Does gender moderate the exercising personality? An examination of continuous and stage-based exercise

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(Received 17 April 2009; final version received 26 October 2009)

For nearly 60 years, researchers have examined the relationship between personality traits and exercise participation. Rhodes and Smith (2006), using meta-analytic procedures reported that extraversion, conscientiousness, and neuroticism were significantly related to exercise participation (Personality correlates of physical activity: A review and meta-analysis. British Journal of Sports Medicine, 40, 958–965). Gender as a moderator of the personality and exercise relationship remained inconclusive. In addition, researchers have suggested that the stage approach may lend greater insight as to the importance of personality. The investigator’s primary purpose was to determine whether gender moderated the personality and exercise relationship. The secondary purpose was to determine the importance of personality within a stage approach. Participants were 827 females and 657 males college-aged students who completed measures of the “big five” personality traits and two exercise measures. The results indicated that gender was not a moderator and that the stage approach offers insight as hypothesized differences resulted in personality between intentional exercisers and non-exercising individuals as well as within exercising individuals.

Keywords: five-factor model of personality; exercise and personality; personality and stages of change

Introduction

Researchers have examined the relationship between personality and exercise or planned physical activity during leisure time over the last five decades with the first stretch of research being described as tumultuous due to limited psychometrics and the lack of common/basic trait taxonomy (Digman, 1990; McCrae & Costa, 1995). Over the last 20 years, personality traits have been related to several exercise topics such as exercise motives and barriers (Courneya & Hellsten, 1998), the translation of exercise intention into actual behavior (Rhodes, Courneya, & Hayduk, 2002a) and affect in response to exercise participation (Lochbaum & Lutz, 2005). The majority of contemporary studies have examined whether personality is a reliable correlate of planned physical activity or exercise participation (see Rhodes & Smith, 2006 for a review).
This research has focused nearly exclusively on Eysenck’s (1970) three-factor model of personality and the more contemporary and popular five-factor model (Costa & McCrae, 1992). The five-factor model includes two of Eysenck’s traits, extraversion and neuroticism, as well as the traits of openness to experience, agreeableness, and conscientiousness. Rhodes and Smith (2006) sought to summarize the literature as no systematic review had been published though several papers existed (Eysenck, Nias, & Cox, 1982; Gavin, 2004; Rhodes, 2006). Using meta-analytic techniques with 35 independent samples, the authors reported that a small relationship between personality and exercise was present for extraversion ($r = 0.23$), conscientiousness ($r = 0.20$), and neuroticism ($r = -0.11$). From their review, several moderators of personality and exercise relationships were investigated. While Rhodes and Smith (2006) noted that personality and exercise appeared invariant to most of these factors, the authors suggested that very few comparative studies that directly evaluate potential moderators of the personality and exercise relationship had been conducted.

One of the potential moderators of this relationship is the gender of the participants. For example, almost all the studies conducted on the five-factor model and exercise include either exclusive female samples or samples with a majority female composition (Courneya, Bobick, & Schinke, 1999; Courneya & Hellsten, 1998; Rhodes, Courneya, & Bobick, 2001; Rhodes, Courneya, & Jones, 2002b). In addition, it is important to note that several studies have reported gender differences (Kjelsas & Augestad, 2004; Sale, Guppy, & El-Sayed, 2000; van Loon et al., 2001) though only one study to date has compared males and females based on three of the “big five” personality traits (Courneya & Hellsten, 1998). It is possible that the expression of personality traits like extraversion or neuroticism may differ by gender. The absolute values of personality (i.e. mean) traits differ by gender (Costa & McCrae, 1992) suggesting a marked and reliable difference in trait expression. In terms of exercise participation, the well-demonstrated gender discrepancy favoring males over females (Centers for Disease Control and Prevention, 2007) potentially suggests that more discrepant personality values are related to participation in exercise for females but not necessarily for males. By contrast, personality, regardless of gender, may relate to exercise behavior if it is a more fundamental and less contextual behavior in trait expression. Clearly direct tests of whether gender moderates the personality and exercise relationship are needed to shed light on this issue.

Contemporary personality research has also focused on its role in the process of exercise behavior. This is most evident in studies that evaluate personality and intention-behavior relationships (e.g. Conner, Rodgers, & Murray, 2007; Rhodes & Courneya, 2003; Rhodes, Courneya, Blanchard, & Plotnikoff, 2007; Rhodes et al., 2002a,b). These studies suggest that personality may affect the self-regulation of exercise behavior such that the ability to implement the decision to be intentionally physically active is impacted by one’s personality. The studies on this topic support either conscientiousness (e.g. Conner et al., 2007; Rhodes et al., 2002a,b; Rhodes et al., 2007), extraversion (Hoyt, Rhodes, Hausenblas, & Giacobbi, 2009; Rhodes et al., 2002a,b, 2003; Rhodes & Courneya, 2003), or neuroticism as potential moderators (Hoyt et al., 2009).

These types of investigations also support the possible advantages of a stage continuum when understanding exercise and personality because this approach separates decisional, implementation, and behavioral actions from one another.
(Prochaska & DiClemente, 1983; Prochaska & Velicer, 1997; Weinstein, Lyon, Sandman, & Cuite, 1998). This model describes the different phases involved in the adoption and eventual maintenance of a behavior. The phases commonly used are from pre-contemplation to maintenance. In the pre-contemplation stage there is no intention to change a behavior. At the end of the continuum is maintenance whereby sustained behavior change has taken place. The other three stages are action (the behavior is engaged in but has not been sustained for at least six months), preparation (intention exists to begin the behavior within a month), and contemplation (intention exists to begin the behavior with half a year). Research investigations have demonstrated that this stage-of-change model is an effective manner to understand important thought patterns that may be changed to influence exercise patterns (e.g. Prochaska & Velicer, 1997).

Surprisingly, only one study has focused on personality and the stages of change paradigm. Rhodes et al. (2001) examined the relationship between personality and exercise participation in patients with breast cancer and found neuroticism to be a more critical variable with regard to earlier and maladaptive exercise stages, whereas extraversion and conscientiousness were found to be more important in the later stages of change and adaptive exercise patterns. Based on these results, the stage approach appears to be informative as to the personality and exercise relationship. Neuroticism may be a more dispositional variable affecting the initial decision to exercise while extraversion and conscientiousness may affect exercise through the implementation and self-regulation of exercise after the initial decision has been made. Certainly more research is needed to confirm this theorizing.

Therefore, the primary purpose of this study is to formally examine whether or not gender is a moderator of the personality and exercise relationship. We generally hypothesize a null relationship for the moderating effect of gender. We hypothesized this based on the notion that trait expression is fundamentally basic as well as the null relationship cited by Rhodes and Smith (2006) with their preliminary evidence. However, it is important to remember, as reviewed earlier, that gender differences have been reported and only one study to date has compared males and females on the contemporary exercising personality based on three of the “big five” personality traits. A secondary purpose of the present study was to investigate whether personality and self-reported exercise relationships would be informative based on the use of a stage approach to planned exercise participation. We hypothesized, based on Rhodes et al. (2001), which differences in the exercising personality will emerge between the decisional stages of pre-contemplation, contemplation and preparation stages and the behavioral stages of action and maintenance. Specifically, participants in the behavioral stages will be more extraverted and conscientious and less neurotic compared to participants in the decisional stages.

Method
Participants
Participants were 827 females and 657 males with comparable mean ages of 21.18 ± 3.50 and 21.62 ± 2.81, respectively. Concerning race/ethnicity, 79.5% (80.6% females, 77.9% males) of the entire sample reported being Caucasian, 3.2% (3.8% females, 3.2% males) being African-American, 13.4% (12.2% females, 14.9% males) being Hispanic, non-White, and the remaining 3.5% of the entire sample being Native American, Pacific Islander, Asian American or reporting other.
Participants were recruited via personal communication from variety of exercise science and personal fitness and wellness courses at a southwestern university in the USA. These data were collected over approximately three consecutive semesters and were a part of other investigations concerning motivational constructs and exercise participation.

**Measures**

**NEO-five factor inventory**

The NEO-five factor inventory (NEO-FFI) is a 60-item measure developed to fit a five-factor model of personality (Costa & McCrae, 1992). The NEO-FFI yields scores for neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. The NEO-FFI has demonstrated good psychometric properties across diverse samples. For the present investigation, the internal consistencies were 0.66, 0.76, 0.64, 0.76, and 0.79 for neuroticism, extraversion, openness to experience, agreeableness, and conscientiousness. Participants were asked to respond to the series of questions concerning how one behaves, feels, and acts. An example question is “I am not a worrier” (neuroticism question). Each of these five personality dimensions is scored by summing 12-items that are scored on a Likert scale ranging from 0 “strongly disagree” to 4 “strongly agree”.

**Leisure time exercise questionnaire**

The leisure time exercise questionnaire (LTEQ) (Godin & Shepard, 1985) was used to assess participants’ exercise behavior. Participants were asked “Considering a typical 7-day period (a week), how many times on average do you do the following kinds of exercise for more than 20 min continuously or discontinuously during your free time?” Participants indicated their weekly frequencies for light, moderate, and strenuous exercise. These frequencies were rated on a 9-point scale ranging from 0 never to 8 times or more a week. Godin and Shephard (1985) demonstrated that the items have shown very good test–retest reliability ($r = 0.94$) and concurrent validity has been examined using physiological surrogates of exercise participation ($r = 0.38$ with $\text{VO}_{2\text{max}}$). Jacobs, Ainsworth, Hartman, and Leon (1993) have demonstrated favorable reliability and validity for the LTEQ over a 1-month period in relation to nine other exercise specific self-report measures. The original version of the LTEQ asked about exercise for more than 15 min as opposed to our 20 min. In addition, for the present investigation, only the strenuous and moderate intensity scores were computed as they are commensurate with public health guidelines for increasing and maintaining health (Centers for Disease Control and Prevention, n.d.).

**Stages of change approach (SC)**

The SC comprised of five sentences that describe an individual’s current situation in regard to exercise participation and was adapted from Courneya (1995) and Rhodes et al. (2001) who queried regular physical activity completed at least three times per week, for at least 20–30 min in duration. The SC is based on the five stages of the transtheoretical model. Participants were asked to circle one of five choices based on the following question, “Do you exercise regularly based on the following definition?
Regular exercise is any planned physical activity (e.g., swimming, brisk walking, aerobics, jogging) performed to increase physical fitness. Such activities should be performed three to five times per week for 20 to 60 either continuous or discontinuous minutes”. The five sentences that the participants chose from were as follows: Yes, I have been exercising regularly for MORE than 6 months; Yes, I have been exercising regularly for LESS than 6 months; No, but I intend to start exercising regularly in the next 30 days; No, but I intend to start exercising regularly in the next 6 months; and No, and I do NOT intend to start exercising regularly in the next 6 months. Based on the participants answer, they were placed into one of the five groups for analysis purposes.

**Procedures**
Permission was granted from instructors of a variety of fitness and wellness courses and exercise science courses to approach potential participants. The primary author or a research assistant stated to the potential participants that the study’s purpose was to understand the relationship among personality, motivation, and exercise participation. Participants were told that tangible rewards such as extra credit were not being offered for participation and punishment would not occur for refusal to participate. Those who agreed to participate were presented with the questionnaire packet. The entire study was approved by the first author’s University Human Subject’s Institutional Review Board. The packet of questionnaires for the present study contained the NEO-FFI, LTEQ, SC, and questions to obtain demographic information.

**Data analyses**
To test the primary purpose of the investigation, whether gender moderated the relationship between personality and self-reported exercise as measured by the LTEQ, a Fisher’s $z'$ test for each comparison was calculated. The $z'$ score was calculated on the difference for the correlations of the LTEQ (strenuous and moderate exercise subscales) for each personality trait by gender. Significance was defined if the critical value was $>1.96$ in absolute value. In addition, Cohen’s (1992) effect size ($ES, q$) was calculated to determine meaningfulness of differences. To test the secondary purpose of the investigation, whether the personality traits were important to exercise as measured by a stage approach, a multivariate analysis of variance (MANOVA) was conducted with gender and the exercise stage as the independent variables and the five personality traits as the dependent variables. Significant follow-up univariate $F$-tests were examined for each personality trait. Exercise stage differences were followed up with the Ryan-Gabriel-Welsch Range post hoc test. ES (Hedges, 1981) were calculated to determine the meaningfulness of the significant post hoc differences.

**Results**
**Primary purpose analyses**
Table 1 contains the correlations, Fisher’s $z'$ scores and Cohen’s $q$ for the genders by each personality trait for self-reported strenuous and moderate intensity exercise. All correlations were small in magnitude ($r$’s $< 0.20$). For self-reported strenuous exercise, significant positive correlations were found for extraversion and
A significant negative correlation emerged for agreeableness. As with the males, significant positive correlations emerged for extraversion and conscientiousness with self-reported strenuous exercise. A significant negative correlation was found for neuroticism. Based on Fisher’s $z^*$ test and Cohen’s $q$ calculations, none of these correlations was significantly or meaningfully different from one another. For self-reported moderate intensity exercise participation for the female participants, the only significant correlation was negative (openness to experience). For the males, conscientiousness and openness were significantly and positively related to self-reported moderate intensity exercise. Fisher’s $z^*$ test was significant ($z = 1.96$) for openness to experience between the genders though this resulted from opposing direction of two very small magnitude correlations (0.09 and $-0.08$ for males and females, respectively).

**Secondary purpose analyses**

A Multivariate Analysis Of Variance (MANOVA) was conducted with gender and stage of change as the independent variables and the “big five” personality traits as the dependent variables to examine the investigation’s secondary purpose. The initial MANOVA results revealed significant ($p < 0.001$) main effect for gender, (Wilk’s $\lambda = 0.98$; $F(5, 1470) = 4.85$), and TTM (Wilk’s $\lambda = 0.92$; $F(20, 4876.38) = 5.98$). The gender by stage of change was not significant. The follow-up univariate $F$-tests for gender revealed a significant difference in neuroticism, $F(1, 1474) = 17.35$, $p < 0.001$. Examination of the mean percentile scores reveals insignificant practical differences in that the females were on average in the 40th percentile while the males were in the 47th percentile. From a personality perspective, both males and females would be classified as having similar “average” neuroticism (Costa & McCrae, 1992). Table 2 contains the several significant univariate $F$-test follow-ups as well as the post hoc test results for differences in four of the five personality traits by stage of exercise. The post hoc tests revealed that the maintenance group scored significantly ($p < 0.05$) different than all groups on extraversion, conscientiousness, and neuroticism. These significant effects ranged from moderately large to small in ES magnitude. Specifically, the maintenance participants scored higher in extraversion and conscientiousness compared to the action (ES’s = 0.30 and 0.19), preparation

<table>
<thead>
<tr>
<th>Physical activity behavior intensity</th>
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<tbody>
<tr>
<td>Male</td>
</tr>
<tr>
<td>Neuroticism</td>
</tr>
<tr>
<td>Extraversion</td>
</tr>
<tr>
<td>Openness to experience</td>
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<tr>
<td>Agreeableness</td>
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<tr>
<td>Conscientiousness</td>
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* $p < 0.05$; ** $p < 0.01$. 

Table 1. Comparison of correlations between personality percentile scores and physical activity behavior by gender.
Table 2. Comparisons of personality traits by exercise stage in percentile classification (standard deviation) for the entire sample ($N = 1484$).

<table>
<thead>
<tr>
<th>Exercise stage</th>
<th>PC ($n = 46$)</th>
<th>CO ($n = 149$)</th>
<th>PR ($n = 308$)</th>
<th>AC ($n = 433$)</th>
<th>MN ($n = 548$)</th>
<th>$F_{4,1474}$</th>
<th>$\eta^2$</th>
<th>Post hoc⁴</th>
</tr>
</thead>
<tbody>
<tr>
<td>Neuroticism</td>
<td>45.76 (24.06)</td>
<td>49.34 (26.47)</td>
<td>44.18 (24.15)</td>
<td>41.98 (24.59)</td>
<td>37.59 (25.29)</td>
<td>10.29*</td>
<td>0.03</td>
<td>MN &lt; all groups; AC &lt; CO</td>
</tr>
<tr>
<td>Extraversion</td>
<td>41.52 (31.44)</td>
<td>43.44 (28.05)</td>
<td>51.07 (30.59)</td>
<td>53.34 (31.81)</td>
<td>62.59 (28.94)</td>
<td>16.56*</td>
<td>0.04</td>
<td>MN &gt; all groups; AC &gt; CO, PC</td>
</tr>
<tr>
<td>Openness</td>
<td>39.23 (29.65)</td>
<td>33.67 (25.16)</td>
<td>37.38 (28.22)</td>
<td>38.54 (27.80)</td>
<td>37.03 (26.76)</td>
<td>1.14</td>
<td>0.00</td>
<td>N.S.</td>
</tr>
<tr>
<td>Agreeableness</td>
<td>35.45 (32.89)</td>
<td>40.71 (32.67)</td>
<td>47.38 (32.28)</td>
<td>50.22 (31.67)</td>
<td>51.25 (31.58)</td>
<td>5.74*</td>
<td>0.02</td>
<td>MN, AC &gt; CO, PC</td>
</tr>
<tr>
<td>Conscientiousness</td>
<td>39.45 (28.44)</td>
<td>48.67 (27.19)</td>
<td>49.32 (27.30)</td>
<td>55.25 (27.76)</td>
<td>60.43 (26.09)</td>
<td>14.53*</td>
<td>0.04</td>
<td>MN &gt; all groups; AC &gt; PR, CO, PC</td>
</tr>
</tbody>
</table>

PC, Precontemplation; CO, Contemplation; PR, Preparation; AC, Action; MN, Maintenance.

⁴Ryan-Elinot-Gabriel-Welsch Range post-hoc test differences significant at the 0.05 level (two-tailed).

*p < 0.001.
The maintenance group scored lower on neuroticism compared to the action (ES = −0.17), preparation (ES = −0.26), contemplation (ES = −0.46), and pre-contemplation (ES = −0.32). For the same personality traits, the action group scored significantly (p < 0.05) lower in neuroticism (ES = −0.29) than the contemplation group; significantly (p < 0.05) higher than the contemplation (ES = 0.32) and pre-contemplation (ES = 0.38) group on extraversion; and significantly (p < 0.05) higher on conscientiousness than the remaining three stage groupings (ES's = 0.21, 0.24, and 0.57). For agreeableness, both the maintenance and action groups scored significantly (p < 0.05) higher than the contemplation (ES's = 0.33 and 0.30) and pre-contemplation groups (ES's = 0.33 and 0.30).

Discussion
Two purposes governed the present investigation. The first purpose, based on the inconclusive findings of Rhodes and Smith (2006), was to test whether gender moderated the personality and exercise relationship in a large male and female college-aged sample. A tentative null hypothesis was tested as no firm theoretical reason has been supported for gender as a moderator. The second purpose, based on the unique findings of Rhodes et al. (2001), was to examine the personality and exercise relationship within a stage approach. Past research has demonstrated the potential for this approach to be informative as to the importance of personality traits, specifically the traits of extraversion, conscientiousness, and neuroticism. We hypothesized that the exercising personality of higher extraversion and conscientiousness and lower neuroticism pattern would emerge between the maintenance and action behavioral stage groups when compared to the preparation, contemplation, and pre-contemplation decisional stage groups. Overall, the results supported both of our hypotheses.

Whether gender moderated the personality and exercise relationship was tested twice. The first test was based on the much-used personality as a correlate of exercise volume, as measured on a continuum, approach. The present results basically supported the findings of Rhodes and Smith (2006). Across both genders, extraversion (r = 0.18) and conscientiousness (r = 0.16) were significantly, albeit modestly related to self-reported physical activity or exercise participation. Across both genders, neuroticism was not significantly related to self-reported strenuous exercise behavior in contrast to that reported by Rhodes and Smith (2006) though the relationship reported (r = −0.11) was small. Tests for differences in correlations by gender, however, were not significant. When examined with the stage approach, the gender by stage interaction was also not significant. Thus, the null moderation hypothesis was supported in either instance. Taken together, this evidence strongly supports the assertion that the personality–exercise relationship is a more fundamental and less contextual behavior in trait expression (Costa & McCrae, 1992; Digman, 1990; Eysenck, 1970; Goldberg, 1992). Therefore, any intervention targeting individuals with an “at-risk” personality for exercise may be applied to both genders without hesitation. For instance and regardless of gender, individual with low in extraversion and conscientiousness could be targeted with an exercise intervention aimed at an “at-home” program with ample social support to combat the “at-risk” exercising personality. Intervention research within “at risk” personalities is needed to test our conjecture.
The stage approach, which was the self-reported measure of exercise pertinent to purpose two, illuminated several important findings. The initial findings supported our hypothesis that significant differences in the exercising personality would result between the preparation/contemplation/pre-contemplation decisional stages and maintenance/action behavioral stages. In addition, the present study is the first to report differences in agreeableness between the active participant groups and the two decisional groups. The ES differences between these stages for extraversion, conscientiousness, and neuroticism were modest (ES's < 0.30) to quite large (ES > 0.70).

The present results go beyond the Rhodes et al. (2001) findings in that differences were consistently found for all of the three major exercise traits. Rhodes et al. (2001) reported differences in neuroticism and not extraversion or conscientiousness differences, between the two exercising stages and at least one non-exercising stage during treatment for breast cancer. During the post-treatment phase, extraversion, conscientiousness, and neuroticism differences were found to be significantly different between the two exercising stages and the preparation and contemplation stages. No significant differences were found between the two exercising stages and those in the pre-contemplation stage.

Differences exist in the populations sampled and sampling procedures that could explain the partially overlapping results. The present sample was that of undergraduate students as opposed to Rhodes et al.'s (2001) sample of women who survived breast cancer. Still, it is interesting and encouraging for the notion of an exercising personality that generally similar findings emerged in both samples. This supports the generalizability of personality and exercise relations and suggests that similar findings may be present in other diverse samples.

Additionally, the results of the stage analyses demonstrated not only the hypothesized differences between the decisional and behavioral stages but also small to moderate effects between the transient (action) and stable (maintenance) behavioral stages as well. These results highlight that personality may be best considered in the process of exercise behavior change rather than a simple presence or absence of behavioral participation. This has important implications. First, the differences found in personality traits amongst the stages demonstrate that correlations between personality traits and self-reported exercise may limit the information present.

Second, the exercising personality traits may be of great importance in the process of becoming engaged in long-term exercise programs. The results concerning the action stage participants suggest that personality may be more important in the successful process of becoming a consistent exerciser. The action group may become long-term exercisers (maintenance stage) or slip back to becoming non-exercisers. Researchers have previously reported that aspects of the exercising personality moderate the intention–behavior relationship within Ajzen’s (1991) theory of planned behavior (Conner et al., 2007; Hoyt et al., 2009; Rhodes & Courneya, 2003; Rhodes et al., 2002a,b, 2007) and this research seems to parallel the findings in this study.

Finally, the reported ES of modest to large magnitude also highlight the potential under-evaluation of the importance of personality to exercise behavior when a continuous behavior measure is used in the analysis. Rhodes and Smith’s (2006) meta-analysis suggests that personality may have a small-to-trivial relationship with exercise while this study and Rhodes et al. (2001) and the present findings suggest the
effect may be medium to large. The greater potential prominence is due to the magnitude of the ES differences reported in the present study between exercisers and non-exercisers as well differences between the two exercising groups, the maintenance and action groups. The findings highlight the potential utility of a stage approach when understanding personality and exercise.

Limitations and future directions

Even with the unique findings in the present investigation and the large samples of students, there are limitations that warrant mention. A cross-sectional design governed the investigation and this does not allow for causal claims among the variables or for an understanding of the within-person behavior change process. Future investigations that determine the stability of the exercising personality and planned physical activity over the lifespan would be very helpful to confirm the veracity of these findings. Referring to the sample, college-aged students completed this investigation. Although this sample was appropriate to answer the research questions, a better understanding of the stability of the exercising personality would result from a larger sampling frame. Last, self-reported exercise may suffer from bias and future research would be enhanced with more direct measures of exercise.

Note

1. All personality traits raw scores were coded as percentile scores based on Costa and McCrae’s (1992) published raw score to percentile scores so that male and female scores could be appropriately analyzed together.

References


