

## The influence of exercise identity and social physique anxiety on exercise dependence

BRIAN COOK<sup>1,2,3\*</sup>, TRISHA M. KARR<sup>4</sup>, CHRISTIE ZUNKER<sup>5</sup>, JAMES E. MITCHELL<sup>1,2</sup>, RON THOMPSON<sup>6</sup>,  
ROBERTA SHERMAN<sup>6</sup>, ANN ERICKSON<sup>1</sup>, LI CAO<sup>1</sup> and ROSS D. CROSBY<sup>1,2</sup>

<sup>1</sup>Neuropsychiatric Research Institute, Fargo, ND, USA

<sup>2</sup>University of North Dakota School of Medicine and Health Sciences, Fargo, ND, USA

<sup>3</sup>California State University, Monterey Bay, Seaside, CA, USA

<sup>4</sup>Winona State University, Winona, MN, USA

<sup>5</sup>ICF International, Atlanta, GA, USA

<sup>6</sup>The Victory Program at McCallum Place, St. Louis, MO, USA

(Received: August 4, 2014; revised manuscript received: March 30, 2015; accepted: May 16, 2015)

*Background:* Previous research has identified exercise identity and social physique anxiety as two independent factors that are associated with exercise dependence. *Aims:* The purpose of our study was to investigate the unique and interactive effect of these two known correlates of exercise dependence in a sample of 1,766 female runners. *Methods:* Regression analyses tested the main effects of exercise identity and social physique anxiety on exercise dependence. An interaction term was calculated to examine the potential moderating effect of social physique anxiety on the exercise identity and exercise dependence relationship. *Results:* Results indicate a main effect for exercise identity and social physique anxiety on exercise dependence; and the interaction of these factors explained exercise dependence scores beyond the independent effects. Thus, social physique anxiety acted as a moderator in the exercise identity and exercise dependence relationship. *Discussion:* Our results indicate that individuals who strongly identify themselves as an exerciser and also endorse a high degree of social physique anxiety may be at risk for developing exercise dependence. *Conclusions:* Our study supports previous research which has examined factors that may contribute to the development of exercise dependence and also suggests a previously unknown moderating relationship for social physique anxiety on exercise dependence.

**Keywords:** exercise dependence, exercise identity, social physique anxiety, eating disorders

### INTRODUCTION

Exercise dependence is a pathological pattern of exercise that includes craving, uncontrollable excessive exercise behavior, physiological symptoms indicative of tolerance and withdrawal, and psychological symptoms such as anxiety and depression (Hausenblas & Symons Downs, 2002a). Research has typically examined descriptive factors of exercise dependence in specific populations such as athletes and college students (Cook et al., 2013; Sussman, Lisha & Griffiths, 2011). However, little is known about etiological factors.

Exercise identity has been proposed as a factor associated with exercise dependence (Murray, McKenzie, Newman & Brown, 2013). Identity theory presumes that individuals view themselves as having a role and behaviors are performed to fit that role (Stets & Burke, 2000). Thus, exercise identity is defined as when an individual's self-concept includes an emphasis on previous exercise behavior and allowing this self-concept to direct future exercise behavior (Anderson & Cychosz, 1994). Therefore, high exercise identity may motivate exercise behavior despite obvious limitations such as injury, time, and social obligations (Murray et al., 2013). Recent studies found the exercise beliefs component of exercise identity (e.g., the individual would feel a loss if forced to give up exercise) is associated with exercise dependence (Murray et al., 2013),

and exercise commitment may mediate this relationship (Lu et al., 2012).

Identifying associations among exercise identity and exercise dependence fails to account for exercise dependence concurrent with body focused pathology (e.g. secondary exercise dependence; Bamber, Cockerill & Carroll, 2000; Bamber, Cockerill, Rodgers & Carroll, 2003; Cook & Hausenblas, 2014). Thus, a need exists to understand contributions of body focused variables in the etiology of exercise dependence. Social physique anxiety (e.g., anxiety related to public presentation of one's body; Hart, Leary & Rejeski, 1989) is a logical candidate for such examinations. Specifically, social physique anxiety is related to drive for thinness (Brunet, Sabiston, Dorch & McCreary, 2010), bulimic symptoms (Diehl, Johnson, Rogers & Petrie, 1998), and body dissatisfaction (Hausenblas & Mack, 1999). Therefore, exercising in response to social physique anxiety may reflect patterns of exercise used to control one's body shape that are commonly seen in eating disorders (Meyer & Tarnis, 2011) and secondary exercise dependence (Bratland-Sanda et al., 2011; Cook et al., 2014).

\* Corresponding author: Brian Cook, PhD; CSUMB Kinesiology Department, 100 Campus Center Drive, Valley Hall / 82D-101, Seaside, CA 93955, USA; Phone: +1(831) 582-5455; E-mail: briancookphd@gmail.com

The purpose of this study was to examine the effects of exercise identity and social physique anxiety on exercise dependence. We hypothesized that both exercise identity (Gapin & Petruzzello, 2011; Lu et al., 2012; Murray et al., 2013) and social physique anxiety (Hausenblas & Mack, 1999) would be positively associated with exercise dependence. Furthermore, we hypothesized that the interactive effect of exercise identity and social physique anxiety would moderate the exercise identity and exercise dependence relationship.

## METHODS

### *Participants*

Participants were 1,766 female road race runners ( $M$  age = 36.98 years,  $SD$  = 10.47; 93.1% Caucasian). Mean body mass index was 23.78 ( $SD$  = 3.93). Most participants were married (62.9%), had a college degree or higher education (83.1%), were employed full time (71.9%), and the most commonly reported household income was \$100,000–\$199,000 (21.9%).

## MEASURES

### *Demographic questionnaire*

Participants self-reported height and weight, ethnicity, marital status, education, employment, household income, and race event.

### *Exercise Dependence Scale*

The 21-item Exercise Dependence Scale (EDS; Hausenblas & Symons Downs, 2002b) was used to assess exercise dependence. The EDS includes three items on each of the following seven subscales: Tolerance, Withdrawal, Continuance, Lack of Control, Reductions in Other Activities, Time, and Intention. Items are measured on a 6-point Likert scale ranging from 1 (never) to 6 (always), with lower scores revealing less exercise dependence symptoms. Higher scores on each item indicate increased severity for that item. The psychometrics of the EDS have been previously reported (Symons Downs, Hausenblas & Nigg, 2004). Internal consistency in the current study was measured by Cronbach's alpha ( $\alpha$  = .930).

### *Exercise Identity Scale*

The Exercise Identity Scale (EIS; Anderson & Cychosz, 1994) includes nine items examining the degree to which exercise is part of one's self-concept (e.g., "When I describe myself to others, I usually include my involvement in exercise."). Items are scored on a Likert scale ranging from "strongly disagree" to "strongly agree", and summed to equal a total scale score; higher scores indicate a greater level of identification with exercise. Studies using the EIS with adult samples have shown strong internal consistency (range: .73–.93) and test–retest reliability values over one week (.93) (Anderson & Cychosz, 1994, 1995; Anderson,

Cychosz & Franke, 1998, 2001). For this sample, internal consistency was measured by Cronbach's alpha ( $\alpha$  = .934).

### *Social Physique Anxiety Scale*

The Social Physique Anxiety Scale (SPAS; Hart et al., 1989) includes 12 items that measure the degree to which people become anxious when others observe or negatively evaluate their physique or figure (i.e., body's form and structure; specifically, body fat, muscular tone, and general body proportions). Items are scored on a five-point Likert scale ranging from "not at all characteristic of me" to "extremely characteristic of me"; higher scores indicate greater anxiety. The SPAS has demonstrated adequate construct validity and test–retest reliability (Hart et al., 1989). Studies using the SPAS with women exercisers and non-exercisers have demonstrated high internal consistency measured by Cronbach's alpha ( $\alpha$  = .84; Koyuncu, Tok, Canpolat & Catikkas, 2010). However, internal consistency in the current study, measured by Cronbach's alpha, was modest ( $\alpha$  = .677).

### *Procedure*

Participants were recruited through participation in the Fargo Marathon weekend road race events (i.e., 5k, 10k, half marathon, full marathon, two- or four-person relay events in the full marathon, 5k plus the half marathon, and 5k plus the full marathon). Recruitment flyers were included in race registration packets and via e-mail. Anyone who took part in the race was eligible to take the study survey within three weeks following the event. A total of 3,117 runners accessed the online survey. Individuals who did not provide informed consent ( $n$  = 161), who did not participate in a race event ( $n$  = 227), under age 18 ( $n$  = 69), and men ( $n$  = 856) were excluded. Men were excluded because our interest was in examining factors related to secondary exercise dependence (i.e., exercise dependence secondary to an eating disorder), and eating disorders are overwhelmingly more common in women than men (APA, 2013; Reas, Rø, Karterud, Hummelten & Pedersen, 2013). Additionally, previous research has established a moderating effect for gender whereby women are more likely to endorse exercise dependence symptoms in pursuit of weight loss (a key factor in eating pathology and exercise as a compensatory behavior; Cook & Hausenblas, 2014). Thus, our final sample included 1,766 female runners.

### *Statistical analysis*

First, variables were centered and an interaction variable for exercise identity and social physique anxiety total score was calculated. Normality assumptions of the dependent variable and outliers were checked. Because data were slightly positively skewed (skewness = .609, std error = .063) we log-transformed the dependent variable. Next, an ordinary least squares regression (OLS) analysis with race distance entered as a covariate was used to examine the associations among exercise identity and social physique anxiety on exercise dependence. The interaction effect was examined because we were interested in examining the moderating influence of social physique anxiety on the relationship between exercise identity and exercise dependence.

Ethics

Study procedures were reviewed and approved by the University of North Dakota and Sanford Health Institutional Review Boards. Individuals interested in participating in this study were directed to a secure website that allowed access to the study survey only after they read a consent statement and clicked on a box to indicate that they were providing full informed consent.

RESULTS

Exercise dependence symptoms were measured by the EDS total score ( $M = 51.82, SD = 14.09$ ), social physique anxiety was measured by the SPA total score ( $M = 31.84, SD = 5.39$ ), and exercise identity was measured by the EIS total score ( $M = 34.51, SD = 8.37$ ). All variables were significantly correlated (see Table 1). The overall model examining the impact of SPA and EIS (independent variables) on EDS (dependent variable) was significant [ $F(5,1338) = 246.16, p < .001$ ] and explained 35.6% of the variance in EDS scores ( $R^2 = .356$ ). Exercise identity ( $\beta = .536, p < .001$ ) and SPA ( $\beta = .221, p < .001$ ) both predicted higher EDS scores (see Figure 1). Additionally, the interaction among EIS and SPA was significant ( $\beta = .091, p < .001$ ) suggesting that the combined effects of EIS and SPA significantly impact EDS, over and above the independent effects of EIS and SPA. Thus, individuals with both high EIS and high SPA scores may experience increased EDS scores.

Table 1. Correlations among exercise dependence, social physique anxiety, and exercise identity

	Exercise Identity	Social Physique Anxiety	Exercise Dependence
Exercise Dependence	.549*	.268*	1.00
Social Physique Anxiety	.101*	1.00	
Exercise Identity	1.00		

Note: \*  $p < .01$

DISCUSSION

The purpose of our study was to examine the potential influence of social physique anxiety and exercise identity on exercise dependence. The results of our study offer several previously unknown insights. Specifically, the main effect for exercise identity on exercise dependence adds to a growing body of recent research suggesting that an exercise identity may be a factor in the development and maintenance of exercise dependence (Gapin & Petruzzello, 2011; Lu et al., 2012; Murray et al., 2013). Similarly, the observed main effect of social physique anxiety extends previous research that has demonstrated its relationship with eating disorder symptoms (Brunet et al., 2010; Diehl et al., 1998; Hausenblas & Mack, 1999). Therefore, social physique anxiety may be a unique factor that plays a role in the development

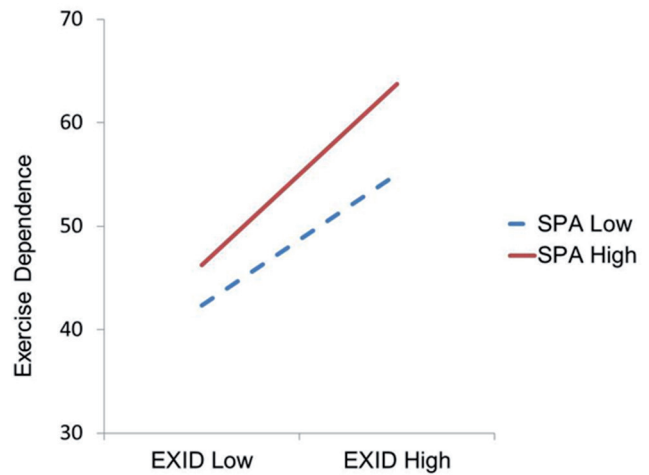


Figure 1. Association between exercise dependence and exercise identity (EXID) and social physique anxiety (SPA)

Note: High and Low categories were determined by adding and subtracting one standard deviation from the mean of EXID and SPA

of secondary exercise dependence. Finally, the significant interaction effect indicates that social anxiety may moderate the previously established exercise identity and exercise dependence relationship. This moderation result indicates that individuals who strongly identify themselves as an exerciser and also endorse a high degree of social physique anxiety may be at risk for developing exercise dependence (Baron & Kenny, 1986; Kraemer, Stice, Kazdin, Offord & Kupfer, 2001). However, the effect size of the moderation effect observed in our study was small, but significant ( $R^2$  change = .008). Accordingly, future longitudinal research is encouraged to examine the associations found in our study to better establish exercise dependence etiology.

Despite the strengths of this study, at least three limitations were present. First, our cross sectional data preclude any causal inferences. To our knowledge, no temporal precedence for these variables has been previously established. Therefore, our use of moderation analyses, rather than mediation, is appropriate. However, future research is needed to establish a temporal order for social physique anxiety, exercise identity, and any other variables that contribute to the development of exercise dependence. Second, our large sample size prevented us from objectively assessing several relevant variables. Additionally, the SPAS in our study demonstrated slightly lower internal consistency than typically previous reports. This may have been due to our sample consisting of only female athletes. Therefore, objective measures of variables such as eating disorders symptoms and/or diagnosis and social physique anxiety would have strengthened our results. Third, our sample was overwhelmingly Caucasian, educated, and reported a relatively high household income. Both exercise dependence and eating disorder symptoms have been found to be influenced by population characteristics (Ahrén et al., 2013; Cook et al., 2013; Quick & Byrd-Bredbenner, 2014). Therefore, future research is encouraged to examine how race and socio-economic variables may influence etiological factors of exercise dependence.

In conclusion, our study supports previous research of factors that may contribute to the development of exercise dependence and also suggests a previously unknown moderating relationship for social physique anxiety on exercise dependence. These results suggest candidate variables for further investigations into the etiology of exercise dependence. Future research is needed to examine the role of various factors in the development of exercise dependence. Furthermore, differences in gender and exercise mode should also be examined to establish the etiology of exercise dependence.

*Funding sources:* This study was funded, in part, by NIMH grant T32 MH082761-05.

*Authors' contributions:* BC wrote the manuscript and designed the study; TK, CZ, JM, RT & RS assisted with writing and study development including crafting the research questions, recruitment, data collection; AE managed all data collection and cleaning; LC & RC conducted statistical analyses.

*Conflict of interest:* None.

## REFERENCES

- Ahrén, J. C., Chiesa, F., Koupil, I., Magnusson, C., Dalman, C. & Goodman, A. (2013). We are family – Parents, siblings, and eating disorders in a prospective total-population study of 250,000 Swedish males and females. *International Journal of Eating Disorders, 46*, 693–700.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.
- Anderson, D. F., & Cychosz, C. M. (1994). Development of an exercise identity scale. *Perceptual and Motor Skills, 78*(3 Pt 1), 747–751.
- Anderson, D. F. & Cychosz, C. M. (1995). Exploration of the relationship between exercise behavior and exercise identity. *Journal of Sport Behavior, 18*, 159–166.
- Anderson, D. F., Cychosz, C. M., & Franke, W. D. (1998). Association of exercise identity with measures of exercise commitment and physiological indicators of fitness in a law enforcement cohort. *Journal of Sport Behavior, 21*, 233–241.
- Anderson, D. F., Cychosz, C. M. & Franke, W. D. (2001). Preliminary exercise identity scale (EIS) norms for three adult samples. *Journal of Sport Behavior, 24*, 1–9.
- Bamber, D., Cockerill, I. M. & Carroll, D. (2000). The pathological status of exercise dependence. *British Journal of Sports Medicine, 34*, 125–132.
- Bamber, D. J., Cockerill, I. M., Rodgers, S. & Carroll, D. (2003). Diagnostic criteria for exercise dependence in women. *British Journal of Sports Medicine, 37*, 393–400.
- Baron, R. M. & Kenny, D. A. (1986). The moderator-mediator variable distinction in social psychology research: Conceptual, strategic, and statistical considerations. *Journal of Personality and Social Psychology, 51*(6), 1173–1182.
- Bratland-Sanda, S., Martinsen, E. W., Rosenvinge, J. H., Rø, O., Hoffart, A. & Sundgot-Borgen, J. (2011). Exercise dependence score in patients with longstanding eating disorders and controls: The importance of affect regulation and physical activity intensity. *European Eating Disorders Review, 19*(3), 249–255.
- Brunet, J., Sabiston, C. M., Dorsch, K. D. & McCreary, D. R. (2010). Exploring a model linking social physique anxiety, drive for muscularity, drive for thinness and self-esteem among adolescent boys and girls. *Body Image, 7*(2), 137–142.
- Cook, B., Engel, S., Crosby, R., Hausenblas, H., Wonderlich, S. & Mitchell, J. (2014). Pathological motivations for exercise and health-related quality of life in eating disorders. *International Journal of Eating Disorders, 47*, 268–272.
- Cook, B. & Hausenblas, H. (2014). The impact of exercise dependence, eating disorders and body dysmorphia in exercisers. In A. Chow & S. Edmunds (Eds.), *Physical exercise and mental health: Interconnections, theory and application* (pp. 255–280). Champaign, IL; Human Kinetics.
- Cook, B., Karr, T. M., Zunker, C., Mitchell, J. E., Thompson, R., Sherman, R. T., Cao, L., Crosby, R. D., Erickson, A. & Wonderlich, S. A. (2013). Primary and secondary exercise dependence in a community-based sample of road race runners. *Journal of Sport and Exercise Psychology, 35*, 464–469.
- Diehl, N. S., Johnson, C. E., Rogers, R. L. & Petric, T. A. (1998). Social physique anxiety and disordered eating: What's the connection? *Addictive Behaviors, 23*(1), 1–6.
- Gapin, J. I. & Petruzzello, S. J. (2011). Athletic identity and disordered eating in obligatory and non-obligatory runners. *Journal of Sport Sciences, 29*(10), 1001–1010.
- Hart, E. A., Leary, M. R. & Rejeski, W. J. (1989). The measurement of social physique anxiety. *Journal of Sport and Exercise Psychology, 11*, 94–104.
- Hausenblas, H. A. & Mack, D. (1999). Social physique anxiety and eating disorder correlates among female athletic and non-athletic populations. *Journal of Sport Behavior, 22*, 502–513.
- Hausenblas, H. A. & Symons Downs, D. (2002a). Exercise dependence: A systematic review. *Psychology of Sport and Exercise, 3*, 89–123.
- Hausenblas, H. A. & Symons Downs, D. (2002b). How much is too much? The development and validation of the Exercise Dependence Scale. *Psychology & Health, 17*, 387–404.
- Koyuncu, M., Tok, S. A., Canpolat, M. & Catikkas, F. (2010). Body image satisfaction and dissatisfaction, social physique anxiety, self-esteem, and body fat ratio in female exercisers and non-exercisers. *Social Behavior and Personality, 38*(4), 561–570.
- Kraemer, H. C., Stice, E., Kazdin, A., Offord, D. & Kupfer, D. (2001). How do risk factors work together? Mediators, moderators, and independent, overlapping, and proxy risk factors. *American Journal of Psychiatry, 158*, 848–856.
- Lu, F. J., Hsu, E. Y., Wang, J. M., Huang, M. Y., Chang, J. N. & Wang, C. H. (2012). Exercisers' identities and exercise dependence: The mediating effect of exercise commitment. *Perceptual and Motor Skills, 115*(2), 618–631.
- Meyer, C. & Taranis, L. (2011). Exercise in the eating disorders: Terms and definitions. *European Eating Disorders Review, 19*, 169–173.
- Murray, A. L., McKenzie, K., Newman, E. & Brown, E. (2013). Exercise identity as a risk factor for exercise dependence. *British Journal of Health Psychology, 18*(2), 369–382.
- Quick, V. M. & Byrd-Bredbenner, C. (2014). Disordered eating, socio-cultural media influencers, body image, and psychological factors among a racially/ethnically diverse population of college women. *Eating Behaviors, 15*(1), 37–41.



- Reas, D. L., Rø, Ø., Karterud, S., Hummelen, B. & Pedersen, G. (2013). Eating disorders in a large clinical sample of men and women with personality disorders. *International Journal of Eating Disorders*, 46, 801–809.
- Stets, J. E. & Burke, P. J. (2000). Identity theory and social identity theory. *Social Psychology Quarterly*, 63(3), 224–237.
- Sussman, S., Lisha, N. & Griffiths, M. (2011). Prevalence of the addictions: A problem of the majority or the minority? *Evaluations and the Health Professionals*, 34, 3–56.
- Symons Downs, D., Hausenblas, H. A. & Nigg, C. R. (2004). Factorial validity and psychometric examination of the Exercise Dependence Scale-Revised. *Measurement in Physical Education and Exercise Science*, 8, 183–201.