Psychology of Sport and Exercise 34 (2018) 79–87

Contents lists available at ScienceDirect

Psychology of Sport and Exercise

journal homepage: www.elsevier.com/locate/psychsport

A meta-analysis of mental imagery effects on post-injury functional mobility, perceived pain, and self-efficacy

Sima Zach [a, *], Urska Dobersek [b], Edson Filho [c], Varda Inglis [a], Gershon Tenenbaum [d]

[a] School of Education, The Academic College at Wingate, Israel
[b] Psychology Department, University of Southern Indiana, USA
[c] School of Psychology, University of Central Lancashire, UK
[d] College of Education, Florida State University, USA

ARTICLE INFO

Article history:
Received 7 May 2017
Received in revised form
19 August 2017
Accepted 22 September 2017
Available online 23 September 2017

Keywords:
Injury
Imagery
Meta-analysis
Functional mobility
Perceived pain
Self-efficacy

ABSTRACT

Objectives: A meta-analysis was employed to examine the effects of mental imagery (MI) on bio-psychological variables, namely *functional mobility*, *perceived pain*, and *self-efficacy*.
Method: Ten studies were included in the meta-analytical review. Cohen's *d* effect sizes (ES) and Hedge's *g* weighted mean ES (WMES) were computed for all dependent variables.
Results: The analysis revealed non-significant effects of imagery interventions that were (1) small and positive for functional mobility ($g = 0.16$), (2) large and negative for perceived pain ($g = -0.86$), and (3) large and positive for self-efficacy ($g = 0.99$). These effects were all non-significant, probably because the interventions administered and populations sampled in the studies were mostly heterogeneous. The observed null results might also reflect that existing studies on injury lack power. Hence, the effects of MI on bio-psychological variables warrant continued empirical investigation.
Conclusions: Given the observed statistical trends, MI interventions might be beneficial for athletes recovering from injury. However, more experimental work in needed before one claims with certainty that MI enhances bio-psychological functioning in injured athletes.

Contents

* Corresponding author. School of Education, The Academic College at Wingate, Wingate Institute, 4290200, Israel.
E-mail address: simaz@wincol.ac.il (S. Zach).

https://doi.org/10.1016/j.psychsport.2017.09.011

Sport injury is a pervasive phenomenon that interferes with athletes' career and overall bio-psycho-social well-being (e.g., Dawson, Hamson-Utley, Hansen, & Olpin, 2014; Evans, Hare, & Mullen, 2006; Knowles, Marshall, & Bowling, 2006; O'Connor, Heil, Harmer, & Zimmerman, 2005). As such, a great deal of research on injury focused on identifying injury recovery strategies aimed at promoting a healthy "return to play" status for various skill-level athletes (e.g., Brewer, 2009; Chan, Hagger, & Spray, 2011). More specifically, extensive research on injury recovery centered on the role of mental skills in injury recovery, particularly the effects of mental imagery (MI) on athletes' rehabilitation process (see Brewer, 2010; Cumming & Williams, 2013; Podlog, Dimmock, & Miller, 2011; Walker, Thatcher, & Lavallee, 2007; Wiese-Bjornstal, 2010). In fact, MI is among the most popular mental techniques used by athletes for both *performance restoration* (e.g., rehabilitation process from sport injury) and *performance optimization* purposes (e.g., increase self-efficacy; see Filho & Tenenbaum, 2015). The popularity of MI is attributed to the minimal space-time constraints, and can be practiced in most places and at different times. As well, once mastered by the athlete, imagery can be practiced independently (Martin, Moritz, & Hall, 1999).

MI refers to the cognitive simulation process by which an individual can represent perceptual information in his/her mind in the absence of sensory input (Munzert, Lorey, & Zentgraf, 2009). Given that different types of perception induce different forms of imagery (Moulton & Kosslyn, 2009), several types of imagery have been identified, such as spatial imagery, visual object imagery, and motor imagery (Hohlefeld, Nikulin, & Curio, 2011). In the current study, we consider the term MI as a dynamic mental state in which the representation of a given motor act or movement is rehearsed in the working memory without an overt motor output (see Guillot & Collet, 2008; Hashimoto, Ushiba, Kimura, Liu, & Tomita, 2010). This operational definition is broad enough to encompass the bulk of research linking MI and injury recovery across scientific disciplines.

To this extent, in the last three decades over 30 qualitative reviews have been conducted with respect to the benefits of MI on bio-psychological outcomes in different disciplines, including medicine, education, music, psychology, and sport and exercise (e.g., Guillot & Collet, 2008; Heremans et al., 2013; Holmes & Calmels, 2008; Martin et al., 1999; Murphy, 1990; Schuster et al., 2011). Collectively, these reviews suggest that MI has a beneficial positive effect on bio-psychological variables (e.g., Schuster et al., 2011; Weinberg, 2008). Although various qualitative reviews of the literature on MI have been published, a meta-analytical review on the effect of MI on injury rehabilitation has not been conducted to date within the sport and exercise psychology domain.

In the field of sport and exercise psychology, Guillot and Collet (2008) reviewed six imagery models designed to (1) explain how MI influences cognitive, affective, and behavioral outcomes (Martin et al., 1999); (2) provide an understanding of what athletes imagine, and where, when, and why they use MI (Munroe, Giacobbi, Hall, & Weinberg, 2000); (3) explore how MI should be implemented by athletes (Moran, Guillot, MacIntyre, & Collet, 2012); (4) describe MI interventions with respect to the individuals' needs, the environment constraints, and the task at hand, as well as the duration, the intended learning outcomes, and the emotions and perspective associated with the imagery exercise (PETTLEP – physical, environment, task, timing, learning, emotion, perspective; see Holmes & Collins, 2001); (5) explain the importance of MI ability regarding vividness, control, duration, ease, and speed (Watt, Morris, & Andersen, 2004); and (6) discuss different imagery outcomes – specifically motor learning and performance, motivation, self-confidence and anxiety, strategies and problem-solving, and injury rehabilitation. From this over-arching analysis, Guillot and Collet (2008) concluded that imagery models have been mostly used to inform MI interventions aimed at promoting performance optimization and restoration in sports.

With respect to performance restoration, sport and exercise psychologists have been reported to use MI to aid athletes recovering from various types of injury (Filho & Tenenbaum, 2015). To this extent, several models have described the sport injuries' phenomenon in general (e.g., Finch & Cook, 2014; Williams & Andersen, 1998; van Tiggelan, Wickes, Stevens, Roosen, & Witvrouw, 2008), and the process of injury rehabilitation in particular (e.g., Brewer, Andersen, & Van Raalte, 2002; Wiese-Bjornstal, 2010; Wiese-Bjornstal, Smith, Shaffer, & Morrey, 1998). Brewer, Andersen, and Raalte (2002) proposed a theoretical framework to describe the process of rehabilitation from sport injury, and presented a bio-psycho-social model that integrated earlier models; this includes seven components: (1) injury characteristics; (2) socio-demographic details; (3) biological components, such as the immune system, nutrition, sleep, and metabolism; (4) psychological aspects, such as personality, emotional behavior, and cognition; (5) social and contextual aspects, such as social relationships, life stressors, and rehabilitation environment; (6) intermediate bio-psychological outcomes, such as range of motion, strength, pain, and endurance; and (7) recovery outcomes, such as functional performance, quality of life, satisfaction from treatment, and readiness to return to sport. In the present meta-analysis, we used this integrative model to orient our search towards the nomological network established between mental injury stimuli and bio-psychological variables.

Most studies on MI and injury recovery have been based on methodological approaches that preclude the development of meta-analytical reviews. In particular, most studies on MI and injury recovery have been qualitative in nature (see Brewer, 2010), or limited to empirical case studies (e.g., Evans, Hardey, & Fleming, 2000; Hare, Evans, & Callow, 2008). Moreover, the correlational studies available are mostly focused on sport actors' (i.e., athletes, coaches, and physical therapists) perception of the recovery process rather than on the relationship between imagery intervention and bio-psychological outcomes (e.g., Albinson & Petrie, 2003). Bearing these limitations in mind, we focused our meta-analytical procedure on experimental studies only. Experimentally-oriented research allows for the establishment of causality links, whereas correlational and qualitative approaches are limited in establishing generalizability.

1. The present study

We assembled all published interventional and experimental studies on this topic. Our overarching aim was to examine the effect of MI use considering Brewer's (2009) conceptualization that biological components, as well as psychological and social aspects, are implicated in injury rehabilitation in sports. In other words, from injury onset to return to play, changes in biological, psychological, and sociological variables are likely to occur. Of note, congruent with recommendations for conducting meta-analytical reviews (see Lipsey & Wilson, 2001), we adopted a conservative approach and expected that the magnitude and direction of MI effects on bio-psychological variables among injured athletes would be null. More specifically, we examined the effects of MI on *functional mobility*, *perceived pain*, and *self-efficacy*.

The first targeted variable, functional mobility, pertains to the extent and quality that a body movement function is operative in daily life. Functional mobility is tied to individual independence and is considered an index of well-being across population cohorts (e.g., Cnossen et al., 2017; Ryff, 1995; Spieth & Harris, 1996), including athletic groups (e.g., Kell, Bell, & Quinney, 2001; Snyder