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# Might virtual reality promote the mood benefits of exercise?

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## Abstract

This study sought to investigate if virtual reality technology enhances the psychological benefits of aerobic exercise in a laboratory setting. In this study, 88 university faculty and staff (44 females, 44 males) were randomly assigned to one of three 30-min conditions including: (1) bicycling at a moderate intensity (60–70% maximum heart rate) on a stationary bicycle, (2) playing a virtual reality computer bicycle game, or (3) an interactive virtual reality bicycle experience on a computer while exercising on a stationary bike at moderate intensity (60–70% maximum heart rate). The Activation-Deactivation Adjective Check List (AD-ACL) was administered immediately before and after the laboratory session. Results suggest that virtual reality enhances some of the mood benefits when paired with exercise. Virtual reality when paired with exercise enhances enjoyment, energy, and reduces tiredness. Virtual reality without exercise was discovered to increase participants' tension, tiredness, and lower their energy level. Results suggest that the combination of virtual reality and exercise might improve some of the beneficial psychological effects of exercise compared with virtual reality or exercise alone.

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## 1. Introduction

Previous research has indicated that physical exercise enhances health including lowering the risks of developing certain types of cancer, cardiovascular disease, and other serious illnesses (Blair, Kohl, Paffenbarger, Clark, Cooper, & Gibbons, 1989; Brill, Kohl, & Blair, 1992; Gauvin & Spence, 1995; Kampert, Blair, Barlow, & Kohl, 1996; Plante, 1996). Research also demonstrates that exercise is associated with

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many psychological benefits including lowering depression, anxiety, and stress (Byrne & Byrne, 1993; Gauvin & Spence, 1995; Plante & Rodin, 1990; Thirlaway & Benton, 1992). Through repeated demonstrations, it has been noted that acute exercise has an anxiolytic effect on individuals (e.g. McAuley, Mihalko, & Bane, 1996). In their review of the literature, Landers and Petruzzello (1994) reported that the anti-anxiety effects of exercise begin almost immediately after acute exercise and last for a minimum of 2 h, regardless of exercise intensity or duration. As a result of recognizing that exercise plays an important role in both physical and psychological health, researchers have investigated the factors that may contribute to people engaging in and enjoying physical exercise (Smith, Handley, & Eldredge, 1998). Presently, a growing body of evidence promotes the use of physical exercise to improve both physical and psychological health and well being (Blair & Connelly, 1996; Winett & Carpinelli, 2000).

There are many theories attempting to understand the mechanisms regarding the benefits of exercise, yet there are many questions that still remain regarding how and why exercise enhances psychological functioning. Biological explanations suggest that exercise increases body temperature, adrenal and steroid activity, and stimulates the release of specific neurotransmitters such as endorphins (Hughes, 1984; Morgan, 1985, 1997; Ransford, 1982). Psychological approaches propose that exercise serves as a beneficial distraction (Long, 1983), meditation (Buffone, 1980; McAuley & Rudolph, 1995), biofeedback (Schwartz, Davidson, & Coleman, 1978), or a psychological buffer (Kobasa, Maddi, & Puccetti, 1982; McAuley & Rudolph, 1995), and can result in an increased sense of self-efficacy, mastery, and control (Bandura, 1977; Marcus, Selby, Niaura, & Rossi, 1992). Studies have shown that when manipulating the social environment of an exercise session, individuals in the socially enriched condition reported greater increases in self-efficacy and mood (McAuley, Talbot, & Martinez, 1999; Plante, Coscarelli, & Ford, 2001; Turner, Rejeski, & Brawley, 1997). Another theory suggests that a person's perception of fitness acts as a therapeutic or positive suggestion/perception that results in more positive psychological outcomes. Because we perceive fitness or exercise as beneficial for health and well-being, the psychological outcome of our exercise experience is thus enhanced (Folkins & Sime, 1981; Plante, 1999; Plante, Coscarelli, Caputo, & Opezzo, 2000).

Human perceptions and beliefs have proven powerful in affecting both physical and psychological health and well being. Several investigations have demonstrated that health is enhanced through positive beliefs about health and benefits about fitness (Idler & Angel, 1990; Idler & Kasl, 1991; Shephard & Bouchard, 1994). Results of these and other investigations have proved so compelling that measuring perception and belief, for example, must be assessed and potentially controlled for by including placebo conditions in medical and psychiatric research protocols. With the knowledge that perception can positively affect health and well being, additional means of altering perception are being investigated to determine if altering perception can enhance positive health outcomes. Technology, such as virtual reality, currently offers one of the more promising avenues of exploration in this area.

Virtual reality is considered technology's answer to an alternate state of consciousness, and has proven useful in enhancing psychological health by altering

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