2014

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Original Research

The Influence of Exercise Environment and Gender on Mood and Exertion

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ABSTRACT

International Journal of Exercise Science 7(3) : 220-227, 2014. This study examined the influence of exercise environment and gender on post-exercise mood and exertion. College student participants (55 females, 49 males) were instructed to pedal a stationary bike at a moderate pace for 20 minutes. Participants were randomly assigned to one of three laboratory conditions: (1) exercising in front of a mirror and posters showing ideal fit body types (i.e., celebrity male and female personal trainers), (2) exercising in front of a mirror only, or (3) a control condition in which participants exercised without a mirror or posters. The Activation-Deactivation Adjective Check List (AD-ACL), measuring exercise-induced mood states, was administered both before and after exercise. Average bike speed throughout the exercise session measured exertion. Mirrors and posters of ideally fit celebrities did interact with gender on post-exercise tension in that women felt most tense after exercising in front of the mirror and posters while men were most tense after exercising in front of the mirror only. Exercise exertion was also impacted by experimental condition such that participants rode significantly faster in the mirror and posters condition. There was no significant interaction of gender and condition on exercise exertion, but women pedaled fastest in the mirror and poster condition relative to the other conditions. Results suggest that exercise exertion and tension reduction are partially a by-product of gender and exercise environment.

KEY WORDS: Exercise, health, gender, exercise environment, emotions, exertion, mirrors

INTRODUCTION

Physical exercise yields a myriad of psychological benefits. It has been associated with a number of positive effects including mood enhancement (2), improved self-evaluation (20), improved visual-spatial memory and increased positive affect (22), and increased creativity (18). While national standards exist to recommend how much, how often, and how intensely one should engage in physical activity (8), no guidelines exist regarding the environmental and social conditions that best suit subgroups of the exercising population. The most widely accepted advice appears to be "whatever conditions make you do it." However, there is reason to believe that certain environmental conditions, such as the presence of a mirror or ideally fit models, may moderate the psychological benefits

that an exercise session imparts (21). Additionally, the impact of these environmental variables may influence males and females differently. The current research investigates the effects of a mirror and fit-ideal body images on subjective post-exercise mood and exercise exertion among male and female college students.

Most gyms or group exercise classes use mirrors. Although mirrors aid exercisers in correcting form, research has uncovered several negative effects of mirrors in exercise behavior as well. The presence of mirrors can heighten one's awareness of physique (14). Self-awareness theory (5) states that anything that causes focus on the self will increase self-awareness. If there is a perceived discrepancy between the actual and ideal self on salient characteristics such as fitness, negative affect may occur. Observing oneself in the mirror, especially with the comparison of ideal fit body type images, can lead to negative mood and most especially for women (7). Additionally, because women are more likely than men to report body-image dissatisfaction and engage in methods to reduce or maintain their weight (9), it is plausible that the presence of mirrors during exercise may highlight body-image dissatisfaction for females more than males.

Several studies have examined the interaction of mirrors and gender during exercise and have shown negative effects. For example, Martin-Ginis et al. (16) found that sedentary women felt significantly worse (i.e., decreased tranquility, decrease in positive engagement) when exercising in front of a mirror compared to those exercising in a no-mirror condition. Likewise, Katula et al. (14) found that moderately active women experienced significantly lower exercise self-efficacy (i.e., confidence in ability to exercise) than men when exercising in a mirrored lab with body image concerns predicting self-efficacy. However, in a later follow-up study, Katula and McAuley (13) found that highly active women exercising in front of a mirror experienced higher exercise self-efficacy than while in the no-mirror condition. Therefore, research suggests that moderately active to sedentary women experience less positive or more negative mood when exercising in a mirrored environment compared to highly active women and compared to men.

The covers of fitness magazines and the majority of models in popular culture typically convey an ideal image of a fit physique that most people cannot realistically attain (3). While the images may have the intention of offering exercise and health inspiration, they often have the opposite effect. Sociocultural norms for appearance as depicted by mass media have negative effects on women's self-evaluation (10). Because the ideal is unrealistic to attain yet still typically conveyed as the cultural standard of body shape, form, and fitness, it highlights the contrast between a woman's actual body and the ideal, which leads to feelings of incompetence and negative affect (17). One meta-analysis found that women felt worse about their body after exposure to thin ideal images (4). These authors also note that thin-ideal internalization is a risk factor for body image and eating disorders.

While most of this research has been conducted with women, there is some evidence of an association between negative body images and exposure to ideal male images (1), and people's inability to

obtain the "perfect body" has led to an increased prevalence of negative body image in both men and women (9). When exposed to images of muscular male models, men who frequently went to a gym reported higher levels of self-enhancement but men who did not exercise frequently reported a more negative perception of their physical appearance (11).

Acute exercise has been shown to reduce the negative affective states associated with body image disturbance, such as anxiety and depression (2, 19). However, these beneficial effects might be mitigated with the presentation of fitness posters and exercise mirrors. Fallon and Hausenblas (6) found that an acute bout of moderate intensity exercise was not able to significantly reduce the anxiety, depression, or body dissatisfaction generated by viewing media pictures of ideal female physiques compared to quiet rest.

To our knowledge, no formal studies have investigated the effects of mirrors on exercise exertion. Additionally, despite assumptions that ideal body types would inspire people to exert more energy during exercise, no studies have formally demonstrated this relationship.

In the present study, we hypothesize that the presence of a mirror will lead to differences in post-exercise mood, especially in women, compared to exercising without a mirror. We also hypothesize that this will be exacerbated by the presence of ideal body fit images, by highlighting the discrepancy between actual (i.e., viewing oneself in a mirror) and ideal (i.e., viewing highly fit celebrity trainer posters) self. We also hypothesize that exercising in the presence of media images depicting body ideals would dampen the potential mood boosting effects of exercise compared to exercising without the images, especially for women. We further hypothesize that the presence of ideal fit body images may increase exercise exertion compared to conditions with mirrors or with no stimuli; however, we do not believe exercise intensity reflects a positive mood state, an important distinction. If true, the choices to inspire exercise intensity may be at the cost of diminishing some of the psychological benefits of exercise.

METHODS

Participants

One hundred and four undergraduate students (49 males, 55 females) at a private, West Coast university participated in the study (Mean age = 18.83, *SD* = 0.91). The participants received research credit for an introductory psychology course. This study met ethical guidelines and requirements approved by the university's institutional review board (IRB).

Protocol

Mood was assessed using the Activation-Deactivation Adjective Check List (AD-ACL; 23, 24). The AD-ACL is a reliable and valid self-report checklist often used in exercise research to collect information on four immediate mood states (i.e., tension, energy, tired, calm) that are associated with exercise behavior (15, 23, 24). Five adjectives are associated with each of the four major categories of mood state. These include the following: Energetic (active, energetic, vigorous, lively, full-of-pep); Tired (sleepy, tired, drowsy, wide-awake, wakeful); Tension (jittery, intense, fearful,

clutched-up, tense); Calmness (placid, calm, at-rest, still, quiet).

The AD-ACL has acceptable test-retest reliability (r = 0.8 and above). The AD-ACL uses a four-point scale that measures levels of mood activation on a continuum. For example, given the word "active," participants are asked to rate "definitely feel," "feel slightly," "cannot decide," or "definitely do not feel." Thus, scores can range from 4 (low) to 20 (high) for each of the four mood states assessed. Among college students, researchers found that both males and females experienced decreased feelings of stress and tension following physical activity (12).

Participants' exertion was measured by their bike speed (MPH) assessed every 5 minutes. These four speed ratings were averaged to indicate average exertion level.

Participants were randomly assigned to one of three experimental conditions: control, mirror, or mirror + poster (m + p). Participants exercised on a stationary bicycle facing a wall (i.e., control condition), a mirror (i.e., mirror only condition), or a mirror plus two fitness posters (i.e., mirror and poster condition). The two posters were of a highly fit male celebrity fitness trainer and a highly fit female celebrity fitness trainer.

The current experiment was advertised as an exercise study among a list of other psychology studies as part of an undergraduate survey course requirement. Once enrolled, participants were notified that the study involved a brief exercise session and were advised to wear comfortable exercise clothing. A research assistant escorted the participant into the laboratory where the exercise bike was set up according to their experimental condition. Participants then read and signed consent forms and were reminded of their right to decline participation. Next, participants completed a pretest on current mood states (AD-ACL) and demographic measures such as age and gender. Participants were then told they would be exercising on a stationary bike at a moderate pace (i.e., 70% maximum heart rate) for 20 minutes. Every five minutes participants' speeds were recorded. After 20 minutes, participants dismounted and completed a post-test that once again measured their mood state (AD-ACL). Participants were then debriefed about the general purpose of the study.

Statistical Analysis

Analyses are presented by mood and exertion, first examining the effects of environmental and individual influences on post-exercise mood scores. For both mood and exertion, environmental condition (control, mirror, mirror + poster) was examined, followed by the individual factors of gender. Since average heart rates did not differ significantly by experimental condition (F (2, 82) = 1.92, p = .15) we assumed that the participants were able to follow the exercise exertion instructions equally.

RESULTS

One important question in this study is what did the exercise session do to mood states, regardless of condition or gender? Paired t-tests indicated that all mood states significantly changed following exercise. See Table 1 for details.

Table 1. Means and standard deviation scores for mood, pre and post exercise.

Mood Measure	Pre-Exercise Scores	Post Exercise Score
Relaxation	5.8 (1.89)	6.5 (1.81) **
Energy	11.0 (3.12)	14.5 (3.38) ***
Tired	12.7 (4.12)	8.8 (3.18) ***
Tension	8.6 (2.87)	9.4 (2.64) *
Calm	12.4 (3.12)	9.1 (3.11) ***

* $p < .05$, ** $p < .01$, *** $p < .001$

Were these mood changes mitigated by experimental condition or gender? With gender and condition as between-subjects factors in an ANCOVA (using pre-exercise mood scores as a covariate), there was a significant interaction of gender x condition for feelings of tension [F (2.95) = 4.27, $p < .05$]. There was no main effect for condition [F (2, 95) = .31, $p > .05$] and no main effect for gender [F (1, 95) = .001, $p > .05$]. Females felt the most tense in the mirror + poster condition, whereas men felt most tense in the mirror only condition (means displayed in Figure 1; p's < .05). There were no significant main effects for condition or gender or interactions of gender x condition for the remaining mood assessed (i.e., relaxation, energized feelings, tiredness, or calmness; p's > .05).

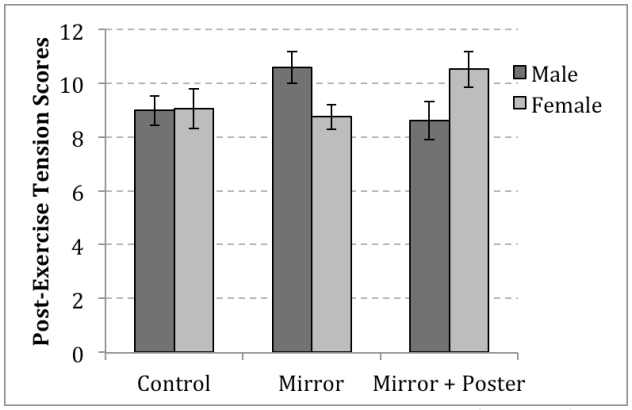

Figure 1. Post-exercise tension ratings by condition for males and females. Females felt most tense in the Mirror + Poster condition, whereas men felt most tense in the Mirror only condition. Error bars are +/- SE of the respective mean.

There was a significant effect for condition on average exercise speed or exertion [F (2,101) = 3.70, $p < .05$]. Post-hoc contrasts demonstrated that participants exercised significantly faster in the mirror + poster condition than the control condition ($p <$ 05), but the mirror only condition did not significantly differ from the control condition ($p > .05$). With both gender and condition as between-subjects factors, the main effect of condition remained [F (2, 98) = 3.6, $p < .05$], and there was a main effect of gender as well [F (1, 98) = 5.29, $p < .05$]; males [Mean speed = 29.16 MPH (SD = 0.81)] exercised faster than females [Mean speed = 25.44 MPH (SD = 1.31)]. There was no significant interaction of condition x gender on average speed, however [F (2, 98) = 1.47, $p > .05$]. However, a closer look at the means suggests that women pedaled at a slower speed than men in the control and mirror condition, but were at a comparable speed to males in the mirror + poster condition (see Figure 2 for means).

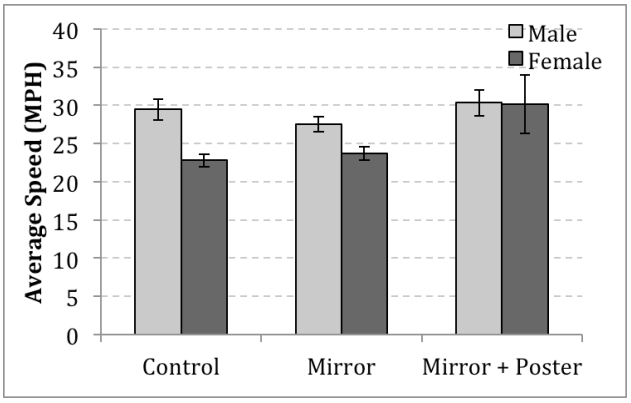

Figure 2. Average speed in each condition by gender. Female participants pedaled the fastest when exercising in front of the mirror and fitness posters. Error bars are +/- SE of the respective mean.

If women were pedaling the fastest yet feeling the most tense in the mirror + poster condition, a natural question is if the feeling of tension is just a proxy for exercise

exertion. However, a post-hoc analysis found no correlation between tension ratings and average speed, (r = -.07, p > .05); neither is there a correlation between the two variables when gender is used as a grouping variable.

DISCUSSION

The changes in tension state after an acute bout of exercise found in the current study are consistent with previous research demonstrating the psychological boost exercise can provide. Surprisingly, while acute exercise typically reduces stress, in our study it increased feelings of tension post-exercise. Further exploration showed that this change was associated by an interaction of gender by experimental environment condition. Women felt the more tense post-exercise, although they exercised the most intensely, in the mirror + poster condition. Men felt the more tense after exercising in front of a mirror alone, and the fitness poster images did not impact their mood. This is consistent with research showing that ideal body image exposure may put females at a unique risk (6, 8). These results indicate that the presence of a mirror and ideal media images may be detrimental to the potential tension reduction that acute exercise has to offer, especially for females.

The gender differences in tension by condition are noteworthy. Women felt less tense than men in the mirror only condition; it was only when the presence of an ideally fit female body was placed alongside the mirror reflection that women felt most tense. It is plausible that the poster primed self-comparison, a phenomenon women are especially vulnerable to (10). Future studies should include a measure of self-comparison. One possibility is asking participants to indicate the position of their perceived actual self and perceived ideal self on a fitness scale. We would hypothesize the gap would be greater for men in the mirror only condition, and greater for females in the mirror + poster condition.

We do not have an explanation for why exercise exertion is not correlated with feelings of tension. There may be a personality variable explaining why the mirror + poster condition may be inspiring for some women, but tension inducing for others. Future studies should investigate what personality traits may buffer potentially detrimental characteristics of exercise environments.

There are several limitations of the current work. The study was conducted at a private, West Coast university where the culture is generally one of fitness and high physical activity. However, this is conservative to the hypotheses; it is possible the effects would be more pronounced in a population where regular exercise and fitness was not the norm. Also, the study was conducted in a laboratory setting; in a gym there are arguably many other types of stimuli in view during aerobic activity. It could be argued, however, that only a mirror and two posters is conservative compared to a gym environment; there would be not only more mirrors and more fitness images (on TVs and in magazines), but also actual fit others, which could amplify the mood and physical outcomes we found in the present laboratory based study environment. Finally, a limitation of the current design is that baseline emotions were assessed in the lab room, where participants could see a

mirror or poster if present, and therefore anticipate exercising in this situation. The next study iteration should assess the mood states outside of the exercise environment, rendering the between-subjects changes in emotional states more commensurate.

The implications of this study are not far from the conclusions of other research showing potential influence from popularized, unattainable ideals (9); while pictures of fit, ideal bodies are pervasive, they are not only not inspiring, but could decrease some mood-enhancing properties that exercise can naturally bring. Practically speaking, the results suggest exercisers should consider their exercise environment when choosing to optimize tension reduction in their workouts. This could have the side-effect of increased enjoyment of exercise behaviors, which could subsequently increase or decrease exercise frequency. Also, gym owners may pay more attention to decisions regarding interior aesthetics knowing they could affect both the physical performance and the subjective experiences of clients, even subconsciously. Perhaps health clubs would do well to consider the clientele to whom they cater while planning mirror and poster placement, because, as this study suggests, social and physical environmental factors do seem to measurably affect exercise performance and mood state.

ACKNOWLEDGEMENTS

The authors wish to thank Melanie Lara, Marissa Sia, Paul Moreno, and Emily Monasterio for their assistance with the project.

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