating disorder development. These questions are important for both further understanding the relationship

between perfectionism and exercise dependency, and for developing effective interventions for exercise dependency.

There were several limitations in considering the results of this study. There was limited diversity included in the sample. This sample was a predominately European American female at a private, Southeastern high school. This should be taken into consideration when generalizing the results to other populations. Additionally, the effects of using a sample participating in an eating disorder prevention program were not accounted for; however, no differences were found in exercise dependency scores before and after the program. Finally, we did not measure whether or not the individuals participated in a sport. Past research has shown that adolescents participating in a sport are more likely to experience exercise dependency (Rasquinha et al., 2014), and future studies should account for this when looking at exercise dependency symptoms and perfectionistic tendencies.

This study presents evidence that high standards perfectionism predicts exercise dependency in an adolescent female population. By understanding this relationship, interventions can be developed to target high standards perfectionism as a means of preventing the development of exercise dependency.

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Tables and Figures

Table 1: Pearson correlations for exercise dependency, perfectionism, and eating disorder symptoms

	T1 EDS	T2 EDS	MEC	PS	EDE-Q
T1 EDS		0.53	0.38	0.41	0.36
T2 EDS	0.53		0.24	0.31	0.30
MEC	0.38	0.24		0.63	0.49
PS	0.41	0.31	0.63		0.31
EDE-Q	0.36	0.30	0.49	0.31	

Note. MEC = Evaluative Concerns Perfectionism, PS = High Standards Perfectionism, T1 EDS= Exercise Dependency Scale at time one, T2 EDS = Exercise Dependency Scale at time two, and EDEQ Global = Eating Disorder Examination Questionnaire-IV, Global Score

Table 2. Descriptive Statistics for Perfectionism, Exercise Dependency, and Eating Disorder Symptoms.

Variable	Time 1		Time 2	
	<i>Mean (SD)</i>	Range	<i>Mean (SD)</i>	Range
MEC	58.35 (21.48)	22.0 – 132.0	57.32 (24.40)	22.0 – 132.0
PS	22.90 (7.48)	7.0 – 42.0	21.67 (8.11)	7.00 – 42.00
EDS	38.45 (19.65)	21.0-147.0	39.54 (26.31)	21.00-147.00
EDEQ global	1.54 (1.32)	.00 – 7.00	1.26(1.43)	.00 – 7.00

Note: MEC = Evaluative Concerns Perfectionism, PS = High Standards Perfectionism, EDS= Exercise Dependency Scale, and EDEQ Global = Eating Disorder Examination Questionnaire-IV, Global Score.

Table 3. High Standards Perfectionism, Evaluative Concerns Perfectionism, and Eating Disorder Symptoms Cross-Sectionally Associated with Exercise Dependency Symptoms

	β	Std. Error	<i>t</i> -value	<i>p</i> -value	Part <i>r</i>
Constant	-	3.03	3.72	.001	---
MEC	0.15	0.06	2.41	.017	0.12
EDEQ	0.23	0.16	4.19	.001	0.20
PS	0.20	0.77	4.19	.001	0.20

Note: MEC = Evaluative Concerns Perfectionism, EDEQ = Eating Disorder Examination Questionnaire-IV, and PS = High Standards Perfectionism

Table 4. High Standards Perfectionism prospectively predict Exercise Dependency at Time 2.

	β	Std. Error	<i>t</i> -value	<i>p</i> -value	Part <i>r</i>
Time 1 EDS	0.46	0.07	9.03	0.001	0.44
MEC	-0.08	0.08	-1.20	0.230	-0.06
EDEQ	0.13	1.09	2.51	0.013	0.13
PS	0.13	0.22	2.19	0.029	0.12

Note. MEC = Evaluative Concerns Perfectionism, EDEQ = Eating Disorder Examination Questionnaire-IV, EDS= Exercise Dependency Symptoms, and PS = High Standards Perfectionism