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Moderators of the Association Between Exercise Identity and Obligatory Exercise Among Participants of an Athletic Event

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Abstract

Previous research has connected exercise identity with obligatory exercise, yet to date no empirical studies have identified moderator variables of this association. The current study included participants of an athletic event (full marathon, $n = 582$; half marathon, $n = 1,106$; shorter distance, $n = 733$) who completed questionnaires about exercise behaviors, obligatory exercise, and internalization of both the thin-ideal and athletic-ideal body shapes. General linear model analyses were conducted to examine the exercise identity-obligatory exercise relationship; moderator variables included gender, internalization of the thin-ideal body shape, and internalization of the athletic-ideal body shape. After controlling for the effects of body mass index, age, and distance group, the three-way interaction of exercise identity, gender, and internalization of the athletic-ideal body shape predicted obligatory exercise. Findings suggest that women who report high identification with exercise and high value on having an athletic physique may be vulnerable to obligatory exercise.

Keywords

exercise identity; obligatory exercise; internalization

Although previous research in eating disorders has examined obligatory exercise, little attention has been paid to exercise identity, or the degree to which one's self-concept is shaped by engagement in exercise. Obligatory exercise is characterized by an inflexible exercise regimen, perceptions of exercise activities as more important than other events, participation in activities despite medical recommendations, and anxiety or guilt due to missed exercise opportunities (Adams, Miller, & Kraus, 2003; Adkins & Keel, 2005; Mond,

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Myers, Crosby, Hay, & Mitchell, 2008). Also, for some individuals who experience obligatory exercise, the postponement or cessation of exercise activities has been associated with physical and psychological withdrawal (Pasman & Thompson, 1988). In general, individuals who report obligatory exercise also report higher scores on measures of disordered eating behaviors than their non-obligatory-exercising counterparts (Brehm & Steffen, 1998; Matheson & Crawford-Wright, 2000; Slay, Hayaki, Napolitano, & Brownell, 1998; Solenberger, 2001). Additionally, among eating-disordered patients, those who engage in a high frequency of exercise report greater weight concern, more psychopathology, and longer treatment durations than those who exercise less often (Solenberger, 2001). Interestingly, recent empirical evidence among runners has linked obligatory exercise with not only eating disorder symptoms, but also athletic, or exercise identity (Gapin & Petruzzello, 2011; Lantz, Rhea, & Mesnier, 2004).

Even though exercise identity has commonly been associated with positive health outcomes, such as engagement in physical activity and a greater frequency, duration, and intensity of exercise behaviors (Anderson & Cychosz, 1994, 1995; Anderson, Cychosz, & Franke, 1998, 2001; Cardinal & Cardinal, 1997; Miller, Ogletree, & Welshimer, 2002; Petosa, Suminski, & Hartz, 2003; Strachan & Brawley, 2008; Strachan, Brawley, Spink, & Jung, 2009; Stryker & Burke, 2000), this construct has also recently been connected with negative health outcomes, such as disordered eating behaviors and obligatory exercise (Gapin & Petruzzello, 2011; Lantz et al., 2004). Obligatory exercise has also been associated with efforts to control weight and shape among eating-disordered inpatients (Dalle Grave, Calugi, & Marchesini, 2008), college women (Hubbard, Gray, & Parker, 1998; Thome & Espelage, 2007), and community samples (Mond et al., 2008; Mond, Hay, Rodgers, & Owen, 2006). Also, proposed statistical models have shown links between obligatory exercise and sociocultural pressures toward thinness (Goodwin, Haycraft, & Meyer, 2011) and appearance investment (White & Halliwell, 2010). Furthermore, in a recent population-based study of young adults that examined many of these factors, participants who reported high exercise identity also reported high compulsiveness to exercise, which was associated with weight concern (Karr, Bauer, Graham, Larson, & Neumark-Sztainer, under review). Among women in particular, high compulsiveness to exercise was also linked with high body dissatisfaction. Given that these findings suggest associations among exercise identity, obligatory exercise, and a focus on physical appearance, one might speculate that internalization of social standards of thinness may connect exercise identity with obligatory exercise.

Research over the past several decades has linked sociocultural influences, including media, family, and peers with shaping a social standard of thinness among women (e.g., Dittmar, 2005; Dunkley, Wertheim, & Paxton, 2001; Field et al., 2001; Keery, van den Berg, & Thompson, 2004; Levine, Smolak, & Hayden, 1994; McCabe & Ricciardelli, 2003; Ricciardelli & McCabe, 2003; Ricciardelli, McCabe, Holt, & Finemore, 2003; Shroff & Thompson, 2006; Stice & Whitenton, 2002; Tylka & Subich, 2004). Sociocultural influences are theorized to contribute to women's attitudes toward their bodies through three general processes: message exposure, the decision to internalize societal standards, and a response to such internalization (e.g., Dunkley et al., 2001; Fredrickson & Roberts, 1997; Ricciardelli et al., 2003). First, women have been exposed to messages within society that connect positive attributes associated with thinness; however, women are not merely passive recipients of societal messages (e.g., Dittmar & Howard, 2004; Dittmar, Halliwell, & Stirling, 2009; Halliwell & Dittmar, 2004). Second, women, especially those who experience body image disturbance or those who have a high body mass index (BMI), process this information and internalize these social values of thinness as their own personal standards (e.g., Dunkley et al., 2001; Low et al., 2003; Stice, Spangler, & Agras, 2001). In this way, sociocultural influences, such as the media, have promoted an ideal body shape of thinness and facilitated the opportunity for women to internalize the thin-ideal body shape

(e.g., Garner, Garfinkel, Schwartz, & Thompson, 1980; Groesz, Levine, & Murnen, 2002; Hesse-Biber, Leavy, Quinn, & Zoino, 2006; Levine et al., 1994; Malkin Wornian, & Chrisler, 1999; Meyers & Biocca, 1992; Sypeck, Gray, & Ahrens, 2004; Wiseman, Gray, Mosimann, & Ahrens, 1992). Lastly, internalization of thinness has commonly been linked with eating and body disturbances across both cross-sectional (e.g., Cusumano & Thompson, 1997; Halliwell & Harvey, 2006; Keery et al., 2004; Knauss, Paxton, & Alsaker, 2007; Shroff & Thompson, 2006) and longitudinal investigations (e.g., Low et al., 2003; Grabe, Ward, & Hyde, 2008). Therefore, researchers have proposed that internalization of societal messages of beauty is a causal risk factor of body image and eating disturbances (Thompson & Stice, 2001).

Recent research has shown that media messages regarding thinness have been linked with an increased risk for compulsive exercise among adolescent boys and girls (Goodwin et al., 2011). For young girls in particular, body image disturbance appears to mediate the association between sociocultural pressures and attitudes toward exercise (White & Halliwell, 2010). Sociocultural pressures have also been positively correlated with obligatory exercise for both adult men and women (Cahill & Mussap, 2007). In line with these connections between messages of thinness and exercise, some researchers have proposed that the Western cultural ideal body shape has shifted toward an ultra-fit, athletic physique (Grogan, 2008; Thompson, van den Berg, Roehrig, Guarda, & Heinberg, 2004). For men in particular, internalization of the athletic-ideal body shape has been linked with decreased body satisfaction and engagement in activities to increase muscle mass (Cahill & Mussap, 2007). Furthermore, muscle dissatisfaction and drive for muscularity have also been noted among college-aged men (Chittester & Hausenblas, 2009; Raudenbush & Meyer, 2003). Interestingly, unlike sociocultural standards for women which have praised thinness, researchers have speculated that the ideal body shape for men promotes muscularity (Cohane & Pope, 2001; Knauss et al., 2007; Kostanski, Fisher, & Gullone, 2004; Stanford & McCabe, 2005). For women, mixed findings have been shown for the association between internalization of the athletic-ideal body shape and body dissatisfaction (Homan, 2010; Homan, McHugh, Wells, Watson, & King, 2012). In general, it appears as though women are still more commonly driven toward the thin-ideal body shape and view an athletic physique as secondary to a thin physique (Homan et al., 2012). However, it has also been suggested that women who are striving to attain exercise goals or training for athletic events may be more likely to endorse internalization of an athletic-ideal body shape (Homan et al., 2012). Yet previous investigations of these constructs have not examined cognitions and behaviors of participants recruited from athletic events. Accordingly, a goal of the current study was to examine the link between internalization of thin-ideal and athletic-ideal body shapes with obligatory exercise among individuals participating in an athletic event.

In order to better understand the function of internalization in relation to sociocultural influences and body image dissatisfaction, researchers have conducted studies of moderation in order to identify how the degree to which individuals internalize standards of thinness may strengthen or weaken links between exposure to images of thinness and body dissatisfaction (Dittmar et al., 2009; Dittmar & Howard, 2004; Halliwell & Dittmar, 2004; Stice et al., 2001). As stated by Baron and Kenny (1986), “A moderator is a qualitative (e.g., sex, race, class) or quantitative (e.g., level of reward) variable that affects the direction and/or strength of the relation between an independent or predictor variable and a dependent or criterion variable” (p. 1174). For example, in a study of college women in the United States, the association between viewing images of thin models and appearance dissatisfaction was moderated by dispositional level of internalization of thinness (Cattarin, Thompson, Thomas, & Williams, 2000). A study of adult women living in the United Kingdom showed similar results for the relation between exposure to images of thinness and body anxiety; women in the high internalization group reported a greater degree of body anxiety than those

in the low internalization group (Halliwell & Dittmar, 2004). In contrast, however, Stice et al. (2001) conducted a study over 15 months with adolescent girls, and found that internalization of the thin-ideal body shape did not moderate the association between exposure to thin-ideal images and body dissatisfaction. Given these mixed findings, further research is necessary in order to clarify the value of internalization as a moderator of body image disturbances. It is possible that the role of internalization may serve an important function within the relation between exercise identity and obligatory exercise; thus, this line of research was of interest in the present study.

In light of the findings presented above, the purpose of the current study was to further examine the association between exercise identity and obligatory exercise within a large sample of individuals who participated in an athletic event. The rationale of the study was twofold. First, in line with previous literature (Cahill & Mussap, 2007; Gapin & Petruzzello, 2011; Goodwin et al., 2011; Lantz et al., 2004), it was hypothesized that exercise identity, internalization of the thin-ideal body shape, and internalization of the athletic-ideal body shape would be positively related to obligatory exercise among all participants. Because both internalization and obligatory exercise have been linked with eating and body image disturbances (e.g., Cusumano & Thompson, 1997; Dalle Grave et al., 2008; Halliwell & Harvey, 2006; Hubbard et al., 1998; Keery et al., 2004; Knauss et al., 2007; Mond et al., 2006, 2008; Shroff & Thompson, 2006; Thome & Espelage, 2007; White & Halliwell, 2010), we proposed that internalization would also relate to obligatory exercise, particularly among women in our sample. Moreover, we predicted that gender and internalization of both the thin-ideal and athletic-ideal body shapes would function as moderators of the association between exercise identity and obligatory exercise by identifying under what circumstances (i.e., female gender, high internalization) exercise identity may be more strongly related to obligatory exercise. Thus, the second aim of the study was to further assess the exercise identity-obligatory exercise relationship, and as suggested by Homan et al. (2012), it was expected that internalization of the thin-ideal and athletic-ideal body shapes and gender would moderate this relation. That is, the strength of the positive association between exercise identity and obligatory exercise would be greater for women with high internalization of the thin-ideal and athletic ideal body shapes. Moderator variables for the association between exercise identity (independent variable) and obligatory exercise (dependent variable) were (1) internalization of the thin-ideal body shape, (2) internalization of the athletic-ideal body shape, and (3) gender. All three variables were used in two-way and three-way interactions. In all interactions it was expected that a high level of internalization and female gender would strengthen the exercise identity-obligatory exercise relationship.

Method

Participants

Participants in the study were individuals who competed in an annual marathon event within the Midwestern United States. Recruitment for the study involved the distribution of flyers throughout the community at athletic facilities, sporting goods stores, and coffee shops. An advertisement for the study was also printed within the event program distributed to all runners, and through an email list serve managed by the race director. Institutional review board approval was obtained for the project and all participants provided informed consent for participation in the study.

A total of 2,421 study participants completed 1 of 3 running distances including, a short distance (5K or 10K; $n = 733$), a middle distance (half-marathon; $n = 1,106$), or a long distance (full marathon; $n = 582$). Across distances, 9,914 individuals registered for the shorter distance, 6,518 registered for the half distance, and 2,213 registered for the full

distance. Thus, study participation across groups was 7.4% for the shorter distance, 16.9% for the half distance, and 26.3% for the full distance. The majority of the sample was Caucasian (96.2%), married (68.1%), employed (93.3%), and had some college education (96.9%). The mean age for the sample was 37.7 years ($SD = 10.8$; range: 18–92), and the mean body mass index (BMI) was 24.4 ($SD = 3.8$; range: 15.3–47.8). More than half of participants ran a minimum of 5 days a week (52.8%) and 53.2% ran a minimum of 20 miles per week. The sample included both men ($n = 779$; 32.2%) and women ($n = 1,642$; 67.8%).

Tests for gender differences were conducted across several demographic variables. Women were more likely to be married (65.7% vs. 34.3%; $\Delta^2 = 10.734$, $p < .001$), and employed than men (66.8% vs. 33.2%; $\Delta^2 = 14.196$, $p < .001$); however, men were more likely to be older ($M = 41.0$, $SD = 11.2$ vs. $M = 36.1$, $SD = 10.2$; $p < .001$) and heavier than women (BMI; $M = 25.7$, $SD = 3.3$ vs. $M = 23.77$, $SD = 3.9$; $p < .001$). Men were more likely to run 50 or more miles per week, but women were more likely to run a greater number of days per week ($p = .001$). Gender differences were not found for race or level of education ($p = ns$).

Procedure

The online survey was accessible to participants for three weeks following the marathon event. Participants completed survey questions regarding demographic characteristics, eating and exercise behaviors, and internalization of the thin-ideal and athletic-ideal body shapes. Eligible participants were those who were registered for the event and were at least 18 years of age. Of the 3,117 individuals who logged on to the survey website, 161 did not mark the box for providing informed consent on the online survey, 227 did not participate in the athletic event, 69 were under age 18, 179 did not provide an age on the survey, and 60 did not provide their gender information or the distance ran in the event; thus, the final sample included 2,421 participants (77.7% of those originally interested in the study). Participants were compensated with entry into a drawing to win 1 of 4 gift cards valued between \$50 and \$200 for a sporting goods store.

Measures

Participant demographic characteristics—Demographic characteristics included questions about age, gender, days run per week, miles run per week, and distance run in the event (i.e., marathon, half-marathon, shorter distance). Self-reported body height and body weight were used to calculate BMI (kg/m^2). Because past research has shown that self-reported information is strongly correlated with objective participant measurements (e.g., Ambrosi-Randic & Bulian, 2007; Shapiro & Anderson, 2003), it was determined that the use of self-report information for assessing BMI within the present study likely functioned as a sufficient estimate of participant characteristics.

Exercise Identity Scale (EIS)—The EIS (Anderson & Cychosz, 1994) was used in order to assess the degree to which exercise is part of one's self-concept. This questionnaire includes nine items that are scored on a Likert scale ranging from *strongly disagree* to *strongly agree*, and summed to equal a total scale score (range: 9 – 45; e.g., “When I describe myself to others, I usually include my involvement in exercise.”). Strong internal consistency (range: .73–.93) and test-retest reliability values over 1-week (.93) have been shown for combined samples of adult men and women, including college students, law enforcement officers, and members of healthcare centers (Anderson & Cychosz, 1994, 1995; Anderson et al., 1998, 2001). Exercise identity has also been positively correlated with indicators of exercise participation (e.g., number of weeks, $r = .93$; minutes/week, $r = .85$; Anderson et al., 1998). In the current sample, high alpha reliability coefficients were found across the three participant groups (marathon = .91; half-marathon = .91; shorter distance = .94).

Sociocultural Attitudes Toward Appearance Questionnaire-3 (SATAQ-3)—Two subscales from the SATAQ-3 (Thompson et al., 2004) were used to examine the degree to which participants internalize the thin-ideal (Internalization-General subscale) and athletic-ideal body shapes (Internalization-Athlete subscale) that are valued within Western culture. All items for each of the subscales are scored on a 5-point Likert scale, ranging from *definitely disagree* to *definitely agree*. Scores are summed to equal total scores for each subscale. In a sample of male and female adults, adequate internal consistency reliability values (Internalization-General: women = .90, men = .89; Internalization-Athlete: women = .79, men = .86), were found for shortened versions of each of the subscales (Wheeler, Vassar, & Hale, 2011). The internalization subscales have also shown strong convergent validity on measures of body dissatisfaction among college-aged females (Thompson et al., 2004). The Internalization-General subscale includes nine items that assess the extent to which participants accept the Western standard of thinness (range: 9 – 45; e.g., “I compare my appearance to the appearance of TV and movie stars.”). Across participants in the present study, the alpha reliability coefficients for internalization of the thin-ideal body shape were strong across the three groups (marathon = .97; half-marathon = .97; shorter distance = .97). The Internalization-Athlete subscale has five items that measure the degree to which participants value an athletic physique (range: 5 – 25; e.g., “I compare my body to those of people who are athletic.”). The alpha reliability coefficients for internalization of the athletic-ideal body shape were high across the three participant groups in the current sample (marathon = .91; half-marathon = .90; shorter distance = .90).

Obligatory Exercise Questionnaire (OEQ)—Obligatory exercise was measured by the OEQ (Pasman & Thompson, 1988; Thompson & Pasman, 1991), a self-report questionnaire for the examination of cognitions and behaviors associated with compulsive exercise. This assessment includes 20 items that are scored on a Likert scale ranging from *never* to *always*, and are summed to equal a total scale score (range: 20 – 80). In a sample of college-aged men and women, excellent internal consistency reliability (alpha = .96) was shown for this measure (Pasman & Thompson, 1988). An example of a behavioral item on this assessment is, “I engage in physical exercise on a daily basis.” An example of a cognitive item on this assessment is, “When I miss an exercise session, I feel concerned about my body possibly getting out of shape.” In the present study, the alpha reliability coefficients across the three participant groups were acceptable (marathon = .80; half-marathon = .84; shorter distance = .87).

Statistical Analyses

Preliminary statistical analyses involved a test for group differences across distance groups (i.e., shorter distance, half marathon, marathon) and gender on demographic characteristics. One-way analysis of variance tests (ANOVA) were conducted for statistical procedures by distance group, and independent-samples t-tests were used for analyses by gender. Post-hoc group comparisons with Bonferroni correction were used in order to identify group differences by distance group. Because distance group, age, and BMI were significantly associated with obligatory exercise, all further analyses included these variables as covariates.

General linear model (GLM) analyses were conducted in order to examine the association between exercise identity (independent variable) and obligatory exercise (dependent variable). The single GLM model involved a test of 3 moderator variables: gender, internalization of the thin-ideal body shape, and internalization of the athletic-ideal body shape. The GLM model thus included 3 covariates (distance group, age, and BMI), main effects for the independent variable (exercise identity) and the 3 moderator variables, 3 two-way interactions between the independent variable and each of the 3 moderators, and 2

three-way interactions between the independent variable, gender, and each of the internalization moderator variables. To test the interactions between exercise identity and the continuous moderator variables, all involved variables were recoded as centered variables around the grand mean (i.e., exercise identity, internalization of the thin-ideal body shape, internalization of the athletic-ideal body shape). Moderator variables were centered so that each continuous variable had a mean of zero in order to clarify the interpretation of values and to reduce the likelihood of problems of multicollinearity (Aiken & West, 1991; Tabachnick & Fidell, 2007). The centered variables were used in all further analyses. Gender was included in the model as a dichotomous moderator variable with women as the reference group. Distance group was a categorical variable in the model with shorter distance as the reference group. Continuous covariates (i.e., BMI, age) were recoded as centered variables around the grand mean. Simple slopes analyses were conducted as post-hoc tests of significant interactions in order to further examine each significant moderator variable of the exercise identity-obligatory exercise relationship (Aiken & West, 1991). To analyze the simple slopes for the continuous independent variables (i.e., internalization of the thin-ideal body shape, internalization of the athletic-ideal body shape), simple regression equations for the association between exercise identity and obligatory exercise were computed at the level of one standard deviation value above and below the mean for exercise identity. Separate regression equations were computed for men and women. All analyses were conducted using SPSS 19.0.

Results

Preliminary Analyses

Initial statistical analyses were completed to test for differences across distance groups on participant characteristics (see Table 1). A one-way univariate analysis of variance (ANOVA) was conducted with distance group as the between-groups variable, and age, BMI, exercise identity, thin-ideal, athletic-ideal, and obligatory exercise as the dependent variables. Significant differences were found across all distance groups for BMI ($F, 2, 2335 = 52.87, p < .001$), exercise identity ($F, 2, 1905 = 108.45, p < .001$), and obligatory exercise ($F, 2, 2112 = 45.46, p < .001$). The marathon group significantly differed from the half marathon and shorter distance groups on age ($F, 2, 2418 = 25.98, p < .001$) and internalization of the thin-ideal body shape ($F, 2, 1996 = 6.56, p < .001$). The marathon and half-marathon groups both significantly differed from the shorter distance group on internalization of the athletic-ideal body shape ($F, 2, 1998 = 5.28, p < .005$). All significant effects for distance group included post-hoc analyses with Bonferroni correction.

Independent-samples t-tests were conducted in order to test for gender differences on participant characteristics (see Table 1). Men reported higher values than women for age ($t, 2419 = 10.50, p < .001$) and BMI ($t, 2336 = 11.68, p < .001$). However, women reported higher values than men on internalization of the thin-ideal ($t, 1997 = -8.20, p < .001$) and athletic-ideal body shapes ($t, 1999 = -7.63, p < .001$). Significant gender differences were not found for exercise identity and obligatory exercise ($p = ns$). Because significant differences were found for associations between participant demographic characteristics (i.e., age, BMI) and obligatory exercise further analyses were conducted in order to better understand these associations. Simple linear regression analyses showed that both BMI ($B = -.246$) and age ($B = -.080$) were inversely related to obligatory exercise ($p < .001$). Given the significant differences found for age, BMI, and distance group in relation to the dependent variable, obligatory exercise, all further analyses included these variables as covariates.

General Linear Model (GLM): Main Effects

GLM analyses were conducted to investigate the relation between the salient independent variables, and the dependent variable – obligatory exercise. Significant main effects of obligatory exercise were found in the GLM model (see Table 2). Exercise identity was positively associated with obligatory exercise ($B = .521$) in that a higher level of exercise identity was related to a higher level of obligatory exercise ($p < .001$, partial $n^2 = .221$). Both internalization of the thin-ideal body shape ($B = .041$; $p < .029$, partial $n^2 = .003$) and internalization of the athletic-ideal body shape ($B = .196$; $p < .001$, partial $n^2 = .013$), were also positively related to obligatory exercise. Gender was significantly associated with obligatory exercise in that men reported a greater level of obligatory exercise than women ($B = 0.728$; $p < .034$, partial $n^2 = .002$). Although significant effects were not found for distance group ($p = ns$) and BMI ($p = ns$), age was inversely related to obligatory exercise ($B = -.109$; $p < .001$, partial $n^2 = .033$).

General Linear Model: Interactions

Both two-way and three-way interactions were calculated for the assessment of moderating effects of the association between exercise identity and obligatory exercise (see Table 2, Figures 1 and 2). Three, two-way interactions were calculated: Exercise Identity $\times$ Gender, Exercise Identity $\times$ Thin-Ideal, and Exercise Identity $\times$ Athletic-Ideal; significant effects were not found for any of the two-way interactions ($p = ns$). Two, three-way interactions were also calculated: Exercise Identity $\times$ Thin-Ideal $\times$ Gender and Exercise Identity $\times$ Athletic-Ideal $\times$ Gender. The three-way interaction, Exercise Identity $\times$ Athletic-Ideal $\times$ Gender was significantly associated with obligatory exercise ($B = -.026$; $p < .01$, partial $n^2 = .004$). A simple slope analysis was conducted in order to post-hoc test this significant interaction (Aiken & West, 1991). The three-way interaction of Exercise Identity $\times$ Athletic-Ideal $\times$ Gender added moderating effects for the prediction of obligatory exercise over and above the effects of exercise identity alone. Significant moderation was not found for the three-way interaction – Exercise Identity $\times$ Thin-Ideal $\times$ Gender; $p = ns$), or for gender alone as a moderator of the exercise identity-obligatory exercise relationship ($p = ns$).

Discussion

The purpose of the current study was to examine the association between exercise identity and obligatory exercise, and to consider the contribution of gender, internalization of the thin-ideal and athletic-ideal body shapes as moderators of this association among individuals who participated in an athletic event. As hypothesized, exercise identity, internalization of the thin-ideal body shape, and internalization of the athletic-ideal body shape were positively associated with obligatory exercise. After controlling for the effects of BMI, age, and distance group (marathon, half-marathon, shorter distance), the three-way interaction of exercise identity, gender, and internalization of the athletic-ideal body shape predicted obligatory exercise.

Similar to previous research, high exercise identity, high internalization of the thin-ideal body shape, and high internalization of the athletic-ideal body shape were associated with high obligatory exercise (Cahill & Mussap, 2007; Gapin & Petruzzello, 2011; Goodwin et al., 2011; Lantz et al., 2004; White & Halliwell, 2010). These findings suggest that athletic participants in our study are not exempt from internalizing Western standards of appearance. Additionally, as hypothesized and proposed by Homan et al. (2012), the three-way interaction of exercise identity, gender, and internalization of the athletic-ideal body shape predicted obligatory exercise. That is, the exercise identity-obligatory exercise relationship was stronger for women who reported high internalization of an athletic physique. To a degree, this finding differs from previous research which has shown that women are

motivated to attain the thin-ideal body shape (Homan, 2010), whereas men are driven to achieve an athletic-ideal body shape (Cahill & Mussap, 2007). Given the nature of the athletic context and the high training demands of participating in marathon running events, it is possible that women in this study who report high exercise identity and high internalization of the athletic-ideal body shape are at risk for obligatory exercise cognitions and behaviors. Because the exercise identity-obligatory exercise relationship was stronger for women than men, further investigation is necessary in order to untangle gender differences in how these constructs (i.e., exercise identity, obligatory exercise) relate among men. For instance, although previous studies of sociocultural pressures toward appearance for men often involve an emphasis on muscularity (Cohane & Pope, 2001; Knauss et al., 2007; Kostanski et al., 2004; Stanford & McCabe, 2005), drive for muscularity was not measured in this study; future research should include this construct in examinations of exercise identity and obligatory exercise among men.

In general, participants in the current study who completed the full marathon reported greater obligatory exercise than those who ran shorter distances. Because the ability to complete long-distance running events in comparison with shorter distances generally requires additional training and endurance, this finding is in line with expectations. Greater obligatory exercise cognitions and behaviors were also likely among younger participants and those who maintained a low BMI. It is possible that because younger individuals are less likely to have experienced physical declines due to age, they are more likely to uphold rigorous physical training demands, which may in turn, increase their risk for developing obligatory exercise cognitions and behaviors. Future research is needed to explore these hypotheses.

Strengths of the study included its large sample size of both men and women who were participants across a variety of distances. Along with the strengths of the investigation, limitations of the study must also be acknowledged. First, participant selection bias must be considered due to the possibility that individuals who participated in the study differ systematically from those who chose not to be in the study. For example, those who chose to participate in the study may have been enticed by the opportunity to win a gift certificate for exercise equipment as compensation for being in the study. Second, the majority of participants represent a particular demographic that is Caucasian and college-educated, and such personal characteristics might not generalize to individuals who participate in other athletic events. Third, although this study found interesting results for internalization of the athletic-ideal body shape, current literature involving internalization of ideal body shapes is better defined for women than men (Heinberg, Thompson, & Stormer, 1995; Thompson et al., 2004). Indeed, validation studies with the SATAQ-3 have shown strong psychometric utility for women, but also noted enhanced reliability and validity values after removing items and testing the factor structure of the measure or shifting the focus of some items to reflect an emphasis on muscularity for men (Karazsia & Crowther, 2008; Wheeler et al., 2011). Moreover, the athletic-ideal body shapes for men and women who participate in running events may differ from the ideal body shapes for participants of other athletic events, such as gymnastics or basketball. In order to more precisely test internalization of the athletic-ideal body shape among athletic individuals, future research should consider the body shapes that are optimal for successful performance for each individual sport. Lastly, the cross-sectional nature of the study inhibits the ability to identify a temporal relationship between the key constructs – exercise identity, internalization of the thin-ideal body shape, internalization of the athletic-ideal body shape, and obligatory exercise. Thus, we are unable to identify cause-effect relationships across these key areas. Prospective studies with athletic individuals are necessary in order to determine causal mechanisms that connect exercise identity with internalization and obligatory exercise.

Despite these limitations, the present study adds to the current body of literature by examining, within a large sample of athletic individuals, moderator variables of the exercise identity-obligatory exercise relationship. Unlike other studies that have shown that women desire a thin-ideal body shape (Cahill & Mussap, 2007; Homan, 2010), findings from the current study suggest that women who participate in athletic events and report high exercise identity may also value an athletic physique. Thus, women who participate in athletic events, maintain high exercise identity, and internalize the athletic-ideal body shape may be vulnerable to developing obligatory exercise cognitions and behaviors.

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- !! We examined moderators of the exercise identity-obligatory exercise relationship.
- !! Participants completed a marathon, half marathon, or shorter running distance.
- !! A three-way interaction significantly predicted obligatory exercise.
- !! Females who value an athletic physique may be at risk for obligatory exercise.

Figure 1.

Exercise Identity $\times$ Athletic-Ideal $\times$ Gender for Predicting Obligatory Exercise Among Women

Note. AID = Internalization of the Athletic-Ideal body shape. The continuous moderator variable, Internalization of the Athletic-Ideal body shape (AID), was recoded as a centered variable around the grand mean. Gender was included in the model as a dichotomous moderator variable. Simple slopes analyses were conducted at the level of one standard deviation value above and below the mean for Exercise Identity. $p < .01$.

Figure 2.

Exercise Identity $\times$ Athletic-Ideal $\times$ Gender for Predicting Obligatory Exercise Among Men

Note. AID = Internalization of the Athletic-Ideal body shape. The continuous moderator variable, Internalization of the Athletic-Ideal body shape (AID), was recoded as a centered variable around the grand mean. Gender was included in the model as a dichotomous moderator variable. Simple slopes analyses were conducted at the level of one standard deviation value above and below the mean for Exercise Identity. $p = ns$.

Table 1

Participant Characteristics by Age, Body Mass Index (BMI), Exercise Identity, Thin-Ideal, Athletic-Ideal, and Obligatory Exercise Across Distance Groups and Gender

Variable	Group		Test Statistic		Gender		Test Statistic
	Shorter Distance (<i>n</i> = 733)	Half-Marathon (<i>n</i> = 1106)	Marathon (<i>n</i> = 582)	<i>F</i> (<i>df</i>)	Male (<i>n</i> = 779)	Female (<i>n</i> = 1642)	<i>t</i> (<i>df</i>)
Age	37.08 (10.84) ^a	36.66 (10.46) ^a	40.46 (10.867) ^b	25.98 (2, 2418)	41.00 (11.22) ^b	36.14 (10.20) ^a	10.50 (2419)
BMI	25.56 (4.84) ^c	24.19 (3.36) ^b	23.44 (2.95) ^a	52.87 (2, 2335)	25.70 (3.32) ^b	23.77 (3.93) ^a	11.68 (2336)
Exercise Identity	30.62 (9.16) ^a	35.34 (7.27) ^b	37.43 (6.70) ^c	108.45 (2, 1905)	34.41 (7.68)	34.46 (8.39)	-0.14 (1906)
Thin-Ideal	25.46 (10.24) ^b	25.32 (10.25) ^b	23.43 (10.26) ^a	6.56 (2, 1996)	22.13 (10.08) ^a	26.15 (10.12) ^b	-8.20 (1997)
Athletic-Ideal	16.47 (5.08) ^a	17.28 (4.84) ^b	17.19 (5.01) ^b	5.28 (2, 1998)	15.76 (5.17) ^a	17.57 (4.77) ^b	-7.63 (1999)
Obligatory Exercise	43.47 (7.61) ^a	46.29 (7.54) ^b	47.44 (7.11) ^c	45.46 (2, 2112)	45.29 (7.36)	45.89 (7.73)	-1.66 (2113)

Note. One-way analysis of variance tests (ANOVA) were used for statistical procedures by Group, and independent-samples t-tests were used for analyses by Gender. All significant effects for Group include post-hoc analyses with Bonferroni correction.

Superscripts denote significant group differences for each dependent variable, *p* .01.

Table 2
General Linear Model Analyses for the Assessment of Moderator Variables of the Exercise Identity-Obligatory Exercise Relationship

Parameter	B	Std. Error	t	p	95% Confidence Interval		Partial η^2
					Lower Bound	Upper Bound	
Intercept	45.292	0.281	161.077	.001***	44.740	45.843	.934
Distance Group							
Marathon	0.549	0.419	1.311	.190	-0.272	1.370	.001
Half-Marathon	0.065	0.342	0.191	.849	-0.606	0.736	.001
Shorter Distance	0 ^a	-	-	-	-	-	-
Gender ^b	0.728	0.343	2.125	.034*	0.056	1.400	.002
Body Mass Index (BMI)	0.060	0.040	1.508	.132	-0.018	0.137	.001
Age	-0.109	0.014	-7.876	.001***	-0.136	-0.082	.033
Exercise Identity	0.521	0.023	22.737	.001***	0.476	0.566	.221
Internalization of the Thin-Ideal	0.041	0.019	2.189	.029*	0.004	0.077	.003
Internalization of the Athletic-Ideal	0.196	0.040	4.882	.001***	0.117	0.274	.013
Exercise Identity $\times$ Gender ^b	-0.029	0.041	-0.711	.477	-0.110	0.052	.001
Exercise Identity $\times$ Thin-Ideal	0.001	0.003	-0.098	.922	-0.005	0.005	.001
Exercise Identity $\times$ Athletic-Ideal	0.016	0.005	3.058	.002	0.006	0.027	.005
Exercise Identity $\times$ Thin-Ideal $\times$ Gender ^b	0.006	0.005	1.184	.236	-0.004	0.017	.001
Exercise Identity $\times$ Athletic-Ideal $\times$ Gender ^b	-0.026	0.010	-2.583	.010**	-0.045	-0.006	.004

Note.

^aShorter Distance was the reference group for the test of main effects for Distance Group.

^bWomen was the reference group for the test of main effects for Gender and the interactions involving Gender. General linear model analyses were used to test a model of moderator variables for the assessment of the exercise identity-obligatory exercise relationship. Gender, Internalization of the Thin-Ideal body shape, and Internalization of the Athletic-Ideal body shape were tested as moderators of the exercise identity-obligatory exercise relationship. Distance Group, Age, and BMI were included as covariates in the model.

* $p < .05$.

** $p < .01$.

*** $p < .001$.