The Role of Self-Efficacy in the Antecedents of Climbing Related Injury: a critical review

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Abstract

The identification of psychosocial determinants of injury in sport has become synonymous with the multi-component theoretical stress and injury model proposed by Williams and Anderson (1998). Williams and Andersen (1998) suggest that predisposing and environmental factors contribute to an adverse stress reaction that detrimentally impacts on neuromuscular functioning and increases the likelihood of injury. Climbing is considered to be a high-risk sport which requires individuals to routinely manage increased levels of stress and anxiety. A synthesis of the findings from the critical review suggests self-efficacy may have a duplicitous role in the antecedents of climbing related injury. Firstly, high levels of self-efficacy developed through repeated mastery experience create a robust confidence frame capable of 'buffering' the adverse effects of stress and therefore reduce the likelihood of acute injury in climbing. Contrastingly the reciprocal relationship of successful performance and repeated exposure may result in the manifestation of chronic overuse injuries when training loads are not adequately managed.

Key Words: self-efficacy; stress, injury, antecedents

Resumé

L'identification des déterminants psychosociaux des blessures dans le sport est devenue synonyme du modèle théorique à composantes multiples de stress et de blessure proposé par Williams et Anderson (1998). Ils suggèrent que les facteurs prédisposants et environnementaux contribuent à une réaction de stress défavorable, qui a un impact négatif sur le fonctionnement neuromusculaire et augmente la probabilité de blessure. L'escalade est considérée comme un sport à haut risque qui exige des individus de gérer régulièrement des niveaux accrus de stress et d'anxiété. La synthèse critique des résultats publies suggère que l'auto-efficacité peut avoir un rôle de duplicité dans les antécédents de blessures liées à l'escalade. Premièrement, des niveaux élevés d'auto-efficacité développés grâce à une expérience de maîtrise répétée créent un cadre de confiance robuste capable de «tamponner» les effets néfastes du stress et donc de réduire la probabilité de blessures aiguës en escalade. À l'inverse, la relation réciproque de performance réussie et d'exposition répétée, peut entraîner la manifestation de blessures chroniques dues au surmenage lorsque les charges d'entraînement ne sont pas correctement gérées.

Mots-clés: auto-efficacité; Stress, blessure, antécédents

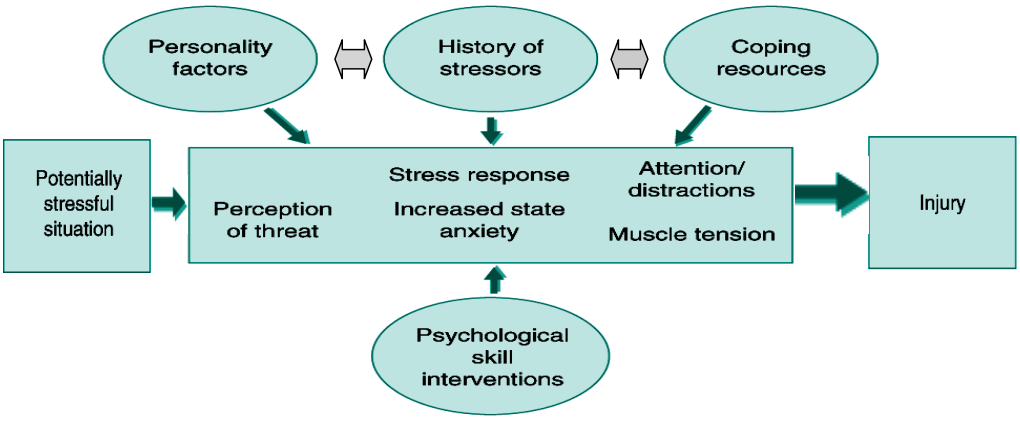
Introduction

Self-efficacy is defined as a "belief in one's capability to organise and execute the courses of action required to produce attainments" (Bandura, 1997, p.3). Individuals with high levels of self-efficacy are more likely to set themselves challenging goals, exert more effort in their pursuit and persist when faced with difficulty (Bandura, 1997). A strong self-efficacy belief facilitates one's perceived competence to manage environmental situations by mediating stress and disruptive thought processes (Bandura, 1997). Therefore, self-efficacy may contribute to our understanding of the relationship between stress and injury in climbing. The aim of this critical review is to explore the role of self-efficacy in the antecedents of climbing related injuries by contextualising the findings from published literature.

Enactive mastery experiences are considered the most influential source of self-efficacy belief (Bandura, 1997). Llewellyn et al. (2008) found self-efficacy to be a significant predictor of the difficulty, frequency and degree of risk undertaken by climbers. Qualitative interviews with elite level climbers have revealed frequent exposure to high standard climbing in challenging environmental situations facilitated necessary mental and physical preparedness for the very hardest ascents (Jones et al., 2017a). Risk taking behaviour is complex and the level of stress experienced by an individual varies directly with the degree of appraised risk (Zuckerman, 1994). Of note Sanchez, et al. (2010) found that higher levels of somatic anxiety were not detrimental to functioning in climbers but were positively associated with performance outcome. The interconnected experiential framework developed by Jones et al. (2017a) revealed enactive mastery to be a composite of task mastery and self-mastery. Task mastery refers to overcoming challenges and new experiences whilst self-mastery refers to perceived control and risk acceptance (Kerr & Mackenzie, 2012; Kerr & Mackenzie, 2014). .Jones, et al. (2017a) revealed that elite climbers reported experiencing high levels of stress yet demonstrated resilience afforded through reflection and interpretation of past performances and ascribed a positive physiological stimulus when performing close to, or at, the limit of their ability. Schonfeld, et al. (2017) suggested self-efficacy may best protect an individual from the negative effects of stress when the standard of performance is set at a suitably challenging level.

The Williams and Anderson (1998) multi-component theoretical stress and injury model (Figure 1) illustrates the interaction between history of stressors, personality factors and coping resources when individuals are placed in a potentially stressful situation. An adverse stress response can reduce motor co-ordination and increase distractibility, which may result in an individual sustaining injury.

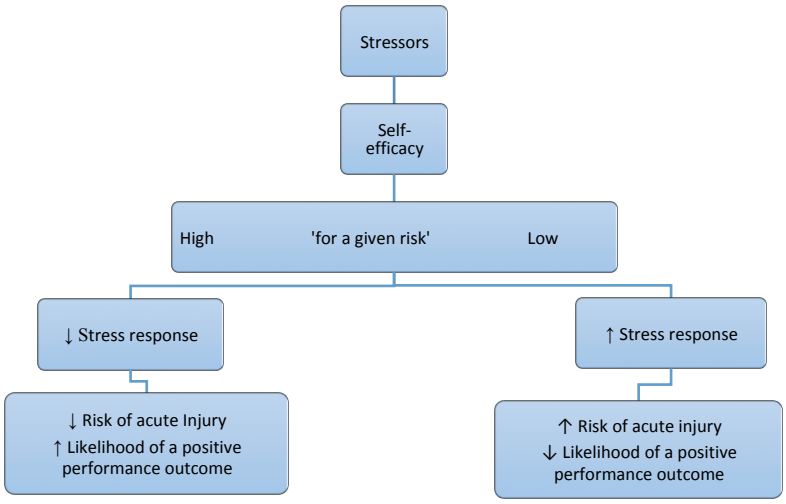
Figure 1: Williams and Anderson (1998) multi-component theoretical stress and injury model



Physiological and attentional change due to a heightened stress has been examined in climbing populations. Pijpers, et al. (2003) investigated anxiety and performance relationships in climbing and found anxiety was exhibited at three levels: subjective, physiological and behavioural; and that increased anxiety resulted in greater uncertainty in movement sequence and hold selection. In a later study Pijpers, et al. (2006) investigated anxiety in perceiving and realising affordance and found anxiety narrowed the visual field and that the climber's perception of the actions necessary to progress were altered by their emotional state. The ability to correctly visualise and interpret climbing route information prior to an ascent is an essential climbing skill (Boschker, et al., 2002; Pezzulo, et al., 2010). Route preview allows individuals to mentally rehearse expected movement sequences in advance and identify difficult sections thereby preserving energy and reducing the risk of non-completion due to a fall. The role of route finding and movement sequencing during climbing performance was examined experimentally by Sanchez et al. (2012). Participants were categorised according to their climbing ability and, in those participants categorised as high standard, a preview of the route prior to ascent reduced the number and duration of stops taken. Accurate route previewing is an essential skill that enables climbers to move efficiently and conserve energy resources which may be required to complete difficult climbing sections (Jones & Sanchez, 2016).

The physical and psychological reactions experienced during climbing are likely dependent on the level of self-efficacy perceived by an individual for a given risk. Climbers high in self-efficacy may profit most from stress-induced effort and are skilled in making judgements that result in success and therefore reduce the likelihood of acute injury occurrence. A schematic representation of the role of self-efficacy in the antecedents of acute injury in climbing and the likely response following exposure to a stressor is proposed in Figure 2.

Figure 2: A schematic presentation of the role of self-efficacy in the antecedents of acute climbing injury



The Williams and Anderson (1998) model as shown in Figure 1 best explains the antecedents of acute athletic injury but does not account for injury sustained though chronic overuse. Chronic overuse is a common mechanism of injury in climbing and associated with repetitive high training loads (Jones et al., 2017b; Jones & Johnson, 2016; Schoffl 2015). Despite evidence to support the use of high training loads to produce musculoskeletal adaptation to reduce injury it is the difference in acute/chronic training load that places an athlete at increased risk (Gabbett, 2016). An International Olympic Committee consensus statement supports monitoring of both physical the psychological training load to reduce injury risk (Soligard, et al., 2016). Routine monitoring of self-efficacy in climbing may be achieved through use of the Climbing Self-Efficacy Scale (CSES) developed by Llewellyn et al. (2008). The CSES is a psychometric scale designed to measure the sub-skills required for accomplished performance in climbing. The CSES contains 10 non-hierarchical themes and the total score provides a measure of an individual's beliefs about their performance ability in climbing, with higher scores reflecting greater confidence i.e. greater self-efficacy. The reliability of the CSES was examined using Cronbach's coefficient alpha, and results of $\alpha = .92$ in a pilot study, and $\alpha = .88$ suggests excellent internal consistency (Kline, 2000). Self-efficacy belief and a successful performance outcome are proposed to be reciprocally determinant factors (Bandura, 1997). We therefore suggest high levels of self-efficacy may indirectly influence the development of chronic overuse pathologies.

Summary

We suggest self-efficacy may have a duplicitous role in the antecedents of climbing related injury. Firstly, high levels of self-efficacy developed through repeated mastery experience create a robust confidence frame capable of 'buffering' the

adverse effects of stress and therefore reduce the likelihood of acute injury in climbing. Contrastingly, the reciprocal relationship of successful performance and repeated exposure may result in the manifestation of chronic overuse injuries when training loads are not adequately managed.

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