

Effects of a psychological and physiotherapeutic intervention on the occurrence of injuries

Efectos de una intervención psicológica y fisioterapéutica sobre la ocurrencia de lesiones

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Abstract

This study aims to analyse the effects of a psychological intervention focused on motivation and anxiety, in combination with a physiotherapy program, upon the occurrence of injuries. The participants were 22 male soccer players (age = 23.31, SD = 4.24). The instruments used were injury protocol, Competitive State Anxiety Inventory 2 (CSAI-2) and Behavioral Regulation in Sport Questionnaire (BRSQ). The program lasted twelve sessions a periodicity of weeks and with duration of approximately 30-40 minutes each. A pre/post-treatment design with three modalities was used: psychological treatment and physiotherapy (combined modality), physiotherapy and control. The groups are formed randomly with the Windows Excel program. The results on the indication of injury show that the physiotherapeutic treatment and the combined treatment reduce the appearance of injury compared to the control group during the intervention. In the long term (six months after the intervention), only the combined treatment significantly reduced the injury compared to the control group. The combined program produced a reduction of de-motivation levels and external regulation, along with an increase in intrinsic motivation (accomplishment) in comparison to the group who received physiotherapy on its own. Both interventions (combined and physiotherapy alone) were efficient in decreasing anxiety levels, although the combined group was more efficient, as well as being the only one that significantly improved self-confidence levels and intrinsic motivation. Nevertheless, because of the lack of previous literature in this area and because of the methodological difficulties further studies are required.

Key words: Soccer players; injury; psychological intervention; motivation; anxiety.

Resumen

Este estudio tiene como objetivo analizar los efectos de una intervención psicológica centrada en la motivación y la ansiedad, en combinación con un programa de fisioterapia, sobre la aparición de lesiones. Los participantes fueron 22 jugadores de fútbol masculinos (edad = 23.31, SD = 4.24). Los instrumentos utilizados fueron el protocolo de lesiones, el Inventario de ansiedad de estado competitivo 2 (CSAI-2) y el Cuestionario de regulación del comportamiento en el deporte (BRSQ). El programa duró doce sesiones con una periodicidad semanal y con una duración de 30-40 minutos cada una. Se utilizó un diseño pre/post tratamiento con tres modalidades: tratamiento psicológico y fisioterapia (modalidad combinada), fisioterapia y control. Los grupos se formaron aleatoriamente con el programa Excel de Windows. Los resultados sobre la incidencia de lesión muestran que el tratamiento fisioterapéutico y el tratamiento combinado reducen la aparición de lesión respecto al grupo control durante la intervención. A largo plazo (seis meses después de la intervención) únicamente el tratamiento combinado reduce significativamente la lesión respecto el grupo control. El programa combinado produjo una reducción de los niveles de desmotivación y regulación externa, junto con un aumento de la motivación intrínseca (logro) en comparación con el grupo que recibió fisioterapia por sí solo. Ambas intervenciones (combinadas y fisioterapia sola) fueron eficientes para disminuir los niveles de ansiedad, aunque el grupo combinado fue más eficiente, además de ser el único que mejoró significativamente los niveles de autoconfianza y la motivación intrínseca. Sin embargo, debido a la falta de literatura previa en esta área y debido a las dificultades metodológicas, se requieren más estudios.

Palabras clave: futbolistas, lesión, intervención psicológica, motivación, ansiedad.

Introduction

Soccer is currently considered one of the most widely played sports in the world, whilst also being one of the sports that presents highest risk of injury (Noya & Sillero, 2012; Pfirrmann, Herbst, Ingelfinger, Simon, & Tug, 2016). The preventive treatment of injuries has traditionally been approached from a physiotherapeutic approach (Krist, van Beijsterveldt, Backx, & Ardine de Wit, 2013; Nomikos, Nomikos, & Kores, 2010; Shivachev & Bogomilova, 2020). The most current trends indicate the need to perform preventive exercises to improve mobility and balance (Ishøi, Krommes, Husted, Juhl, & Thorborg, 2020; Meurer, Silva, & Baroni, 2017; Thacker, Gilchrist, Stroup, & Kimsey, 2004), increase strength or correct and take care of body hygiene to reduce the risk of injury (Rojas-Inda, 2018). A meta-analysis carried out by Al Attar and Alshehri (2019), indicates evidence that the combination of these exercises reduces the risk of injury. However, sports massage is considered the most popular preventive treatment option among athletes, trainers and sports physiotherapists (Brummitt, 2008). This therapy has been shown to have important effects on the body, for example, increasing blood flow and reducing muscle tension (Choroszewicz, Dobosiewicz, & Badiuk, 2020; Gasibat & Suwehli, 2017) and in the mind, for example, decreasing anxiety and improve mood (Brummitt, 2008; Hemmings, 2001; Pa, Salamuddin, Zin, & Lian, 2020). These changes decrease the risk of injury (Weerapong, Hume, & Kolt, 2005).

On the other hand, psychological treatment has also been used to prevent injuries (Cano, 2012). Although there have been studies, since the seventies, about the effects of psychological interventions on sports injuries, it could be said that it wasn't till the eighties and nineties that a larger body of empirical research started to appear addressing this problem (Olmedilla & García-Mas, 2009). Olmedilla and Garcia Mas (2009), in their global psychological model about sports injuries, consider that there are three basic areas where psychology can be applied to the study of injuries: 1) to analyse the psychological factors associated to the players' vulnerability to injury, 2) to study players' coping and perceptions in relation to the psychological component of the injury and 3) to focus on emotional and psychological reactions of the injured player, either to associate these aspects to adherence to rehabilitation programs or because of the changes in players' moods during the recuperation process.

In relation to the psychological programs designed regarding injuries, most of the studies focus on the

recovery of the injured player (Christakou & Zervas, 2007; Coronado et al., 2020; Gennarelli, Brown, & Mulcahey, 2020; Holguín-Ramírez, Ramos-Jiménez, Quezada-Chacón, Cervantes-Borunda, & Hernández-Torres, 2020; Yoon & Yoon, 2014), although more and more research is focusing on injury prevention (Edvardsson, Ivarsson, & Johnson, 2012; Ivarsson, Johnson, Andersen, Fallby, & Altemyr, 2015; Noh, Morris, & Andersen, 2007; Olmedilla-Zafra, Rubio, Ortega, & García-Mas, 2017; Tranaeus, Ivarsson, & Johnson 2015; Tranaeus et al., 2015). Two systematic reviews concluded that psychological prevention strategies have a high potential to reduce the risk of injury (Ivarsson et al., 2017; Tranaeus, Ivarsson, et al., 2015). Specifically, goal setting (Davis, 1991; Johnson, Ekengren, & Andersen, 2005; Tranaeus, Johnson, et al., 2015), visualization (Davis, 1991), biofeedback (Edvardsson et al., 2012; Rusciano, Corradini, & Stoianov, 2017), mindfulness (Holguín-Ramírez et al., 2020; Ivarsson et al., 2015), acceptance and commitment therapy (MAC) (Ivarsson et al., 2015), attribution training (Johnson et al., 2005), self-confidence training (Johnson et al., 2005; Tranaeus, et al., 2015), autogenic training (Noh et al., 2007), cognitive-behavioural therapy (Coronado et al., 2020; Edvardsson et al., 2012), abdominal breathing (Kolt, Hume, Smith, & Williams, 2004) or control of emotions (Davis, 1991; Tranaeus, Johnson, et al., 2015) are some of the most analyzed strategies. Instead, these strategies have been little used in sport to prevent injuries. A systematic review by Gledhill, Forsdyke and Murray (2018), indicates that there is a predominance of interventions based on stress management. This is so because most of the works are conceptually based on the Stress and Injury Model of Andersen & Williams (1998). Other variables that have been studied to a lesser extent have been competition anxiety (Fernandez Garcia et al., 2014; Johnson et al., 2005; Olmedilla Zafra, Álvarez, Ortín Montero, & Blas Redondo, 2009; Ortega et al., 2018), motivation (Kerr et al., 2004), coping strategies (Edvardsson et al., 2012; Reeves, Nicholls, & McKenna, 2011), engagement in risk behaviours (Griffith et al., 2006; Rubio et al., 2014), emotional processes (Brewer, 2003; Rubio et al., 2014) and mood (Olmedilla et al., 2014).

Both treatments (ie, physiotherapeutic and psychological), separately, appear to have effects on the incidence of injury or psychological preparedness. Instead, under the knowledge of the authors of this work, there is currently no literature that addresses the effects of a treatment that combines both techniques to reduce the risk of injuries in sport. Therefore, the main objective of this work is to verify the efficacy of a

physiotherapy program with respect to physiotherapy program together with psychological intervention to reduce footballers' injuries. In addition, as secondary aim, it is intended to evaluate the change produced in the variables object of intervention (i.e. motivation and anxiety) in both treatments.

Methods

Participants

Our sample consisted of 22 male soccer players belonging to a third division club from Madrid. In relation to educational level, 36.4% had completed secondary school, 31.8% had completed high school, 18.2% had gone to university and 13.6% had a master degree. Of them 59% were working at the time of the study, about a third part of participant (31%) were studying and 10% were exclusively dedicated to playing soccer. The average age was 23.31 years old ($SD = 4.24$; range [18-32]). On average they had been playing the sport for 17.54 years ($SD = 4.64$) and had been playing in the same category for 3.31 years ($SD = 3.06$).

The instruments used were the following:

1. Injury protocol. The F-MARC questionnaire (Fuller et al., 2006) proposed by UEFA was used. The questions consist of 9 questions. The questions were specifically about: date of injury, injured body part, type of injury, diagnosis, previous injury, when the injury occurs and the cause of the injury.

2. Competitive State Anxiety Inventory 2 (CSAI-2, Martens, Burton, Vealey, Bump, & Smith, 1990). The Spanish version by Taberner and Marquez (1994) was used. This inventory is composed by 27 items and is scored on a 4 point Likert type scale, it assesses three factors: cognitive anxiety (9 items), somatic anxiety (9 items) and self-confidence (9 items). The scores for each dimension range between 1 and 4. In this study, Cronbach's alphas were: 0.85 for cognitive anxiety, 0.84 for somatic anxiety and 0.72 for self-confidence.

3. Behavioural Regulation in Sport Questionnaire (BRSQ, Lonsdale, Hodge, & Rose, 2008). The version by Moreno-Murcia, Marzo, Martínez-Galindo and Conte (2011) was used. The questionnaire is composed by a total of 36 items that measure 8 dimensions regarding the continuum of motivation (demotivation, external regulation, introjected regulation, identified regulation, integrated regulation, intrinsic motivation for knowledge, intrinsic motivation to accomplish and intrinsic motivation for stimulation). Scores are marked on a 7-point Likert type scale, the scores for each dimension range between 1 and 7. In the current

study, Cronbach's alphas ranged between 0.80 for integrated regulation to 0.94 for intrinsic motivation to accomplish.

Design and Procedure

A randomized controlled trial design was used as the study had a control group and the players were randomly assigned to the different groups (Lazcano-Ponce et al., 2004). The Excel for Windows randomization utility was used. The sample was divided into three groups: group 1 (control group; $n = 7$) only completed the questionnaires, received no intervention, group 2 ($n = 7$) underwent a physiotherapy intervention and group 3 (combination of intervention; $n = 8$), in addition to receiving physiotherapy intervention as well as psychological intervention.

A psychologist accredited by the Official College of Psychologists with extensive experience in this sport applied the psychological intervention. A physiotherapist specialized in sports recovery techniques applied the physiotherapeutic intervention. The same professionals always applied these interventions.

Brief description of the programs

- Physiotherapy treatment: The aim of the physiotherapy treatment was to physically and psychically prepare the body for training and competition. A warming massage with rather rapid movements was used to activate circulation and warm up the muscles. The manoeuvres used were: rubbing, kneading and percussion. The massage reduces the energy expenditure used by the athlete in an active warm-up. The aim was to increase the temperature and circulation of the muscle groups that were to intervene in the subsequent activity. Especially work was done on the trunk and lower extremities in field players and the whole body in goalkeepers. The manoeuvring speed was more or less fast and the depth was medium. In addition, the joints were rubbed since the massage stimulates the production of synovial fluid (a nutrient for the joints). With this, if there was an overload in it, we increased the flow of blood and lymph favouring the restoration of its normal function. This massage influences the nervous system, increases the speed of motor response.
- Psychological treatment: The psychological treatment aimed to increase all forms of self-determined motivation and to decrease the less self-determined motivation forms, as well as to decrease anxiety levels in the players and to increase their self-confidence.

Table 1 shows a description of the sessions. In relation to motivation, techniques associated to stabling aims and full attention/concentration (mindfulness) were used. To improve self-confidence a number of techniques were used, such as lists of positive and negative personal and sporting adjectives along with personal and sporting aims, analysis of psychological characteristics depending on position on the playing field, triple column technique (stimuli, thoughts and emotions) and positive reinforcement and self-instructions. Finally, aiming to reduce anxiety, Jacobson's relaxation technique was included, along with breathing and visualization, cognitive restructuring, self-dialogue and emotional regulation (identification, discrimination, labelling and emotional expression through different techniques such as life-line, attachment, letter to child and to future self).

The sessions for both treatments (physical and psychological) lasted between 30-40 minutes with a weekly frequency and were applied in person and individually during 12 consecutive weeks. The players from Group 3 received sessions for the psychological and physiotherapy interventions on different days of the week.

Before the intervention, before the first game of the second round of the season, a self-report questionnaire was applied to the players to assess anxiety and motivation. Twelve weeks later, just before the game, the players filled out the same questionnaires again. In addition, an injury protocol was administered daily after each training / match for 15 months (during the 6 months before the intervention, during the 3 months after the intervention, and during the 6 months after the intervention). This protocol should only be completed in case of injury. Of the same, during the vacation period the daily protocol was administered through a mobile application so that they could complete it. The present study obtained approval from the Ethics Committee of the Rey Juan Carlos University (registry number: 190720167016), respecting the ethical principles of the Convention from Helsinki and all participants gave written informed consent.

Statistical analysis

All statistical analyses were carried out using SPSS 21 (Armonk, NY, USA) software. Descriptive analyses were performed for the variables of interest (motivation, anxiety, number and type of injury) as were internal consistency analyses, using Cronbach's alpha. Finally, mean scores were compared using non-

parametric tests (Mann-Whitney U test) between all three groups (control/physiotherapy, control/combined, physiotherapy/combined) with the aim of analysing the pre-post differences for injuries and for both motivation and anxiety (secondary aim).

Results

Evolution of injury history

Table 2 shows the intra and intergroup effects of the different intervention modalities on injury history.

As Table 2 shows, no statistically significant differences were found in the player's injury histories for the three groups in the six months before the intervention. This lack of differences remained during the intervention, but six months after the intervention, statistically significant differences were found between the control and the combined intervention groups, with fewer lesions in the combined group (specifically no injuries). Table 3 shows the specific evolution of injuries for all the players belonging to each group and Table 4 shows the type of injury found in each player.

As can be seen in the table, whilst the control group and the physiotherapy group had sporting injuries before and after the intervention (although fewer among the physiotherapy group), the number of injuries in combined group decreased during the intervention program, and they remained injury free during the six month follow-up.

Change in motivation, anxiety and self-confidence variables

Table 5 shows the post-pre intervention differences for motivation, anxiety and self-confidence as assessed in this study. The results for the Mann-Whitney analysis are also shown, as well as the statistical significance for each of the possible comparisons between the groups (control/physiotherapy, control/combined, physiotherapy/combined).

In relation to the intergroup effects on the pre-post intervention differences, statistically significant differences were found for demotivation and external regulation in the physiotherapy and combined groups. In both cases, the combined group reduced the scores after the intervention, whilst the physiotherapy group presented an increase of these scores after the program. Regarding identified and integrated regulation, differences were also found for both the physiotherapy group and the combined group in comparison to the

Table 1. Description of session and techniques used in the psychological intervention.

Variable	Technique	Session n.	Duration
Motivation	Establishing aims	2	40 min
	Full attention / Concentration (mindfulness)	2	40 min
Self-confidence	List of positive and negative personal and sports adjectives, personal and sports aims, analysis of psychological characteristics depending on position on the playing field, triple column technique (stimuli, thoughts and emotions), positive reinforcement and self-instructions.	2	40 min
Anxiety	Jacobson relaxation technique, breathing and visualization.	2	40 min
	Cognitive re-structuring and self-dialogue	2	40 min
	Emotional regulation: identification, discrimination, labeling and emotional expression through different techniques such as life-line, attachment, letter to child and to future self.	2	40 min

Table 2. Intra and intergroup effects of the different intervention modalities on injury history.

	Group 1 M(DT)	Group 2 M(DT)	Group 3 M(DT)	Intergroup Effects			Intragroup Effects		
				G1/G2 U (p)	G1/G3 U (p)	G2/G3 U (p)	G1 (p)	G2 (p)	G3 (p)
Injury									
(a) Pre-treatment	.57(.79)	.42(.53)	.50(.76)	23.00(.83)	26.50(.84)	28.00(1)	(a/b).32	(a/b).16	(a/b).18
(b) During treatment	.71(.76)	.14(.37)	.13(.35)	13.50(.09)	15.00(.07)	27.50(.92)	(b/c).56	(b/c).56	(b/c).31
(c) Post-treatment	.43(.53)	.28(.49)	.00(.00)	21.00(.59)	16.00(.04*)	20.00(.11)	(a/c).32	(a/c).56	(a/c).10

Group 1 (G1): Control group, Group 2 (G2): Physiotherapy group; Group 3 (G3): Physiotherapy & psychology group; *p<0.05; **p<0.01.

Table 3. Individual injury evolution per player in each of the intervention groups.

	Group 1			Group 2			Group 3		
	pre	during	post	pre	during	post	pre	during	post
Payer 1	0	0	0	0	0	1	0	0	0
Player 2	0	0	0	1	1	0	1	0	0
Player 3	1	1	1	1	0	0	0	0	0
Player 4	1	1	0	0	0	0	0	0	0
Player 5	0	0	1	1	0	1	2	0	0
Player 6	2	2	1	0	0	0	0	0	0
Player 7	0	1	0	0	0	0	1	1	0
Player 8	-	-	-	-	-	-	0	0	0
Total	4	5	3	3	1	2	4	1	0

Group 1: Control group, Group 2: Physiotherapy group; Group 3: Physiotherapy & psychology group; Pre: Six months before intervention; during: during intervention; post: six months after intervention. *p<0.05; **p<0.01

control group. The scores (pre-post) for both types of motivation were reduced in the control group, stayed the same for the physiotherapy group and increased in the combination group. In relation to the intrinsic motivations, significant pre-post differences were found for all types of intrinsic motivation between the control and the combined group, with scores being lowered for the control group and increasing in the combination group after the intervention. In the case of intrinsic motivation to accomplish additional pre-post differences were found between the physiotherapy and

combination groups, with a reduction for the former and an increase in the latter.

Significant pre-post differences were found for both somatic and cognitive anxiety in all groups; the intervention groups showed a reduction in all types of anxiety after the program, whilst the control group showed an increase of these variables.

In relation to self-confidence, pre-post differences were found between the combined group and the control group, with post-intervention increases for the combined group and reductions for the control group.

Table 4. Individual type of injury per player in each of the intervention groups.

	Group	Pre	Injury		During	Injury		Post	Injury
Player 3	1	1	Back problems		1	Back problems		1	Back problems
Player 4	1	1	Bone edema		1	Sprain		0	
Player 5	1	0			0			1	Broken 5th metatarsal
Player 6	1	2	Groin pain	Tear in abductor	2	Groin pain	Rip in abductor	1	Groin pain
Player 7	1	0			1	peroneal tear		0	
Player 1	2	0			0			1	sprain
Payer 2	2	1	Sprained ankle		1	Luxation of the peroneal tendon		0	
Player 3	2	1	Bone edema		0			0	
Player 5	2	1	Beginning of groin pain		0			1	Beginning of groin pain
Player 2	3	1	Broken 5th metatarsal		0			0	
Player 5	3	2	Tear in abductor	Beginning of groin pain	0			0	
Player 7	3	1	Fractured menisc		1	Shoulder luxation		0	

Group 1: Control group, Group 2: Physiotherapy group; Group 3: Physiotherapy & psychology group; Pre: Six months before intervention; during: during intervention; post: six months after intervention. *p<0.05; **p<0.01

Table 5. Intergroup effects of the different intervention modalities on motivation and anxiety variables.

Difference post-pre	Group 1 M (SD)	Group 2 M (SD)	Group 3 M (SD)	G1/G2 U (p)	G1/G3 U (p)	G2/G3 U (p)
Demotivation	.68(1.60)	.57(.74)	-.75(.87)	18.50(.42)	14.50(.09)	6.00(.00*)
External reg.	.89(1.84)	.25(.59)	-.81(1.08)	20.50(.60)	13.50(.08)	8.50(.02*)
Introjected reg.	-.18(.62)	.60(1.04)	.25(.93)	11.50(.09)	18.00(.24)	23.00(.56)
Identified reg.	-.78(.56)	.00(.67)	.62(1.00)	9.00(.04*)	1.50(.00**)	17.00(.20)
Integrated reg.	-1.00(1.04)	.07(.83)	.37(.42)	8.00(.03*)	1.50(.00**)	23.50(.59)
MI_ accomplish	-.93(.74)	-.53(.80)	.59(.99)	16.50(.30)	1.50(.00**)	8.50(.02**)
MI_stimulation	-.71(.69)	-.07(1.51)	.43(.59)	10.00(.06)	3.00(.00**)	24.50(.68)
MI_knowledge	-.28(.33)	.10(1.26)	.68(.53)	20.00(.53)	1.50(.00**)	14.00(.10)
Somatic anxiety	.62(.50)	-.19(.53)	-.40(.37)	7.00(.02*)	1.00(.00**)	25.00(.72)
Cognitive anxiety	.74(.45)	-.30(.29)	-.79(.47)	.50(.02*)	.00(.00**)	12.00(.06)
Self- confidence	-.31(.22)	.00(.47)	.42(.36)	14.00(.17)	1.00(.00**)	12.00(.06)

M= Mean, SD= Standart deviation, U= Mann-Whitney U test, Group 1 (G1): Control group, Group 2 (G2): Physiotherapy group; Group 3 (G3): Physiotherapy & psychology group; *p<0.05; **p<0.01.

Relations between the evolution of injuries and the change in the motivational and anxiety variables in the combined group.

Based on the information regarding the evolution of injuries in each of the players of the combined intervention group (Table 3), we proceeded to analyse the differences between the motivational and anxiety variables in the different groups in relation to injuries. Within the combined intervention group (physiotherapy and psychological), two groups were found in relation to the evolution of injuries: Group A) players who had not been injured neither before nor after the intervention (n = 5) and Group B) players who had been injured before the intervention but who had not been injured after the intervention (n = 3). The

pre-post analysis between both groups for each of the variables (motivation, anxiety and self-confidence) showed differences in relation to somatic anxiety, so that players from Group B (injured before intervention) had greater reductions (U = 0.500, p = 0.034) in their somatic anxiety levels in comparison to Group A (no injury before the intervention).

Discussion

The main objective of this work has been to verify the efficacy of a physiotherapy program with respect to a physiotherapy program together with psychological intervention to reduce footballers' injuries. In addition, it was intended to evaluate the change produced in the

variables object of intervention in both treatments. Regarding the appearance of injuries, the results show that physiotherapy treatment has positive effects in reducing injuries in the short term, while combined treatment has positive effects in the short and long term. In particular, the intervention program here used, designed specifically by our research team, focuses on motivation and anxiety variables associated to injury prevention, based on the Stress and Injury Model by Andersen and Williams (1988).

Considering the specific effects of the program on anxiety and motivation, the results show a positive effect of the combined intervention with respect to the control group. Specifically, a reduction in anxiety levels and an increase in more self-determined motivation (i.e. identified regulation, integrated regulation, intrinsic motivation of stimulation, accomplish and knowledge) and self-confidence were observed. The novelty of this work is the comparison of a physiotherapeutic intervention versus a multidisciplinary / combined program. Therefore, whilst physiotherapy on its own increased demotivation and external regulation, the multidisciplinary program statistically reduced these variables. Also, the latter managed to increase the internal motivation for accomplishment versus the reduction shown in the physiotherapy alone group. These findings can be explained by the characteristics of the implemented psychological program. While some authors use only visualization techniques to improve the motivation of the players (Munroe-Chandler et al., 2005; Munroe-Chandler & Hall, 2004), here a combination of techniques is carried out (i.e. Mindfulness goals and techniques). Previous reviews pointed to the need to implement various techniques to increase the effectiveness of programs (Gledhill et al., 2018; Ivarsson et al., 2017; Tranaeus, Ivarsson, et al., 2015).

In relation to anxiety, both intervention groups improved in comparison to controls, although the results were stronger for the combination group. The fact that the physiotherapy intervention program was able to reduce anxiety would be expected and has been shown in previous literature (Boguszewski et al., 2012; Campos, 2015; Pa et al., 2020). Specifically, the massage technique seems to be effective both physically (i.e. reduces muscle tension and fatigue) (Choroszewicz et al., 2020; Gasibat & Suwehli, 2017) as well as at a psychological level (reduces somatic and cognitive anxiety) (Boguszewski et al., 2012; Pa et al., 2020; Suarez & Moreno, 2014). Suarez and Moreno (2014) point out that the popular of this technique in the sports field it is due, in addition to therapeutic effects, to their effects on security, well-

being, motivation and performance in players. In this context, some authors consider it to have stronger psychological than physical effects (Robertson et al., 2004); others even consider it to only have psychological rather than physical effects (Moyer et al., 2004).

Regarding the beneficial effects of the psychological intervention on the reduction of anxiety, it is a well-known fact that relaxation and training in specific skills is effective in the reduction of stress levels and anxiety (Johnson et al., 2005; Marshall & Gibson, 2017). An interesting result that separates the psychological intervention is that the combined intervention was the only one to increase self-confidence among the players. Previous literature has found, in general, that the use of visualization of images produces positive results upon self-confidence (Kramar, 2008; Yoon & Yoon, 2014), although there are some contradictory results (Ramsey et al., 2010). In the psychological intervention here analyzed the improvements found in self-confidence could be due to the inclusion of additional techniques, such as cognitive re-structuring or other more specific techniques such as creation of lists of positive and negative personal and sports adjectives.

In general, the results from the current study show a clearly positive effect for the combined group, in comparison to the others, in relation to the evolution of injuries. The additional effects of the psychological intervention on top of the physiotherapy can be summarized as a reduction of the levels of demotivation and external regulation along with a significant increase in intrinsic motivation for accomplishment. The more relevant question is whether these differentiating results could be the cause of the significant decrease in injuries in this group in comparison to the rest. Previous literature shows that most psychological programs are effective in injury prevention (Gledhill et al., 2018; Ivarsson et al., 2017; Tranaeus, et al., 2015). However, these works analyze the incidence of injuries through the efficacy of psychological techniques and not through the study of specific psychological variables. Some studies have found significant reductions in the number of injuries after the relaxation training, cognitive techniques and emotional expression or mindfulness programs (Coronado et al., 2020; Holguín-Ramírez et al., 2020; Ivarsson et al., 2015; Kolt et al., 2004). In contrast, Edvardsson et al. (2012) found no differentiating effects upon the reduction of sports injuries after the application of visualization, relaxation and cognitive-behavioral techniques techniques. Considering the psychological variables as such, the conceptual asso-

ciations between anxiety and injuries are well known (Kerr & Goss, 1996). On the other hand the possible effects of motivation on injuries, to our knowledge, no studies have been carried out specifically examining this question, although its relevance has been highlighted in relation to guaranteeing adherence to physiotherapy treatment (Mercado et al., 2015).

In this context, it is also necessary to keep in mind that the psychological intervention, in the combined group, was additional to physiotherapy treatment. Our data shows that although the combined group is the one that obtained statistically significant results, there were also positive clinical effects found for the physiotherapy group in comparison to controls. The analysis of the data seems to indicate that the physiotherapy intervention has a short term effect upon injuries, as it is an intervention, whilst at the same time its preventive effects are fewer. Within sports physiotherapy, overloading and injuries play a fundamental role. Nevertheless, it is also certain that there is no consolidated body of knowledge in this regard, partially due to the lack of consensus relating to the concept of sports injury (Bahr, 2005). Among the very different types of physiotherapy treatments, massage therapy is par excellence one of the most frequently used in soccer, especially because of its uses in muscle overloading (de Hoyo et al., 2013), which, when considering the relation of overloading and injuries, would explain the reduction of the number of injuries in the physiotherapy group during the intervention.

In the current study there are a number of limitations to take into consideration when interpreting the results. One of them refers to the format of the combined program (physiotherapy and psychological), although it allows us to explore the additional contribution of the psychological treatment to physiotherapy in comparison to physiotherapy on its

own, it does not allow us to consider the psychological intervention independently. The lack of a fourth group dedicated exclusively to psychological intervention alone is because of a need to choose, because of the sample size, between two intervention groups and because the soccer clubs require physiotherapy to be a mandatory intervention.

Another limitation is that the sample size was small, as we only counted on one football team, as we wanted to control for trainer's leadership style variables, training load or competition results, among others. It should be considered that, precisely because of wanting to control for these variables, this is the main procedure used in other studies (de la Vega Marcos et al., 2011; de La Vega Marcos et al., 2008), therefore, sample size is similar to previous literature. Finally, we should point out that more studies are needed, which should include other categories, age groups, and women, so as to improve generalizability of results to other demographic groups.

In spite of these limitations, the results of the study show the importance of designing combined programs that include both psychological interventions and physiotherapy, because of the multicausal nature of injuries (Olmedilla & Garcia-Mas, 2009). It is therefore important to create multidisciplinary work groups in sports centers with the aim to be able to provide a more exhaustive approach. Although, given the current design, it is difficult to demarcate the role of each of the components (motivation and anxiety) of the psychological intervention on the prevention of injuries.

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