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Personality traits and individual differences predict threat-induced changes in postural control



Martin Zaback^a, Taylor W. Cleworth^b, Mark G. Carpenter^b, Allan L. Adkin^{a,*}

^a Balance and Gait Laboratory, Department of Kinesiology, Brock University, St. Catharines, ON, Canada

^b Neural Control of Posture and Movement Laboratory, School of Kinesiology, University of British Columbia, Vancouver, BC, Canada

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ABSTRACT

This study explored whether specific personality traits and individual differences could predict changes in postural control when presented with a height-induced postural threat. Eighty-two healthy young adults completed questionnaires to assess trait anxiety, trait movement reinvestment (conscious motor processing, movement self-consciousness), physical risk-taking, and previous experience with height-related activities. Tests of static (quiet standing) and anticipatory (rise to toes) postural control were completed under low and high postural threat conditions. Personality traits and individual differences significantly predicted height-induced changes in static, but not anticipatory postural control. Individuals less prone to taking physical risks were more likely to lean further away from the platform edge and sway at higher frequencies and smaller amplitudes. Individuals more prone to conscious motor processing were more likely to lean further away from the platform edge and sway at larger amplitudes. Individuals more self-conscious about their movement appearance were more likely to sway at smaller amplitudes. Evidence is also provided that relationships between physical risk-taking and changes in static postural control are mediated through changes in fear of falling and physiological arousal. Results from this study may have indirect implications for balance assessment and treatment; however, further work exploring these factors in patient populations is necessary.

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* Corresponding author at: Department of Kinesiology, Brock University, 500 Glenridge Avenue, St. Catharines, Ontario L2S 3A1, Canada. Tel.: +1 (905) 688 5550x4990.

E-mail address: aadkin@brocku.ca (A.L. Adkin).

1. Introduction

It is well established that specific emotions (i.e., fear and anxiety) influence postural control. For instance, differences in postural control have been observed between individuals with and without pathological anxiety disorders (Jacob, Furman, Durrant, & Turner, 1997; Perna et al., 2001; Redfern, Furman, & Jacob, 2007) as well as between older adults with and without a fear of falling (Maki, 1997; Maki, Holliday, & Topper, 1991; Rochat et al., 2010), with anxious and fearful individuals typically demonstrating greater instability. To explore how these emotions influence postural control, researchers have experimentally manipulated fear and anxiety in healthy individuals using methods such as increasing the height of the surface on which they stand (height-induced postural threat; Adkin, Frank, Carpenter, & Peysar, 2000, 2002; Brown, Polych, & Doan, 2006; Carpenter, Adkin, Brawley, & Frank, 2006; Carpenter, Frank, Adkin, Paton, & Allum, 2004; Carpenter, Frank, Silcher, & Peysar, 2001; Cleworth, Horslen, & Carpenter, 2012; Davis, Campbell, Adkin, & Carpenter, 2009; Hauck, Carpenter, & Frank, 2008; Huffman, Horslen, Carpenter, & Adkin, 2009; You, Deroche, Do, & Woodman, 2011) or presenting them with pictures known to elicit negative emotional responses (Azevedo et al., 2005; Horslen & Carpenter, 2011). This research has been instrumental in identifying characteristic changes (i.e., reduced range of body movement) in static (Adkin et al., 2000; Brown et al., 2006; Carpenter et al., 2001, 2006; Hauck et al., 2008; Huffman et al., 2009), anticipatory (Adkin et al., 2002; You et al., 2011), and reactive (Carpenter et al., 2004) postural control associated with fear and anxiety. However, limited research has considered how characteristics of the individual contribute to these changes (Alpers & Adolph, 2008; Min, Kim, & Parnianpour, 2012). As there is some evidence of inter-individual variability in terms of the postural control strategy adopted when standing under conditions of height-induced postural threat (Davis et al., 2009), it is reasonable that personality traits and other individual differences may predispose individuals to be more or less vulnerable to the effects of these threatening stimuli.

Personality traits are relatively stable internal factors that are consistent across situations and vary between individuals (Allport, 1966; Tett & Guterman, 2000). These traits interact with environmental factors to influence how individuals appraise a situation and subsequently behave, with traits more relevant to the environmental context exerting a greater influence (Kenrick & Funder, 1988; Tett & Guterman, 2000). Individual differences, such as experience with a given situation, influence individuals' behavior in a similar manner to personality traits (Anshel, Robertson, & Caputi, 1997; Lazarus, 1993; Wilken, Smith, Tola, & Mann, 2000). While a range of individual characteristics influence how an individual behaves across different situations, a smaller subset of situation relevant characteristics may play a more influential role when confronted with a threat to posture. In the present study, altering the surface height on which individuals stand was used to explore how individual characteristics contribute to changes in postural control during threatening postural tasks. Based on existing literature and the nature of this postural threat, personality traits including trait anxiety and movement reinvestment and individual differences in physical risk-taking and experience with height-related activities were considered relevant for explaining threat-induced changes in postural control.

Trait anxiety reflects an individual's tendency to experience anxiety reactions in response to external stressors (Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983). Thus, this trait may predispose individuals to experience greater perceptions of anxiety when presented with a postural threat. For example, studies have shown that despite low and high trait anxious individuals often showing similar changes in physiological arousal in response to physical (e.g., threat of electrical stimulation), cognitive (e.g., mental arithmetic), and social (e.g., public speaking) stressors, high trait anxious individuals consistently self-report greater increases in state anxiety (Arena & Hobbs, 1995; Baggett, Saab, & Carver, 1996; Gonzalez-Bono et al., 2002; Noteboom, Barnholt, & Enoka, 2001; Steptoe & Vogele, 1992; Willmann, Langlet, Hainaut, & Bolmont, 2012). Furthermore, changes in postural control following exposure to an anxiety-inducing cognitive task have been shown to be dependent on an individual's level of trait anxiety (Hainaut, Caillet, Lestienne, & Bolmont, 2011).

Movement reinvestment is a personality trait that reflects individuals' propensity to direct attention to their movement. It is composed of two sub-traits; trait conscious motor processing (T-CMP)

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