A COMMENT ON SPORT INJURY

Autores: Alessandra De Maria[1*], Luca Mallia[1], Federica Galli[1], Arnaldo Zelli[1]

[1] Department of Movement, Human and Health Sciences. University of Rome "Foro Italico", Largo L. De Bosis, 15, 00135, Rome, Italy.

***Autor de correspondencia:** alessandra.demaria@uniroma4.it https://orcid.org/0000-0001-8241-6891

ABSTRACT

Despite numerous health benefits associated with sports participation, sport injury is a common by-product widely accepted by athletes. Given the multifactorial nature of injury, its definition and classification vary among studies and disciplines in the sport injury psychology. This variability renders any comparison of findings and conclusions across studies difficult. Relatedly, the understanding of the causes of sports injuries is important for assessing the true burden of injuries and for developing adequate prevention programs. Recently, the role of psychological factors in predicting sports injuries has gained greater relevance. The growing diversification, reconceptualization and expansion of the theoretical models developed in preinjury psychology acknowledge and stress the complexity of the phenomenon. This brief comment supports the importance of identifying the factors that determine athletes' psychological susceptibility to sport injuries and it also offers some recommendations on the theoretical and methodological implications for a thorough understanding of sport injury.

Keywords: sport psychology; preinjury psychology; injury prediction.

UN COMENTARIO SOBRE LA LESIÓN DEPORTIVA

RESUMEN

A pesar de los numerosos beneficios para la salud asociados a la participación deportiva, la lesión deportiva es una consecuencia común ampliamente aceptada por los atletas. Dada la naturaleza multifactorial de la lesión, su definición y clasificación varían entre estudios y disciplinas en la psicología de la lesión deportiva. Esta variabilidad dificulta cualquier comparación de hallazgos y conclusiones entre estudios. En relación con esto, la comprensión de las causas de las lesiones deportivas es importante para evaluar la verdadera carga de lesiones y para desarrollar programas de prevención adecuados. Recientemente, el papel de los factores psicológicos en la predicción de lesiones deportivas ha cobrado mayor relevancia. La creciente diversificación, reconceptualización y expansión de los modelos teóricos desarrollados en la psicología de la pre-lesión reconocen y acentúan la complejidad del fenómeno. Este breve comentario apoya la importancia de identificar los factores que determinan la susceptibilidad psicológica de los atletas a las lesiones deportivas y también ofrece algunas recomendaciones sobre las implicaciones teóricas y metodológicas para una comprensión profunda de las lesiones deportivas.

Palabras clave: psicología del deporte; psicología de la pre-lesión; predicción de lesiones.

INTRODUCTION

Regular participation in sports has always been associated with health, psychological and personal benefits in sport injury psychology. However, sports injury remains a common by-product of sports participation and this idea seems to be widely accepted among athletes as "a part of the game" (Brewer & Redmond, 2017). Sustaining a sports injury involves major negative consequences for the athlete, including negative emotional responses (Ivarsson, Tranaeus, et al., 2017), physical repercussions that can undermine the athlete's career (Samuel et al., 2015), as well as meaningful costs for the health system and sports club (Tranaeus et al., 2017). In Europe about 6.2 million people need hospital treatment every year for a sports injury (EuroSafe, 2014), and in Italy alone an incidence rate of 3.05 per 1000 people has been estimated (Kisser et al., 2017). Furthermore, recent research conducted during the Rio 2016 Olympic Games found that 8% of all athletes sustained at least one injury during the 17 days of the event, which corresponds to 9.8 injuries per 100 participating athletes (Soligard et al., 2017). Currently, sport injury is a very complex phenomenon to study and a still open challenge for researchers. Therefore, there are four theoretical and methodological issues that we think need to be addressed for assessing the true burden of sport injuries and for developing adequate prevention programs. These are: (1) inconsistency of injury definition and classification, (2) multidisciplinary nature of sport injury, (3) paucity of pre-injury study, and (4) proliferation of theoretical models of injury risk.

Inconsistency of injury definition and classification

Despite the high injury rates in sport, the inconsistency of the injury definitions used in various studies makes it difficult to compare scientific results. In general, the term sports injury is used to indicate any damage to body tissues and functional impairment that occurs in relation to the practice of a sport-related activity (Timpka et al., 2015). However, studies on the epidemiology of sports injuries do not offer only a single definition of injury, but rather offer three hierarchical or nested definitions that can be used: (1) time loss, (2) medical attention, and (3) all complaints (Clarsen & Bahr, 2014). The first, most used, refers to those physical or psychological issues that do not allow the athlete to fully participate in training or competition. The second definition, instead, includes those injuries who need medical attention. Finally, the third and most recommended definition includes all physical or psychological illnesses resulting from sports participation regardless of the need for medical attention.

Sports injuries are also classified based on multiple biological dimensions, such as mechanism, location, type, and severity (Brewer & Redmond, 2017). In terms of mechanism, an injury is defined as traumatic if the trauma is known and sudden; while if the trauma is not known and the onset is gradual, it is defined as overuse injury (Olsen et al., 2005). The location of the injury is closely related to its type, which refers to which tissue types are compromised. Finally, classifying sports injuries based on severity may depend on both biological and behavioral criteria (Brewer & Redmond, 2017).

Multidisciplinary nature of sport injury

All the inconsistency and variability of information on sport injury in the literature may be due to the multidisciplinary nature of the field of study. Given the multifactorial nature of sport injury, sport injury psychology has always been populated by independent contributions from the most diverse sport-related or social science disciplines (e.g., kinesiology, physiotherapy, sports sociology, or sports medicine psychology, Brewer,

2020). For example, the called "sports medicine psychology" refers to the psychological study of injury within the medical sports context. Likewise, the research field named *sports sociology* is a sub-discipline of sociology that studies sport and, within this context, sports injury might be viewed as a social phenomenon. As there is no single dedicated discipline for sport injury psychology, it is reasonable to expect these inconsistencies and variability to continue.

Paucity of pre-injury study

Sport injury psychology literature is divided into two major research areas: preinjury and postinjury psychology (e.g., Wiese-Bjornstal et al., 2018). On the one hand, preinjury psychology refers to the psychological causes of sports injuries and the development of functional prevention strategies and programs. On the other hand, postinjury psychology includes all those studies that investigate the psychological aspects after an injury has occurred. So far, the psychological responses that an athlete can exhibit after suffering an injury have been extensively explored, but the determination of the reasons why some athletes are more exposed to injury risk remains still relatively unknown.

Although recent time-trends showed a decrease in the incidence of sports injuries over time (Ekstrand et al., 2021), the identification of those at risk for sport injury still is a relevant issue to move forward with the development of adequate prevention programs. In line with this, the investigation of the causes of sports injury should focus not only on all those psychological, behavioral, and social factors that determine the athlete's psychological susceptibility to sports injury, but also on the protective factors that influence the outcomes of sports injuries such as risk or injury rate (Wiese-Bjornstal, 2019). In this regard, the field of preinjury sport psychology might be very useful and beneficial to injury prevention efforts.

Proliferation of theoretical models of injury risk

Recently, a topic that has gained greater relevance in preinjury sport psychology is the role of psychological factors. Several models have been developed to provide a theoretical framework to explain the relations linking psychological factors and injury risk. The most prominent model in scientific literature is the stress-injury model by Williams and Andersen (1998). This model identifies the psychosocial antecedents of traumatic injury which, combined with both athletes' stress responses and cognitive appraisals of potentially stressful situations, increase the risk of injury. That is, in stressful situations, athletes with a history of stressful events, personality characteristics leading to poor coping with stress, and ineffective coping resources will experience increased physiological arousal and attention disruption that will make them more vulnerable to injury. In addition, Williams and Andersen also recommended psychological interventions aimed at helping athletes to buffer the stressful situation and thus reduce the risk of injury.

Williams and Andersen's model (1998) was in recent years criticized. For instance, Wiese-Bjornstal (2010) stressed the role of emotional and environmental factors, together with cognitive ones, in sport injury risk. This author proposed that athletes' behavior and vulnerability to sport injury risk should depend on both personal variables (i.e., biological, and psychological characteristics) and environmental (i.e., sociocultural, and physical characteristics). Other authors (Appaneal & Perna, 2014), instead, considered the model's focus on athletes' cognitive mechanisms associated with the stress response a potential limitation. In their biopsychosocial model of stress and

athletic injury and health, Appaneal and Perna (2014) included behavioral and physiological mechanisms to more broadly understand the potential pathways that can influence injury risk. All this diversification, reconceptualization, and expansion of theoretical models for the prediction of sport injury occurrence, have had a meaningful impact on sport injury psychology, acknowledging, and stressing the complexity of the phenomenon of interest.

RECOMMENDATIONS AND FUTURE DIRECTIONS

With these general concepts in mind, how could these theoretical and methodological issues concerning the psychological aspects of preinjury be addressed? There are some recommendations that can plausibly be put forward.

A first direction for future research involves the need to promote and to encourage the standardization of methodologies used to record sports injuries. The use of standardized data collection methods would ensure the quality of epidemiological data and would allow the comparability of the results and conclusions obtained across different studies. A lot of research groups have published consensus recommendations taking into consideration both a specific sport, such as football (Orchard et al., 2016) or track and field (Timpka et al., 2014), and sport in general (Bahr et al., 2020) or mass-participation events (Schwellnus et al., 2019). In addition, other authors have proposed new methodologies to measure the occurrence and severity of injuries in sports such as, for instance, the Oslo Sports Trauma Research Centre (OSTRC) overuse injury questionnaire (Clarsen et al., 2013). All this research clearly highlights the need to develop valid and reproducible methods of data collection which, as such, would not underestimate the true burden of sport injuries.

Second, the study of preinjury psychology should be encouraged at an interdisciplinary, besides a multidisciplinary, level to favor the integration of knowledge and methods from different disciplines, using a true synthesis of approaches. The multifactorial nature of sports injuries implies having a complete understanding of the causality of the event, this is, all factors involved should be considered. Indeed, a recent meta-analysis (Ivarsson, Johnson, et al., 2017) showed that psychosocial variables explained only one part of the total variance in the injury rate, which means that other factors are responsible for the remaining variance. Besides, interdisciplinary studies would promote and reinforce collaboration among diverse sport professionals, such as doctors, kinesiologists, sports trainers, psychologists, etc., so that the work of one professional might inform and be complementary to the work of other professionals.

A third related recommendation is concerned with the need to carry out further studies focusing on the causes of athletes' vulnerability to sports injury rather than on its consequences. This line of investigation would offer multiple opportunities for preinjury psychology given the current paucity of research. In the ideal world which we should fight for, the identification of the causes of sports injuries should be a priority of professionals and experts in the field. Working more on the prediction and prevention of sports injuries, especially to predict and avoid those injuries that no longer allow the return to sports, would allow solving the problem at its origin.

Lastly, a final recommendation is concerned with the theoretical models present in the existing literature. As the models described above suggest, several psychological, physiological, behavioral, and environmental factors make athletes more vulnerable to

sports injuries. However, to the best of our knowledge, no studies have explored the models from a holistic perspective. This fact reflects the complexity of the issues underlying the models and it prevents the possibility of drawing conclusions about the robustness of the models and the dynamic nature of the variables. Consequently, future research should direct efforts toward all of these issues.

CONCLUSION

This contribution should not be intended as an exhaustive report on sports injuries, but rather just as a brief comment on the complexity of sport injury phenomena which is intended to illustrate some critical issues concerning athletes' sport experiences and to highlight the need to conduct further studies to move scientific knowledge forward. There is still a lot to know about why some athletes are at greater risk of injury in sports than others. A convinced and renewed scientific effort in this direction might provide a strong leap forward for contributing to sport risk prediction and prevention.

REFERENCES

Appaneal, R. N., & Perna, F. M. (2014). Biopsychosocial model of injury. *Encyclopedia of sport and exercise psychology*, 74-77.

Bahr, R., Clarsen, B., Derman, W., Dvorak, J., Emery, C. A., Finch, C. F., Hägglund, M., Junge, A., Kemp, S., & Khan, K. M. (2020). International Olympic Committee consensus statement: methods for recording and reporting of epidemiological data on injury and illness in sport 2020 (including STROBE Extension for Sport Injury and Illness Surveillance (STROBE-SIIS)). *British Journal of Sports Medicine*. https://doi.org/10.1136/bjsports-2019-101969

Brewer, B. W. (2020). *Three Decades Later: Looking Back to Look Forward*. In Sport Injury Psychology (pp. 232-246). Routledge.

Brewer, B. W., & Redmond, C. (2017). *Psychology of sport injury*. Human Kinetics.

Clarsen, B., & Bahr, R. (2014). Matching the choice of injury/illness definition to study setting, purpose and design: one size does not fit all!. *British journal of sports medicine*, 48(7), 510-512. http://dx.doi.org/10.1136/bjsports-2013-093297

Clarsen, B., Myklebust, G., & Bahr, R. (2013). Development and validation of a new method for the registration of overuse injuries in sports injury epidemiology: the Oslo Sports Trauma Research Centre (OSTRC) overuse injury questionnaire. *British journal of sports medicine*, 47(8), 495-502. http://dx.doi.org/10.1136/bjsports-2012-091524

Ekstrand, J., Spreco, A., Bengtsson, H., & Bahr, R. (2021). Injury rates decreased in men's professional football: an 18-year prospective cohort study of almost 12 000 injuries sustained during 1.8 million hours of play. *British journal of sports medicine*, 55(19), 1084-1091. http://dx.doi.org/10.1136/bjsports-2020-103159

EuroSafe. (2014). Injuries in the European Union, Report on injury statistics 2010-2012.

Ivarsson, A., Johnson, U., Andersen, M. B., Tranaeus, U., Stenling, A., & Lindwall, M. (2017). Psychosocial factors and sport injuries: meta-analyses for prediction and prevention. *Sports medicine*, 47(2), 353-365. https://doi.org/10.1007/s40279-016-0578-x

Ivarsson, A., Tranaeus, U., Johnson, U., & Stenling, A. (2017). Negative psychological responses of injury and rehabilitation adherence effects on return to play in competitive athletes: a systematic review and meta-analysis. Open access journal of sports medicine, 8, 27. https://doi.org/10.2147/OAJSM.S112688

Kisser, R., Walters, A., Rogmans, W., Turner, S., & Lyons, R. A. (2017). *Injuries in the European Union 2013-2015 – supplementary report on trends in IDB data flow, country comparison and ECHI-injury indicators 2013-2015*. Amsterdam: Eurosafe. https://www.eurosafe.eu.com/uploads/inline-files/IDB%202013-2015_suppl%20to%206th%20edition%20Injuries%20in%20the%20EU.pdf

Olsen, O. E., Myklebust, G., Engebretsen, L., Holme, I., & Bahr, R. (2005). Exercises to prevent lower limb injuries in youth sports: cluster randomised controlled trial. *Bmj*, 330(7489), 449. https://doi.org/10.1136/bmj.38330.632801.8F

Orchard, J. W., Ranson, C., Olivier, B., Dhillon, M., Gray, J., Langley, B., ... & Finch, C. F. (2016). International consensus statement on injury surveillance in cricket: a 2016 update. *British Journal of Sports Medicine*, 50(20), 1245-1251. http://dx.doi.org/10.1136/bjsports-2016-096125

Samuel, R. D., Tenenbaum, G., Mangel, E., Virshuvski, R., Chen, T., & Badir, A. (2015). Athletes' experiences of severe injuries as a career-change event. *Journal of Sport Psychology in Action*, 6(2), 99-120. https://doi.org/10.1080/21520704.2015.1012249

Schwellnus, M., Kipps, C., Roberts, W. O., Drezner, J. A., D'Hemecourt, P., Troyanos, C., ... & Borjesson, M. (2019). Medical encounters (including injury and illness) at mass community-based endurance sports events: an international consensus statement on definitions and methods of data recording and reporting. *British journal of sports medicine*, 53(17), 1048-1055.

Soligard, T., Steffen, K., Palmer, D., Alonso, J. M., Bahr, R., Lopes, A. D., Dvorak, J., Grant, M.-E., Meeuwisse, W., & Mountjoy, M. (2017). Sports injury and illness incidence in the Rio de Janeiro 2016 Olympic Summer Games: A prospective study of 11274 athletes from 207 countries. *British Journal of Sports Medicine*, 51(17), 1265-1271. https://doi.org/10.1136/bjsports-2017-097956

Timpka, T., Alonso, J.-M., Jacobsson, J., Junge, A., Branco, P., Clarsen, B., Kowalski, J., Mountjoy, M., Nilsson, S., & Pluim, B. (2014). Injury and illness definitions and data collection procedures for use in epidemiological studies in Athletics (track and field): consensus statement. *British Journal of Sports Medicine*, 48(7), 483-490. https://doi.org/10.1136/bjsports-2013-093241

Timpka, T., Jacobsson, J., Ekberg, J., Finch, C. F., Bichenbach, J., Edouard, P., ... & Alonso, J. M. (2015). Meta-narrative analysis of sports injury reporting practices based on the Injury Definitions Concept Framework (IDCF): a review of consensus statements and epidemiological studies in athletics (track and field). *Journal of Science and Medicine in Sport*, 18(6), 643-650. https://doi.org/10.1016/j.jsams.2014.11.393

Tranaeus, U., Heintz, E., Johnson, U., Forssblad, M., & Werner, S. (2017). Injuries in Swedish floorball: a cost analysis. *Scandinavian journal of medicine & science in sports*, 27(5), 508-513. https://doi.org/10.1111/sms.12675

Wiese-Bjornstal, D. M. (2010). Psychology and socioculture affect injury risk, response, and recovery in high-intensity athletes: a consensus statement. *Scandinavian journal of medicine & science in sports*, 20, 103-111. https://doi.org/10.1111/j.1600-0838.2010.01195.x

Wiese-Bjornstal, D. M. (2019). *Injury, psychological susceptibility to*. In P. Hackfort, R. J. Schinke, & B. Strauss (Eds.), Dictionary of sport psychology (pp. 145–146). Amsterdam: Elsevier.

Wiese-Bjornstal, D. M., White, A. C., Wood, K. N., & Russell, H. C. (2018). *Sports medicine psychology*. In T. S. Horn & A. L. Smith (Eds.), Advances in sport and exercise psychology (4th edition), (pp. 387-408). Human Kinetics.

Williams, J. M., & Andersen, M. B. (1998). Psychosocial antecedents of sport injury: Review and critique of the stress and injury model'. *Journal of applied sport psychology*, 10(1), 5-25. https://doi.org/10.1080/10413209808406375