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The Effect of Mindfulness Training on Sport Injury Anxiety During Rehabilitation

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Abstract: This study investigated whether mindfulness training can play a role in decreasing sport injury anxiety during rehabilitation. Injured participants ($N=10$) were recruited from different sports and quasi-randomly assigned to either a mindfulness intervention group ($n=5$) or control group ($n=5$). Both groups completed the Mindfulness Attention and Awareness Scale and the Sport Injury Anxiety Scale pre- and post-intervention. The intervention group also took part in social validation interviews when the intervention was completed. Mixed factorial ANOVA indicated that there was a significant treatment effect for both mindfulness ($p<.01$) and sport injury anxiety ($p<.01$). Additionally, Awareness, Acceptance and Action were the three super-ordinate themes elicited from the social validation interviews. Following an evaluation of the strengths and weaknesses of this study, the theoretical significance of the results was assessed and the application of mindfulness training in decreasing sport injury-related anxiety during rehabilitation discussed.

Keywords: Mindfulness; injury; rehabilitation; anxiety; sports

Introduction

Despite the fact that there is now a substantial body of evidence on how mindfulness has been successfully used to improve performance (e.g. Aherne et al. 2011; Gardner and Moore 2007/2012; Jackson and Csikszentmihalyi 1999; Kee and Wang 2008; Ravizza 2002), aid in reduction of pain sensitivity (Zeidan et al. 2010a; Zeidan et al. 2010b), decrease injury risk (Ivarsson et al. 2015) and support injury rehabilitation (Demarzo et al. 2015; Mosewich et al. 2012), there still need to be more studies conducted on its effects on sport injury-related anxiety during rehabilitation. To the author's knowledge, only one previous study, using a very brief educational acceptance-commitment based approach, has been conducted during injury rehabilitation among athletes. Successful results were recorded, helping to educate injured athletes about how to meet the challenges of their recovery, as well as increasing commitment to their rehabilitation programme and exhibiting behaviours that would potentially permit their successful re-entry to their sport (Mahoney and Hanrahan 2011).

Previous research has highlighted how traditional psychological interventions, using cognitive-behaviour therapy such as guided imagery (i.e. mental rehearsal), relaxation, goal setting, written discourse, and biofeedback can be used to improve emotion regulation and the process of injury rehabilitation (Arvinen-Barrow et al. 2015; Reese et al. 2012). However, cognitive behavioural interventions may have a counter-intentional effect (Wegner et al. 1987), where the athlete makes too much effort to control his/her thoughts and emotions, leaving the athlete with increased anxiety and without much resources to focus on the task at hand, in this case, successful rehabilitation from injury.

The present work, therefore, contributes to existing knowledge by establishing whether a full intervention programme, using a mindfulness-acceptance-commitment approach, creates a difference in the athletes' sport injury-related anxiety during rehabilitation. Adopting a longer intervention and a mixed-method approach will help to generate a more detailed explanation of how mindfulness may be successful in alleviating sport injury-related anxiety.

Emotional Response Towards Sport Injury Rehabilitation

Athletes are constantly striving to improve and reach their peak performance, but this sometimes comes at a cost. Apart from the persistence, determination, focus, attention, awareness, and hard work that sport entails, injuries are also part of an athlete's career. Injuries can be emotionally devastating and often mean some form of alteration to daily living (National Center for Injury Prevention and Control 2000). In a sporting context, injury may also result in the forced withdrawal from training and/or competition, either partially or completely. Athletes who attempt to return to sport following injury without having their psychological concerns addressed face a number of risk factors, including a greater risk of re-injury (Williams et al. 2001).

Psychological distress influences athletes' return to full sport participation and also their adherence to rehabilitation protocols (Williams et al. 2001). Athletes who are experiencing distress surrounding their injury may either attempt to hasten their recovery in an attempt to return quickly to their role as a sportsperson or avoid rehabilitation protocols because they raise uncomfortable or painful sensations (both physically and psychologically). In both cases, failing to adhere to a rehabilitation protocol jeopardizes the likelihood of a successful recovery and places athletes at greater risk of re-injury upon returning to full sport participation (Mahoney and Hanrahan 2011).

Morrey et al. (1999) suggested that the initial heightened distress of athletes experiencing long-term injury is due to adjustment difficulties that stem from uncertainty following injury. Conversely, a decrease in distress is often due to an acceptance of the injury recovery process and a sense of certainty about rehabilitation protocols. Distress levels are speculated to rise again toward the final stages of physical recovery, because athletes are often concerned about their abilities to successfully return to sport and the fear of re-injury (Mahoney and Hanrahan 2011).

These findings illustrate how negative mood states in injury recovery are not necessarily steady and predictable. Poor emotional coping strategies—such as avoidance, denial, impaired autonomy, support dissatisfaction, and inhibition—lead to higher levels of negative emotions such as anxiety. According to Mankad and Gordon (2010), the simple intervention of writing down experienced emotional thoughts and feelings can reduce mood disturbances. Therefore, since mindfulness raises awareness of the thoughts and feelings experienced and allows the athlete to accept the situation and commit to the values, goals, and successful behaviour activation, it may also play a role in achieving optimal sport injury rehabilitation.

Mindfulness

Mindfulness has recently received more empirical research attention as part of an acceptance-based '3rd wave' of cognitive behaviour therapy (Segal et al. 2002). The most commonly used definition of mindfulness is that of 'paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally' (Kabat-Zinn 1994: 4). Mindfulness has its roots in Buddhism, and as Kabat-Zinn (2005) highlights, it uses meditation as a means of 'scaffolding' to develop the state/skill of mindfulness. One of the main differences

between cognitive control techniques such as thought suppression (Wegner et al. 1987) and mindfulness training is the non-judgemental orientation. Cognitive techniques that attempt thought suppression or elimination of distracting thoughts (e.g. Bowen et al. 2007; Kavanagh et al. 2004) through, for example, ironic processing, may produce counter-intentional effects (Wegner et al. 1987). In contrast, mindfulness training urges acceptance (Aherne et al. 2011).

Mindfulness has been found to facilitate sport performance enhancement through, for instance, enhancing current moment awareness (e.g. Jackson and Csikszentmihalyi 1999; Ravizza 2002), generating 'flow', or a state of complete focus on the task or event at hand (e.g. Aherne et al. 2011; Kee and Wang 2008). This leads to increased attention focus while minimizing external distractions, positively influencing emotional and metacognitive awareness, and promoting attentional focus onto performance-related stimuli (Gardner and Moore 2007/2012). As described in Mahoney and Hanrahan (2011), mindfulness provides the knowledge of how to detach from a conceptualized self (i.e. the "thinking" self) and to view the self as context (i.e. the "observing" self). Cognitive defusion and acceptance, which are skills of mindfulness, help foster this process and also increase the likelihood of individuals achieving psychological flexibility (Arch and Craske 2008; Hayes et al. 2006). When individuals are encouraged to avoid describing themselves by their perceived roles (e.g. athlete, coach, student, parent) and to start viewing themselves as a being with transient experiences, a form of distancing between the injury and the athlete takes place (Mahoney and Hanrahan 2011). As a consequence, the athlete is no longer defined as an 'injured athlete'. Brewer and Cornelius (2010) found that athletic identity decreased considerably from pre- and post-anterior cruciate ligament surgery and in those who struggled with their rehabilitation programme. Through mindfulness, the view of 'self as context' means that athletic identity is retained but, as a result, athletes are more accepting of challenging events that occur during rehabilitation. This may allow for increased compliance to commit to rehabilitation protocols and eventually a decrease in sport injury-related anxiety.

Current Study

While previous research has shown that mindfulness can enhance cognitive appraisals and emotional responses, what still needs to be studied is whether mindfulness can improve sport injury-related anxiety during rehabilitation. Therefore, the research question of the current study is to establish whether sport injury-related anxiety can be reduced after a full Mindfulness-Acceptance-Commitment (MAC) intervention. The findings have the potential to contribute to knowledge of how mindfulness may be used as an intervention to help successful injury rehabilitation. If the findings show this, the null hypothesis that mindfulness training does not lower sport injury anxiety will be rejected.

Methods

Project Design

A quasi-experimental study design took place where a control group (no mindfulness programme) and an experimental group (mindfulness training programme) were created. Participants were allocated quasi-randomly to one of the two groups, and a pre- and a post-intervention test of mindfulness and anxiety was administered. The dependent variables were mindfulness level and sport injury anxiety level, while the independent variables were group (mindfulness training vs no mindfulness training) and time (pre vs post). To add depth to the findings, post-intervention social validation with the experimental group was carried out using a short semi-structured interview to generate further detail on the effectiveness of the intervention.

Participants

The participants consisted of ten 20- to 30-year-old athletes who were injured and out of their sport for a minimum of eight weeks. They took part in competitive sports such as football, cross-fit, athletics and badminton, and came from mixed genders (see Table 1).

Homogenous sampling was chosen to recruit participants with the same specific characteristics (Onwuegbuzie and Collins, 2007) i.e. athletes, same high performance sport level, and the same period of time out of their sport (minimum of eight weeks), so as to limit the number of confounding variables while still being aware of confounding variables such as gender, country, and sport type. Due to the low number of participants identified using homogenous sampling, a snowball sampling approach, where participants were asked to suggest other individuals to join the study (Onwuegbuzie and Collins 2007), was adopted. Participants with previous mindfulness experience or those who experienced recent difficult life events were excluded.

Measures

The 15-item Mindfulness Attention Awareness Scale (MAAS) was used to assess receptive state of mind, in which attention, informed by a sensitive awareness of what is occurring in the present, simply observes what is taking place (Brown and Ryan 2003). The MAAS has shown excellent psychometric properties. Factor analyses with undergraduate, community, and nationally sampled adults, as well as adult cancer populations, have confirmed a single factor scale structure (Brown and Ryan 2003; Carlson and Brown 2005). Internal consistency levels (Cronbach's alphas) generally range from .80 to .90. The MAAS has demonstrated high test-retest reliability, discriminant and convergent validity, known-groups validity, and criterion validity (Carlson and Brown 2005).

Secondly, the 29-item Sport Injury Anxiety Scale (SIAS) was used to measure anxiety across seven subscales typically associated with sport injury anxiety. The subscales are related to losing athleticism, being perceived as weak, experiencing pain, loss of social support, letting down important others, re-injury, and an impaired self-image. Individuals respond on a 5-point Likert-type scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*), with an additional option of 'not applicable.' The SIAS has been reported to have strong internal consistency ($\alpha=0.95$) and equally strong measures of reliability for the seven subscales (alpha coefficients ranging from 0.81 to 0.90). A factor analysis supported the construct validity of the SIAS, demonstrating that items mapped onto their intended factors for the seven subscales (Cassidy 2006).

Sample composition									
	Group	Gender	Country/City	Age	Sport	Sport Level	Injury	Time out of Sport	
Participant 1	Experimental	Female	Malta	20-30	Crossfit	Competitive	Torn point of insertion at the antepubis	Minimum of 8 weeks	
Participant 2	Experimental	Female	Liverpool	20-30	Crossfit	Competitive	Thoracoscapula stabilisation	Minimum of 8 weeks	
Participant 3	Experimental	Female	Liverpool	20-30	Football	Competitive	Swelling of bursa sacks in the knee and a pulled hamstring	Minimum of 8 weeks	
Participant 4	Experimental	Female	Malta	20-30	Badminton	Competitive	ACL surgery	Minimum of 8 weeks	
Participant 5	Experimental	Female	Darlington	20-30	Athletics	Competitive	ACL surgery	Minimum of 8 weeks	
Participant 6	Control	Male	Liverpool	20-30	Football	Competitive	PCL surgery	Minimum of 8 weeks	
Participant 7	Control	Male	Malta	20-30	Football	Competitive	ACL surgery	Minimum of 8 weeks	
Participant 8	Control	Male	Malta	20-30	Football	Competitive	Torn hamstring	Minimum of 8 weeks	
Participant 9	Control	Female	Malta	20-30	Basketball	Competitive	ACL surgery	Minimum of 8 weeks	
Participant 10	Control	Female	Malta	20-30	Crossfit	Competitive	Auxiliary vein thrombosis	Minimum of 8 weeks	

Table 1: Participants' details

Intervention

For the intervention, a Mindfulness-Acceptance-Commitment (MAC) approach (Gardner and Moore 2007) was used. This included a coherent semi-structured programme formed from a combination of mindfulness and ACT techniques designed to be utilized with performance populations. The semi-structured approach is organised into five components that include: psychoeducation, mindfulness, values identification and commitment, acceptance, and integration and practice. Originally designed to be a fixed 8-module programme, the MAC was later modified to become a flexible 7-module programme to allow the practitioner to address specific client needs by expanding the number of sessions available for any module before moving on to the next module in the sequence (Ibid). Many sport studies have used the MAC approach with successful results (Gardner and Moore 2006; Lutkenhouse et al. as described in Gardner and Moore 2007; Schwanhausser 2009; Wolanin 2005).

In order to measure the effectiveness of the intervention, in addition to the questionnaire measures of mindfulness and sport injury anxiety, a social validation interview was carried out with the intervention group. This was based on a semi-structured interview with simple, open-ended questions which encouraged participants to speak about their experience and impact of the intervention with as little prompting from the interviewer as possible (Page and Thelwell 2013). "Social validation" is a measure of social importance (Wolf 1978) and supplements statistical analysis of objective data by subjectively assessing socially important outcomes (Dempsey and Matson 2009). Similarly, "social validation could play an important role to help validate the measures taken by observers and researchers and alleviate some of the concerns that changes are attributable to biased recording on their part" (Page and Thelwell 2013: 63). To enhance the quality of social validation, systematic, concise, single item, unambiguous, and simple-worded questions were asked. For instance, "how did you find the training?" and "can you describe any effects this intervention has had on you as an athlete so far?"

Procedure

Ethical approval was received from the author's academic institution. A brief-intervention (four weeks: two sessions per week instead of one) pilot study was carried out with one performer of a similar background to the chosen participants. The participant reported that they found the intervention to be clearly administered.

The study participants were given an information sheet followed by an informed consent form to sign and return. The control group ($n=5$) completed the two questionnaires before and after the intervention period (without receiving the intervention itself). The experimental group ($n=5$) also filled in the two questionnaires pre- and post-intervention, having taken part in the MAC programme and a social validation interview after the intervention. The MAC programme took place over eight weeks, with one meeting being conducted each week. The mindfulness intervention also required the intervention group to undertake some tasks between the sessions, which were then discussed during the next meeting. The questionnaires took about 20 minutes to complete, while the interviews took a maximum of 15 minutes each.

The questionnaires, interviews, and modules were administered either in person at the athletes' preferred location or through skype/emails by the researcher. The between-session tasks were carried out either in the comfort of the participant's own home or in their sporting environment. When the study was over, the control group also received the intervention.

Analysis

The data from the questionnaires was inputted into the Statistical Package for the Social Sciences version 23. Since two dependent variables (mindfulness and anxiety) and two independent variables were present (group and time (pre-post)), a two-way mixed ANOVA was carried out to determine whether there were any significant changes between and within groups.

The social validation interviews were recorded and transcribed verbatim. As Smith and Osborn (2007) suggest, interpretative phenomenological analysis (IPA) is ideal to analyse semi-structured interviews through the use of coding. As Pietkiewicz and Smith (2014) suggest, credibility, consistency, confirmability, and transferability to enhance the trustworthiness of the data was established through the multiple reading of, and making notes on, the transcripts, thereby transforming the notes into emergent themes and, finally, seeking relationships and clustering themes. In the current study, themes in connection to mindfulness and anxiety were identified to describe the way in which the intervention had helped to create change in injury-related anxiety experiences.

Results

Mindfulness

A mixed ANOVA with sphericity assumed found that there was a significant interaction effect between group and time ($F(1, 8)=16.980, p=.003, effect\ size=0.68$) and a main effect for time ($F(1, 8)=9.052, p=.02, effect\ size=0.53$) (see Table 2 and Figure 1). Therefore, the evidence supports the main experimental hypothesis—that mindfulness training does decrease sport injury anxiety.

Analysis of experimental data					
	Control Group M (SD)	Experimental Group M (SD)	P-Value (Time)	P-Value (Group)	P-Value (Time*Group)
Baseline Mindfulness Score	61.60 (9.40)	46.60 (10.09)	.017	.556	.003
Post- Intervention Mindfulness Score	58.20 (5.54)	68.40 (5.03)			
Baseline Sport Injury Anxiety Score	80.20 (18.34)	105.40 (8.62)	.021	.698	.007
Post- Intervention Sport Injury Anxiety Score	84.80 (17.88)	66.60 (19.63)			

Table 2: Baseline and post-intervention scores with experimental group P-values

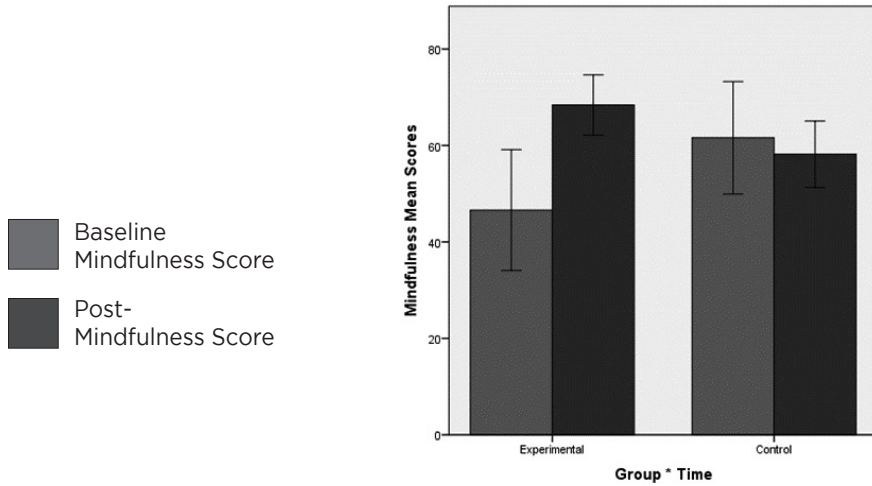


Figure 1: Mixed ANOVA mindfulness mean scores for the group by time interaction. Error bars represent 95% confidence intervals

Sport Injury Anxiety

A mixed ANOVA with sphericity assumed found that there was a significant interaction effect between group and time ($F(1, 8)=13.153, p=.007, effect\ size=0.62$) and a main effect for time ($F(1, 8)=8.168, p=.02, effect\ size=0.51$) (see Table 2 and Figure 2). Therefore, the evidence supports the main experimental hypothesis—that mindfulness training does decrease sport injury anxiety.

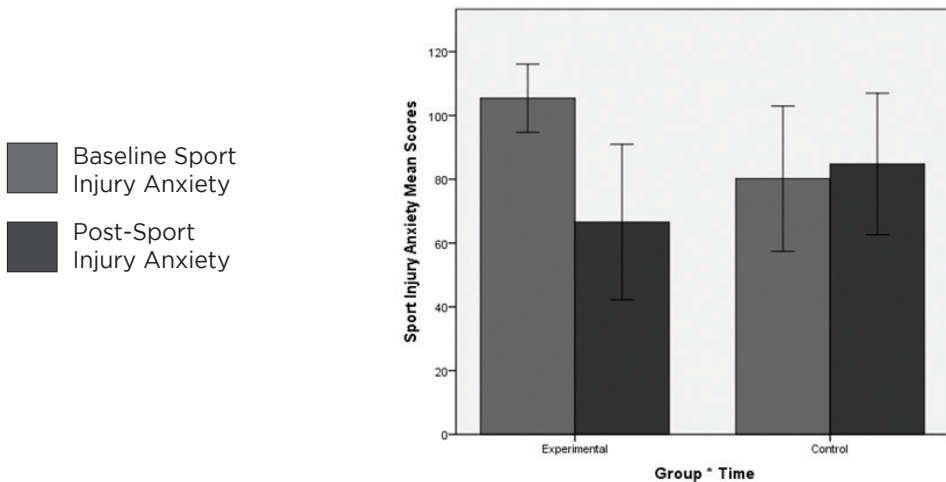


Figure 2: Mixed ANOVA sport injury anxiety mean scores for the group by time interaction. Error bars represent 95% confidence intervals

Social Validation Interviews

The interviews with the experimental group yielded three important recurrent themes relating to the impact of the mindfulness intervention: 'awareness', 'acceptance', and 'action'. Sub-themes for 'awareness' included greater 'focus', 'in the moment/more present', and 'concentration and attention'. Having greater 'awareness' helped the participants to 'accept' the situation they were in (through more 'resilience', 'meaning/purpose', and 'patience' sub-themes). As a result, participants felt more able to take 'action' through 'behaviour change', 'adherence to rehabilitation', and the preservation of 'athletic identity'.

Theme development		
Awareness	Acceptance	Action
Focus In the moment presence Concentration and attention	Resilience Meaning/purpose Patience	Behaviour change Adherence to rehabilitation Athletic identity

Table 3: The three super-ordinate themes with their sub-themes that emerged from the social validation interviews

Although some minor initial intervention barriers were mentioned by different participants, such as the need for commitment, concerns about the application of the intervention during competition (considering these were injured athletes), and some difficulty in the beginning to grasp the mindfulness concept, the intervention enablers highly outweighed the barriers. Positive enablers included increases in awareness, acceptance, positive behaviour changes, and adherence to the rehabilitation programme. Despite some initial scepticism, all of the experimental group participants recommended intervention for athletes, teams, and 'everyday individuals' who are going through a difficult situation in their life or just need some performance-enhancement techniques. One of the participants reported the discovery of a new talent through the intervention and another one expressed how mindfulness helped her do well in an interview and gain employment. The physiotherapists of the athletes reported (to the participants) that they were 'doing very well' and some were even 'ahead in their rehab process'.



Figure 3: The relationship between the three super-ordinate themes that emerged from the social validation interviews

While the themes identified to support the impact of the mindfulness intervention were described as a linear step-like process, participants also reported that injury can simulate a form of symbolic grief and loss (Kübler-Ross 1969) where the stages are interrelated. From a mindfulness perspective, this infers that, for instance, participants need to accept the intervention in order to give mindfulness, cognitive defusion and, in turn, awareness a chance, and that participants could not arrive at the decision to change their behaviour without first having an awareness of what type of behaviours they were utilising. In addition, participants adhered to the rehab programme but also learned to give meaning to it through becoming more values-driven. This made the participants more willing to accept

the injury and its associated discomfort 'in the moment' and adhere to the repetitive rehab programme to focus on their goal to recover from the injury and successfully return to competitive sport.

Discussion of the Findings

The purpose of this study was to investigate whether mindfulness training reduces sport injury-related anxiety during rehabilitation. The results provided support for the effectiveness of mindfulness training in decreasing sport injury-related anxiety. Among the experimental group, an increase in mindfulness and a decrease in sport injury-related anxiety were recorded, which was not observed in the control group. This supported Mahoney and Hanrahan's (2011) research, and shows how mindfulness can help injured athletes to meet their recovery challenges, increase commitment to their rehabilitation programmes, and exhibit behaviours to facilitate successful re-entry into sport.

The findings also provided a more in-depth view of the experience of injured athletes who experienced a mindfulness intervention during their rehabilitation process. Through the mindfulness intervention, the injured athletes became more aware (Jackson and Csikszentmihalyi 1999; Ravizza 2002) of their psychological distress and of their focus on emotion-driven behaviours. According to Williams et al. (2001), this can positively influence athletes when returning to full sport participation and their adherence to rehabilitation protocols. The activity of requiring participants to write down their own experienced thoughts and emotions in specific situations allowed them to be more aware of psychological distresses, reduce their mood disturbances (Mankad and Gordon 2010) and increase their ability to focus on the task at hand (Aherne et al. 2011; Kee and Wang 2008). Through increased awareness, injured athletes felt more able to accept the situation and at the same time felt more resilient to be able to deal with sport adversities more effectively (Collins and MacNamara 2012; Howells and Fletcher 2015; Sarkar et al. 2014; Tamminen et al. 2013). Their enhanced mindfulness added meaning and purpose (Allan et al. 2014; Garland et al. 2015) to their situation and sport through being better able to embrace each step of their recovery and improve their patience (Glicksohn 2001) or enabling them to be more tolerant of their negative circumstances. Similar to Morrey et al. (1999) and Mahoney and Hanrahan (2011), participants did report initial heightened distress due to adjustment difficulties that stemmed from uncertainty following injury. In this regard, participants experienced a decrease in distress once acceptance of the injury recovery process and a sense of certainty about rehabilitation protocols took place. Contrary to these two studies, the participants in the experimental group of this study did not report experiencing a rise in distress levels towards the final stages of recovery, and this may have been due to the gradual and careful actions taken throughout the flexible delivery of the mindfulness intervention (Gardner and Moore 2007). As a consequence of psychological distresses being better understood and accepted, participants' behaviours shifted from being emotion-driven to more values-driven (Gardner and Moore 2007). This paved the way to more perseverance towards and commitment to their rehabilitation programme (Williams et al. 2001), as well as increased psychological flexibility, where a distancing between the injury and the athlete took place. This in turn led to a retention of athletic identity (Arch and Craske 2008; Hayes et al. 2006; Mahoney and Hanrahan 2011) and decreased sport injury-related anxiety, enabling athletes to be more eager and prepared to return to their competitive sport post-injury.

Limitations

Results showed preliminary support for the efficacy of mindfulness training on sport injury related-anxiety. However, this was a small-scale study in terms of sample size that could have limited the generalizability of the findings. Using partial-eta squared for effect sizes in a small-scale study could have also overestimated the variance explained in the population (Nandy 2012). While double-blind methodology can reduce or eliminate experimental biases in participants and researchers to eliminate an expectancy effect (Rosenthal 1994), the design of this intervention study meant that that was not possible. The intervention took 8 weeks, and participants in either group could have made changes to their daily living routine in that time. For example, two participants in the control group had a small increase in mindfulness and sport injury anxiety at the same time as they had started to diet (thus scoring better on food intake and body image questions), and one was also allowed to start some simple exercises, potentially lifting her overall mood and alleviating anxiety. Another participant from the experimental group, who had the smallest increase in mindfulness and decrease in sport injury anxiety scores, was also the least compliant participant with respect to the intervention. In order to further eliminate biases, randomisation of participants' group allocation was used. However, this could have possibly resulted as a confounding variable. A reflection of this was shown in the baseline scores of both groups. The experimental group mindfulness baseline score was lower than the control, while the anxiety baseline score was higher in the control group when compared to the experimental group. Having said that, there was still a drastic increase in mindfulness level and a drastic decrease in anxiety level in the experimental group, compared to the slight opposing changes within the control group.

Conclusions

The findings of the study support the need for further research to establish more comprehensive and conclusive evidence for the positive relationship between, and impact of, mindfulness and sport injury-related anxiety. Such research would need to include a larger sample size, more homogeneity, and follow-up mindfulness sessions once the participants return to sport and re-engage in competitive activity. This study presents a good first step to consider how mindfulness training can aid athletes with sport injury-related anxiety, and how it might become part of an injured athletes' daily training regime and extend into performance optimisation and dealing with performance challenges.

What About the Maltese Context?

Considering the prevalence of injury occurrence among Maltese elite level athletes, as well as the need to find ways to help them manage their sport injuries effectively and return to sport as quickly as possible, it is suggested that having a psychological tool that can be administered among Maltese athletes to support injury recovery will facilitate:

1. Quicker recovery from injury and successful return to sport, which is highly important due to the small athlete pool in Malta.
2. More resilient, purpose-driven, and patient athletes; useful not just for injury rehabilitation but also for performance optimisation and dealing with performance challenges and adversity, such as making mistakes, non-selection, dealing with transitions, dealing with dual-career stresses, and reducing negative behaviours (e.g. doping and match-fixing).

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