Return to sport after anterior cruciate ligament reconstruction: a qualitative analysis

Retorno ao esporte após reconstrução do ligamento cruzado anterior: uma análise qualitativa

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Abstract

Introduction: Return to sport is a desired outcome in individuals submitted to anterior cruciate ligament reconstruction (ACLR). **Objective:** Understand the factors that affect return to pre-injury level sport after ACLR from the patient's perspective. **Methods:** The sample consisted of 29 individuals submitted to ACLR who participated in sport before the ligament injury. This is a narrative analysis with a qualitative approach, using a semi-structured interview as a methodological resource. Standardized instruments were also applied to evaluate psychological readiness to return to sport, via the Anterior Cruciate Ligament – Return to Sport after Injury Scale (ACL-RSI); self-perceived knee function using the International Knee Documentation Committee (IKDC) subjective questionnaire; and the frequency of participation in sports with the Marx scale. **Results:** Analysis of the interviews produced three main themes related to post-ACLR return to sport: self-discipline, fear of reinjury and social support. In qualitative analysis, the average scores obtained were 59.17 (± 23.22) on the ACL-RSI scale, 78.16 (± 19.03) for the IKDC questionnaire and 9.62 (± 4.73) and 7.86 (± 5.44) for the Marx scale before and after surgery, respectively. **Conclusion:** Psychological factors influence the decision to return to sport post-ACLR. Physiotherapists should therefore be aware of the psychological aspects and expectations of patients, and that other health professionals may be needed to help prepare these individuals to return to their preinjury sports level and achieve more satisfactory outcomes after ACLR.

Keywords: Anterior cruciate ligament reconstruction. Return to sport. Sports psychology.

Resumo

Introdução: *O retorno ao esporte é um desfecho almejado pelos indivíduos que se submetem à reconstrução do ligamento cruzado anterior (RLCA).* ***Objetivo:*** *Compreender os fatores que interferem no retorno ao esporte no nível anterior à lesão ligamentar em indivíduos submetidos à RLCA sob o ponto de vista do paciente.* ***Métodos:*** *A amostra foi composta por 29 indivíduos que se submeteram à RLCA e praticavam esporte antes da lesão ligamentar. O estudo é caracterizado como uma pesquisa narrativa de abordagem qualitativa, utilizando como recurso metodológico a entrevista semiestruturada. Com o uso de instrumentos padronizados, avaliou-se também a prontidão psicológica para retornar ao esporte, utilizando a escala ACL-RSI; a autopercepção da função do joelho, utilizando o questionário subjetivo do IKDC; e a frequência de participação esportiva antes da lesão e após a cirurgia, utilizando a Escala de Marx.* ***Resultados:*** *A análise das entrevistas gerou três unidades temáticas principais relacionadas com o retorno ao esporte pós-RLCA: autodisciplina, medo de uma nova lesão e suporte social. Na análise quantitativa, obteve-se média de 59,17 pontos (± 23,22) na escala ACL-RSI, 78,16 pontos (± 19,03) no IKDC, e 9,62 (± 4,73) e 7,86 pontos (± 5,44) na escala de Marx, antes da lesão e após a cirurgia, respectivamente.* ***Conclusão:*** *Fatores psicológicos influenciam a decisão de retorno ao esporte pós-RLCA. Os fisioterapeutas, portanto, devem estar atentos aos aspectos psicológicos e expectativas dos pacientes, considerando a necessidade de outros profissionais da saúde auxiliarem na preparação do indivíduo para retornar ao nível esportivo pré-lesão e alcançar resultados mais satisfatórios pós-RLCA.*

Palavras-chave: *Reconstrução do ligamento cruzado anterior. Retorno ao esporte. Psicologia do esporte.*

Introduction

Sport is no longer viewed as simply a leisure or competitive activity, but in recent years has also become an important strategy in social inclusion and mitigating problems related to health and education.[1] Thus, sport plays a key role in contributing to preventing chronic degenerative diseases and antisocial behavior.[2] However, it can also lead to injury resulting from mechanical trauma or joint and muscle overuse.[3]

Anterior cruciate ligament (ACL) rupture is the most prevalent injury in sports that require abrupt changes in direction at high speeds or sudden decelerations with high axial loads on the knee.[4] After injury, decision making about whether to undergo ligament reconstruction or conservative treatment is influenced by different factors, such as the extent of the injury, degree of instability, physical activity level and patient's functional needs.[5] Many individuals with this injury opt for ACL reconstruction as opposed to conservative rehabilitation with the goal of returning to sport.[6]

Return to preinjury level sport is the desired outcome of patients who undergo physiotherapy to treat these injuries.[5] However, a systematic review with meta-analysis demonstrated that only 65% of those submitted to this surgical procedure are able to return to their preinjury level of sport.[7] It should be noted that the authors of the meta-analysis did not establish mandatory postoperative physiotherapy as an inclusion criterion. Thus, it is possible that some participants in the studies analyzed had not undergone physiotherapy, representing a limitation for the return to sport outcome. Nevertheless, the fact that a considerable portion of patients do not obtain the desired outcome after surgery is important, given the functional aspects of social participation.

Several factors have been proposed to explain successful return to sport after ACLR.[8] In recent years, psychological factors have been investigated as possible variables that may help or hinder individuals submitted to ACLR in returning to their preinjury sport level.[9] The negative emotions experienced by athletes after injury hamper their rehabilitation, making psychological, social and contextual factors critical to successful rehabilitation.[10] Thus, personal psychological factors can also influence this clinical outcome in terms of the individual's return to their preinjury activity level.

Patients' perception of their functional status is one of the psychological factors that seem to influence engagement in sport and can be evaluated using standardized questionnaires developed for this purpose.[11] However, studies that investigate the psychological aspects surrounding the return to sport, such as self-reported knee function after surgery, primarily use methods that do not provide an in-depth assessment of these issues.[9-11] Likewise, aspects such as lifestyle, employment status and social support were not explored in detail in the Brazilian population submitted to knee ligament reconstruction. As such, the aim of this study was to identify the barriers, facilitators and meaning of the return to sport from the perspective of patients who undergo ACLR.

Methods

The study sample was selected by convenience from the patient registration data of four specialist knee surgeons in the municipality of Divinópolis, Minas Gerais state (MG), Brazil. Inclusion criteria were individuals of both sexes, with a minimum age of 18 years, who underwent unilateral primary ACLR between two and ten years before the study and engaged in sports prior to injury. The two-year minimum period was established to allow sufficient time to return to and maintain regular sport activity and the 10-year maximum to minimize recall bias.

The study followed the Standards for Reporting Qualitative Research (SRQR) guidelines[12] and is characterized as narrative research with a qualitative approach, which aims to identify specific aspects and addresses the meanings, values and attitudes of the interviewees. The data collection resources used included a semi-structured interview with questions on factors that influenced the decision to return to sport or not after ACLR. A single researcher was responsible for data collection and the interviews were carried out in quiet locations selected by the interviewee (home, work or other previously agreed sites) to prevent third party interference. Patients filled out a form before the interview to provide demographic and clinical data for sample characterization. Data on physiotherapy quality and treatment plan were not collected because this was not the focus of the proposed qualitative approach. As such, the quality of the physiotherapy treatment received might be one of the factors mentioned by participants, depending on their ability to critically assess and identify barriers and facilitators in the return or not to sport after surgery.

Interviewing was halted once new information rarely emerged, confirming saturation. The interviews were recorded and then transcribed in full, with prior authorization from participants, who signed a consent form. Participants were assigned a number (P1, P2, etc.) to protect their identity. The study was approved by the Research Ethics Committee of Minas Gerais State University (protocol number: 2.239.953).

The script used for the interview contained ten questions that addressed: 1- what influenced the return or not to sport; 2 – how the interviewee felt about the possibility of knee reinjury; 3 – coping with the injury/surgery; 4 – history of previous severe injuries; 5 – the influence of family support; 6 – outside pressure to return to sport; 7 – the influence of financial status on rehabilitation; 8 – advice and guidance from professionals on returning to sport; 9 – the role of health professionals monitoring rehabilitation; 10 – the rehabilitation process from surgery to return or not to sport.

Three standardized data collection instruments were also used, in order to achieve better sample characterization regarding relevant aspects involved in the return to sport. The instruments were applied before the interview, after participants had filled out the form providing demographic and clinical data. The Anterior Cruciate Ligament – Return to Sport after Injury Scale – (ACL-RSI) was used to assess psychological readiness to return to sport after ligament reconstruction.[13] It contains 12 items divided into three subscales (emotions, confidence and risk appraisal), with each item graded from 0 to 10. The scores for each item are added and the total converted into a percentage, with the result ranging from 0 to 100. The instrument demonstrates adequate validity, reliability and internal consistency.[13,14]

The International Knee Documentation Committee (IKDC) subjective questionnaire was applied to evaluate patients' perception of their knee function and consists of 18 items related to symptoms, daily activities and sports and knee function, with the result converted to a scale from 0 to 100, whereby the higher the score, the better the knee function. The validity, reliability and internal consistency of the IKDC have been tested and confirmed as adequate.[15-17]

The Marx scale analyzed the frequency of sports activities before injury and after ligament reconstruction, at the time of the interview. It was developed to measure how often individuals perform physical activities that are difficult for those with knee pathologies. Items are scored from 0 to 16 and activities are divided into four categories: running, changing direction, deceleration and pivoting. The higher the score, the more frequent the individual's participation in sports.[18]

Data analysis

The quantitative data obtained from the standardized instruments were analyzed by descriptive statistics via mean and standard deviation. The qualitative data were assessed by content analysis, whereby a set of criteria are used as a guide to identify topics or themes that can be considered a unit of meaning in the text analyzed.[19] To establish discussion, interview data, information from the scientific literature and interpretations of the statements within the themes were triangulated.[20]

Results

Twenty-nine patients were interviewed, 3 women (10.3%) and 26 men (89.7%), with an average age of 37.1 years (± 9.9 years). In relation to sport, 72.4% (n = 22) played soccer, 20.7% (n = 6) overhead sports and 6.9% (n = 2) practiced martial arts. Of those interviewed, 79.3% (n = 23) returned to their preinjury level and 20.7% (n = 6) opted not to return to sport. Quantitative analysis of the data obtained from the standardized instruments is shown in Table 1.

Table 1 - Participants' (n = 29) scores on the instruments used

	Marx pre (points)	**Marx post** (points)	**IKDC** (%)	**ACL-RSI** (%)
Mean	9.62	7.86	78.16	59.17
SD	4.73	5.44	19.03	23.22

Note: Marx scale preinjury and post-surgery; IKDC = International Knee Documentation Committee; ACL-RSI = Anterior Cruciate Ligament – Return to Sport after Injury Scale; SD = standard deviation.

Analysis of the Marx scale data indicated that of the 23 individuals who returned to sport, 39.1% (n = 9) maintained their preinjury participation frequency, 34.8% (n = 8) reduced their frequency and 26.1% (n = 6) increased it. A separate analysis of the IKDC and ACL-RSI scores of participants who returned or not to sport is presented in Table 2.

Analysis of the interviews produced three main themes related to post-ACLR return to sport: self-discipline, fear of reinjury and social support, which were illustrated by statements from the interviews.

Table 2 - Scores of participants who returned (R) or not (NR) to sports

	IKDC R (n = 23)	**IKDC NR** (n = 6)	**ACL-RSI R** (n = 23)	**ACL-RSI NR** (n = 6)
Mean	83.46	57.85	64.53	38.61
SD	15.69	17.91	22.36	13.46

Note: IKDC = International Knee Documentation Committee (%); ACL-RSI = Anterior Cruciate Ligament – Return to Sport after Injury Scale (%); SD = standard deviation.

Discussion

The aim of this study was to identify the barriers, facilitators and meaning of the return to sport from the perspective of patients who undergo ACLR. The interviews demonstrated that psychological factors influenced the outcome of post-ACLR return to sport, with enjoyment, self-discipline and fear of reinjury cited most often. Fear was identified as a relevant factor in the decisions of both groups (those who returned to sport and those who did not). Social support also played an important role in patient decisions about returning to sport after surgery.

The first theme identified in interview analysis was self-discipline, considered a significant factor in the decision to return to sport by many of the interviewees. Self-discipline and persistence in pursuing this outcome are evident in the interviews of several patients who returned to sport, as shown in the following statement:

I think it's about willpower, about really wanting it, because when you want it, you go after it. It's mind over body; if you want it, if you really enjoy something, then you have to go after it; it's about overcoming ourselves. (P1)

The literature highlights psychological resilience, discipline and dedication as relevant aspects in improving and maintaining high levels of sports performance.[21,22] Thus, self-discipline is a key variable of sporting success because it directly reflects the learning process for a specific sport, the persistence to keep practicing and the pursuit of better daily performance improvement:

I had the surgery so I could play soccer again; I think it worked out because I wanted it so much. (P2)

Almeida[23] reported similar findings among runners in a study on lessons learned from sports, where enjoyment and enthusiasm were the most cited motivations for these athletes. The author observed that, based on this motivation for the sport, the athletes learned values and attitudes that ensured personal and sporting development and improved performance in activities of daily living. Physical exercise and sport promote continuous learning in practitioners when they find meaning in the activity. Some accounts obtained in the present study illustrate this point:

I don't think I could live without sport. (P3)

You think you won't go back, but your will and love for the sport drive you on, regardless of injury or anything else. Being active in life keeps you going. (P4)

A second theme identified in the interviewee statements was fear of reinjury, which predominated in patients from both groups. While in one group this factor weighed heavily in the decision not to return to sport, others chose to use their fears as a motivator to overcome barriers and return to their preinjury activity level. The accounts of some patients paint a clear picture of fear as a decisive factor in deciding not to return to sport:

I decided not to go back for fear of having to undergo another surgery. (P5)

It's in the back of my mind every time I play soccer; that fear of tearing my ligament again is unbelievably strong. (P6)

I don't think my knee will ever be the same again; it might just be psychological, but it'll be with me for the rest of my life. (P7)

Despite the fear of reinjury, especially in the early stages of returning to sport, all patients who did so described their struggle to overcome this obstacle. This strategy to deal with obstacles is known as coping or active coping.[24] An example of this is evident in the following statement :

There is a fear of going through it all over again, of needing more surgery or getting the same injury, but my desire to be active again was greater than the fear. (P8)

In a study similar to our investigation, but conducted in Canada, fear was also prominent in the interview statements of both groups, but predominated among those who did not return to sport,[25] with 64% of interviewees not returning to their preinjury level. This differs from our findings, where returning to sport was more prevalent.

Athletes experience considerable stress when undergoing ACLR and dealing with this adversity seems to be the most important coping strategy used, as observed by Dias and Fonseca.[24] In the present study, patients cited not only fear of reinjury, but nonphysical fears, such as financial losses due to time off work and having to undergo surgery and rehabilitation again:

I didn't return to sport out of fear, because I felt that the joy soccer gave me wasn't worth the risk of being disabled after an injury. (P7)

The literature indicates that sports injuries are not only decisive in preventing physical activity, but can also result in substantial financial losses and the need for specialized treatment.[26] According to Lavoura and Machado,[27] in a study about fear in sports psychology, fear is presumed to have a considerable effect on athletic performance, since it is responsible for causing a variety of sensations and emotions involved in sporting activities, thereby contributing to success or failure.

The third theme identified that influenced return to sport was social support. Gonçalves et al.[28] reported that social support seems to have a wide-ranging effect on many aspects of people's lives. An individual's view on the support received is linked to different mental and physical health outcomes that affect how they perceive stressful situations and their emotional and psychological well-being. According to Gokeler et al.,[10] a person's level of social support modulates the psychological stress that accompanies ACL injury, reconstruction surgery and rehabilitation.

This is consistent with patient accounts that highlight the positive influence of social support from family members or friends on their decision to return to sport:

It was a challenge in my life, but with support from my family and friends, thank God I was able to return. (P9)

In times like those you really need support, someone to help and encourage you, I think it makes a big difference. (P10)

My whole life, I made so many friends through soccer and that definitely influenced my decision to go back. (P11)

This motivational factor may be linked to different definitions of social support that emphasize different aspects of interpersonal relationships. In general, social support is defined as any information, spoken or not, and/or material assistance and protection offered by other people and/or groups to those with whom they have regular contact that result in emotional effects and/or positive behavior.[28]

Another noteworthy aspect regarding the interviews that does fall within the themes identified here was weight gain as a decisive factor in the decision not to return to sport, reported by two patients:

I put on a lot of weight because of the surgery so my knee suffered much more than it should have [...] If I could go back, I wouldn't have the surgery, I'd rather leave the injured ligament because things were worse after the surgery. (P12)

I think that being overweight ultimately influenced the load on my knee. (P13)

Weight gain is an important element and a significant global health problem, making it one of the most widely studied issues. Postoperative weight gain is the result of the decline in everyday activities, leading to less energy expenditure. According to Rodrigues et al.,[29] a high calorie intake and sedentary lifestyle are the main culprits in energy imbalance, which can cause considerable weight gain in the long term. Evidence suggests that a high body mass index is related to a lower return to sport rate after ACLR,[6] indicating that this physical aspect should not be overlooked during rehabilitation.

Analysis of the themes and the results of the standardized instruments show that psychological aspects have a considerable effect on the outcome after ACLR, triggering the decision to return to sport and the patient's view of the rehabilitation process. According to Nunes et al.,[30] rehabilitation can be a lengthy process that requires considerable personal investment because of the discipline needed for clinical, surgical, physiotherapy and psychological treatment, the delay in regaining preinjury technical and physical status and the inability to engage in sports during rehabilitation. This set of circumstances can cause athletes to lose their motivation to continue with treatment or maintain high sports performance, resulting in delays or failure to achieve results.

The authors of the present study believe that qualitative research is important in broadening clinical knowledge and improving the quality of care because it allows phenomena to be understood within their context, establishing links between concepts, representations, beliefs and behaviors and exposing intersubjectivities between professionals and patients. However, a limitation of this study is its objective of identifying factors related to post-ACLR return to sport from the perspective of patients, who do not have the scientific knowledge to critically analyze some factors that may be linked to the outcome analyzed, such as the surgical techniques used or the quality of the physiotherapy received after surgery. This could explain why psychosocial factors were more frequently cited by participants than physical and functional aspects.

Conclusion

In this study, the positive outcome of returning to sport surpassed the small number of individuals who did not return, establishing self-discipline and enjoyment of sport as decisive factors in this outcome. Thus, the results indicate that physiotherapists must be aware of psychological factors and patients' goals, and that other health professionals may be needed to help prepare these individuals to return to their preinjury sports level and achieve more satisfactory outcomes after ACLR.

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Authors' contributions

LMR and ACAA were responsible for data collection and, together with the other authors, data analysis. All the authors contributed to conception of the project and writing the manuscript and the final revision was carried out by VGA, VCA, JFM and CFA.

References

1. Alves JAB, Pieranti OP. O Estado e a formulação de uma política nacional de esporte no Brasil. RAE Electron. 2007;6 (1):Art.1. DOI

2. Azevedo MAO, Gomes Filho A. Competitividade e inclusão social por meio do esporte. Rev Bras Cienc Esporte. 2011; 33(3):589-603. DOI

3. Gornitzky AL, Lott A, Yellin JL, Fabricant PD, Lawrence JT, Ganley TJ. Sport-specific yearly risk and incidence of anterior cruciate ligament tears in high school athletes: A systematic review and meta-analysis. Am J Sports Med. 2016;44(10):2716-23. DOI

4. Bjordal JM, Arnøy F, Hannestad B, Strand T. Epidemiology of anterior cruciate ligament injuries in soccer. Am J Sports Med. 1997;25(3):341-5. DOI

5. Feucht MJ, Cotic M, Saier T, Minzlaff P, Plath JE, Imhoff AB, et al. Patient expectations of primary and revision anterior cruciate ligament reconstruction. Knee Surg Sports Traumatol Arthrosc. 2016;24(1):201-7. DOI

6. Müller U, Krüger-Franke M, Schmidt M, Rosemeyer B. Predictive parameters for return to pre-injury level of sport 6 months following anterior cruciate ligament reconstruction surgery. Knee Surg Sports Traumatol Arthrosc. 2015;23(12):3623-31. DOI

7. Ardern CL, Taylor NF, Feller JA, Webster KE. Fifty-five per cent return to competitive sport following anterior cruciate ligament reconstruction surgery: an updated systematic review and meta-analysis including aspects of physical functioning and contextual factors. Br J Sports Med. 2014;48(21):1543-52. DOI

8. Czuppon S, Racette BA, Klein SE, Harris-Hayes M. Variables associated with return to sport following anterior cruciate ligament reconstruction: a systematic review. Br J Sports Med. 2014;48(5):356-64. DOI

9. Everhart JS, Best TM, Flanigan DC. Psychological predictors of anterior cruciate ligament reconstruction outcomes: a systematic review. Knee Surg Sports Traumatol Arthrosc. 2013; 23(3):752-62. DOI

10. Gokeler A, Dingenen B, Hewett TE. Rehabilitation and return to sport testing after anterior cruciate ligament reconstruction: where are we in 2022? Arthrosc Sports Med Rehabil. 2022;4(1): e77-82. DOI

11. Logerstedt D, Di Stasi S, Grindem H, Lynch A, Eitzen I, Engebretsen L, et al. Self-reported knee function can identify athletes who fail return-to-activity criteria up to 1 year after anterior cruciate ligament reconstruction: a Delaware-Oslo ACL cohort study. J Orthop Sports Phys Ther. 2014;44(12):914-23. DOI

12. O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. Acad Med. 2014;89(9):1245-51. DOI

13. Webster KE, Feller JA, Lambros C. Development and preliminary validation of a scale to measure the psychological impact of returning to sport following anterior cruciate ligament reconstruction surgery. Phys Ther Sport. 2008;9(1):9-15. DOI

14. Silva LO, Mendes LMR, Lima POP, Almeida GPL. Translation, cross-adaptation and measurement properties of the Brazilian version of the ACL-RSI Scale and ACL-QoL Questionnaire in patients with anterior cruciate ligament reconstruction. Braz J Phys Ther. 2018;22(2):127-34. DOI

15. Irrgang JJ, Anderson AF, Boland AL, Harner CD, Kurosaka M, Neyret P, et al. Development and validation of the International Knee Documentation Committee Subjective Knee Form. Am J Sports Med. 2001;29(5):600-13. DOI

16. van Meer BL, Meuffels DE, Vissers MM, Bierma-Zeinstra SMA, Verhaar JAN, Terwee CB, et al. Knee injury and osteoarthritis outcome score or international knee documentation committee subjective knee form: Which questionnaire is most useful to monitor patients with an anterior cruciate ligament rupture in the short term? Arthroscopy. 2013;29(4):701-15. DOI

17. Metsavaht L, Leporace G, Riberto M, Sposito MMM, Batista LA. Translation and cross-cultural adaptation of the brazilian version of the international knee documentation committee subjective knee form : Validity and reproducibility. Am J Sports Med. 2010;38(9):1894-9. DOI

18. Marx RG, Stump TJ, Jones EC, Wickiewicz TL, Warren RF. Development and evaluation of an activity rating scale for disorders of the knee. Am J Sports Med. 2001;29(2):213-8. DOI

19. Bardin L. Análise de conteúdo. Lisboa: Edições 70; 1979. 225 p.

20. Minayo MCS. O desafio do conhecimento: pesquisa qualitativa em saúde. 8 ed. São Paulo: Hucitec; 2004.

21. Weinberg RS, Gould D. Fundamentos da psicologia do esporte e do exercício. 6 ed. Porto Alegre: Artmed; 2017.

22. Vidual MBP, Rodrigues FSU, Gomes G, Guerrero KB, Fernandes PT. Relação treinador-atleta. In: Fernandes PT (org.). Interdisciplinaridade na psicologia do esporte. Curitiba: CRV; 2019. p. 93-104.

23. Almeida ST. Envelhecimento bem-sucedido e as aprendizagens no esporte competitivo: uma forma de adaptação de atletas que praticam corrida. Rev Bras Geriatr Gerontol. 2011;14(2):233-9. DOI

24. Dias C, Cruz JF, Fonseca AM. Emoções, stress, ansiedade e coping: estudo qualitativo com atletas de elite. Rev Port Cienc Desp. 2009;9(1):9-23. DOI

25. Tjong VK, Murnaghan ML, Nyhof-Young JM, Ogilvie-Harris DJ. A qualitative investigation of the decision to return to sport after anterior cruciate ligament reconstruction: to play or not to play. Am J Sports Med. 2014;42(2):336-42. DOI

26. Dempsey RL, Layde PM, Laud PW, Guse CE, Hargarten SW. Incidence of sports and recreation related injuries resulting in hospitalization in Wisconsin in 2000. Inj Prev. 2005;11(2):91-6. DOI

27. Lavoura TN, Machado AA. Investigação do medo no contexto esportivo: necessidades do treinamento psicológico. Rev Bras Psicol Esporte. 2008;2(1):1-28. DOI

28. Gonçalves TR, Pawlowski J, Bandeira DR, Piccinini CA. Avaliação de apoio social em estudos brasileiros: aspectos conceituais e instrumentos. Cienc Saude Colet. 2011;16(3): 1755-69. DOI

29. Rodrigues AE, Marostegan PF, Mancini MC, Dalcanale L, Melo ME, Cercato C, et al. Análise da taxa metabólica de repouso avaliada por calorimetria indireta em mulheres obesas com baixa e alta ingestão calórica. Arq Bras Endrocrinol Metab. 2008;52(1):76-84. DOI

30. Nunes CRO, Jaques M, Almeida FT, Heineck GIU. Processos e intervenções psicológicas em atletas lesionados e em reabilitação. Rev Bras Psicol Esporte. 2010;3(4):130-46. DOI