Comparison of the Psychological Profile of Ankle Sprain Between Coper and Chronic Ankle Instability Individuals: Cross-sectional Study

Shima Babakhanian

University of Tehran Faculty of Physical Education and Sport Science

Mohammad Hani Mansori

University of Tehran Faculty of Physical Education and Sport Science

Mohammad Karimizadeh Ardakani (✉ m.karimizadeh@ut.ac.ir)

Tehran University: University of Tehran

Homa Naderifar

Hamadan University of Medical Sciences

Research

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Abstract

Background: The aim of this study was to compare the psychological parameters in Coper individuals and people with chronic ankle instability (CAI).

Methods: This study was a cross-sectional and comparative study. Sixty elite athletes, from multiple athletic disciplines, who have suffered from lateral ankle sprains at least once in the last two years, were selected as research subjects and were divided into two groups: Copers (n = 30) and CAI (n = 30). Classification of CAI, and coper groups were done by AJFAT, CAIT and FAAM self-report questionnaires. Athletes' psychological characteristics were measured using the Ottawa Mental Skills Assessment Tool (OMSAT-3). Multivariate analysis of variance (MANOVA) and independent t-test were used to evaluate the differences between groups at a significance level of 0.05.

Results: The results showed there was a significant difference between the two groups in Goal setting, Self-confidence, Commitment, Relaxation, Fear control and Coping with stress, Focusing, Refocusing, and Mental practice ($P < 0.05$). And Coper athletes scored higher than ankle instability athletes. But there were no significant differences between the two groups in the following parameters: Inactivation, Imagery, and Competition planning skills ($P < 0.05$).

Conclusion: The findings showed that athletes with CAI scored lower than Coper athletes on psychological exams. Given the importance of prioritizing the mental components of goal setting, imagery, relaxation, activation, and self-confidence, the design of the competition should be a priority for rehabilitation. Therefore, coaches and sports experts are recommended to focus and improve mental skills in athletes who suffer from sports injuries, to reduce the occurrence of repetitive sports injuries.

Background

The risk of injury can act as a deterrent to future participation in athletic activities (1). Lateral ankle sprain is the most common musculoskeletal injury in the physically active population and is highly prevalent in the general population. This prevalence is significant and leads to the cost of health care for injuries (2). The cost of treating and diagnosing lateral ankle sprains was estimated at approximately \$4.5 billion in 2015, up from \$2 billion in 1984. It also has a high prevalence rate of over 2.15 per 1,000 people per year and more than half of all ankle sprain injuries that are reported in high school and college games in the United States (3).

A lateral ankle sprain is a common orthopedic injury. People with ankle sprains who have responded to conservative treatment have no recurrent or unstable symptoms and engage in high-level activities without recurrent injury or loss of function (turning, jumping and e.g) return and function like non-injured people, known as Coper (4). CAI is a term used to describe perceived ankle awareness for "giving way" or weak and unstable ankles (5-7). CAI is an important risk factor for ankle sprain re-injury and can lead to one or a combination of mechanical and functional defects (8). Despite the preventive and rehabilitation approaches, the relevant data show that the rate of ankle injury has increased in 10 years, from 2.8 per

1000 cases in 2000 to 17.5 in 2010 (9). To evaluate the quality of life of people with ankle sprain injury, research has been conducted, which can be referred to the study of Haddadi et al 2020 aimed at assessing and comparing the social and psychological aspects of health-related quality of life in subgroups of people with CAI. The results showed that patients with MAI and FAI were more afraid of re-injury in daily life activities and sports activities (10). Kosik et al. 2020 examined the quality of life related to local and global ankle health in participants in individuals with and without CAI and Coper, and the results showed that CAI can measure HRQOL outcomes. This includes pain, fatigue, sleep disturbance, anxiety, depression and inability to participate in social roles and activities. In middle-aged adults (11). Quality of life is related to health, the performance of daily life, and personal assessment of well-being, which includes five broad dimensions which includes, physical health, mental health, daily activity, role in activities, and general perceptions of health (12). In a study comparing the health-related quality of life with people with functional FAI ankle instability, Brent et al. found that people with FAI had lower HRQOL and more functional limitations, and a positive association between HRQOL and Functional limitations was identified. This suggests that ankle defects may reduce overall HRQOL (13). In people with CAI, the global and local function is reduced. Despite identifying functional deficits in patients with CAI, Houston et al. have conducted further studies to determine the effect of CAI on the multidimensional view of health-related quality of life. People with CAI reported decreased performance and increased fear of re-injury compared to healthy control participants. Findings suggest that health-related quality of life should be assessed during the rehabilitation process of people with CAI (14).

Examining the differences between Coper's individuals and chronic instability can help to determine the factors and risk factors associated with the development of chronic ankle instability. One of the important dimensions of quality of life and the scientific dimension of sports is the subject of psychology. Studies to date have looked at functional differences and quality of life in people with functional instability, susceptible, healthy, and Coper. This leads to a lack of understanding of the psychological factors that develop chronic ankle instability, and the study of psychological factors that develop this injury can help to design exercises and implement prevention mechanisms in these people (15). Because one of the factors that can perform an important role in rehabilitation demand as well as a risk factor in causing injury is psychological factors. Findings show that having higher levels of mental and psychological skills among elite players can be one of the reasons for their success in competitions (16). Consequently, the role of mental skills in achieving maximum performance cannot be ignored (17). Accordingly, this study intends to compare psychological indicators in Coper and CAI and finally to the relationship between the components affecting the development of ankle functional instability such as ankle giving way, characteristics practical on these people.

Methods

Participants

The present study was a cross-sectional descriptive and comparative study. Sixty elite men athletes, were selected as research subjects according to the inclusion criteria, and were divided into two groups of

Coper (n = 30) and CAI (n = 30) by the AJFAT and CAIT and FAAM self-report questionnaires. The elite athlete in this study is defined as a person who participates in sports activities at least three times a week, each time for more than one hour. Inclusion criteria included having at least one history of acute ankle sprain in the past two years, leading to pain and swelling and temporary loss of function, men over the age of 18 years, completed the consent form to participate in the study. Exclusion criteria for participants younger than the study target, no history of ankle sprain in the past two years, and any dissatisfaction with completing the questionnaire.

Ankle Joint Functional Assessment Tool (AJFAT): The AJFAT Questionnaire was used to differentiate Coper individuals and those with chronic instability ankle. Participants selected responses that best describe ankle use using the following scale: much less than the other ankle, slightly less than the other ankle, Equal in amount to the other ankle, slightly more than the other ankle, or much more than the other ankle. Each answer is assigned a score between 0 and 4. Score values were unknown to participants. Higher scores indicate higher levels of symptoms or more functional instability with functional limitations. The maximum score in this assessment tool is 48. Experimental data show that AJFAT has test reliability (internal correlation coefficient of 0.94) and accuracy (standard measurement error of 1.5) (18). A score of > 22 is known as Coper and a score of <22 is known as the CAI group in the AJFAT questionnaire.

Cumberland Ankle Instability Tool (CAIT)

Another method of assessing ankle functional instability is the score a person receives from the CAIT questionnaire. The range of performance stability score in this questionnaire is between 0 and 30, in which a score less than 24 indicates CAI. Also, people who have a history of the first ankle sprain, but do not have symptoms and subsequent problems of functional instability and have a score greater than or equal to 24 in this questionnaire were considered as Cooper individuals (19).

Foot and Ankle Ability Measure (FAAM)

The FAAM comprises the separately scored 21-item ADL and 8-item sports subscales. Each item is scored on a 5-point Likert scale anchored by 4 (no difficulty at all) and 0 (unable to do). Item score totals, which range from 0 to 84 for the ADL subscale and from 0 to 32 for the sports subscale, are transformed to percentage scores. A higher score represents a higher level of function for each subscale (20).

The Ottawa mental skills assessment tool (OMSAT-3)

In 2001, Salmela et al. developed the OMSAT-3 Mental Skills Assessment (OMSAT-3), the third version of the Ottawa Mental Skills Assessment Tool. This test is one of the most comprehensive tests of athletes' mental health and includes 48 questions in the form of a 7-level Likert scale (options completely disagree, disagree, somewhat disagree, disagree/disagree, somewhat agree, agree, strongly agree that is awarded points 1 to 7, respectively), which is 12 mental or psychological skills in three groups of basic psychological skills (goal setting, confidence and motivation), psychosomatic skills (stress reaction, fear

control, relaxation and activation) and cognitive skills (focus, refocus, imagery, mental practice and competition planification) are measured (21). (OMSAT-3) significant differences between athletes at the level of competition and elite, and its scales have acceptable internal reliability and time stability.

Evaluation

First, eligible individuals were asked to attend a briefing session to explain the purpose of the research. Then, people who knowingly and consciously intended to participate in the study entered the study. Participants were asked to provide the researcher with age, height, weight, body mass index, and, if desired, email and contact information. Participants with inclusion criteria were given a standard health history questionnaire consisting of questions about the last ankle sprains in the past two years, ankle ability during various activities. After completing the initial process of determining the statistical sample of the research, the eligible participants of this study were asked to fill in the ankle joint function evaluation AJFAT and CAIT in full accuracy. In addition, participants completed the FAAM to quantify functional limitations. The approximate time to complete questionnaires was estimated at 25 minutes. Finally, participants completed the Mental Skills Assessment Questionnaire (OMSAT-3), which should answer one of these seven options based on their current or past status in competitions and training. After completing the information and questionnaire, the data were collected and entered into Excel spreadsheet software.

Statistical Analysis

The statistical method used in the present study included descriptive and inferential statistics. The normality of all demographic information and research variables was determined based on the results of Shapiro-Wilk test. We found that all demographic information and information related to the questionnaires were naturally distributed ($P < 0.05$). Due to the normality of data distribution, multivariate analysis of variance (MANOVA) and independent t-test were used to compare the mental skills of the two groups at a significance level of 0.05. All statistical analyzes were performed using SPSS version 24.

Results

In the descriptive statistics, the mean and standard deviation for the demographic information of the participants as well as the score of the AJFAT, CAIT and FAAM self-declared questionnaires are listed in Table 1. As can be seen in Table 1, the results of independent t-test showed that there was no significant difference between the two groups in terms of height, weight, age, body mass index and history of exercise ($P > 0.05$). Coper group obtained a score of 25.50 and CAI group received a score of 18.43 in the AJFAT questionnaire. Also coper group obtained a score of 26.50 and CAI group received a score of 20.23 in the CAIT questionnaire, which showed a significant difference between the two groups ($P < 0.05$). We observed a significant difference for both the FADI-ADL ($T = 4.897$, $P = 0.001$) and FADI-Sport ($T = 4.874$, $P = 0.001$) scores in two groups.

Table 1
Characteristics and personal characteristics of the subjects

Variables	Groups	Mean $\pm$ SD	T	P
Age (y)	Coper	24.68 $\pm$ 1.90	1.391	0.170
	CAI	23.96 $\pm$ 2.98		
Weight (kg)	Coper	77.83 $\pm$ 4.21	1.139	0.259
	CAI	76.60 $\pm$ 4.17		
Height (cm)	Coper	181.03 $\pm$ 4.06	-1.118	0.268
	CAI	182.10 $\pm$ 3.28		
BMI (kg/m ²)	Coper	21.50 $\pm$ 1.18	1.475	0.146
	CAI	21.04 $\pm$ 1.23		
History of sports activities	Coper	4.76 $\pm$ 1.33	-1.411	0.164
	CAI	5.26 $\pm$ 1.41		
AJFAT	Coper	25.50 $\pm$ 1.90	13.160	0.001*
	CAI	18.43 $\pm$ 2.23		
CAIT	Coper	26.50 $\pm$ 1.25	13.379	0.001*
	CAI	20.23 $\pm$ 2.23		
FAAM-ADL	Coper	96.55 $\pm$ 2.93	4.897	0.001*
	CAI	92.86 $\pm$ 2.89		
FAAM-SPORT	Coper	95.73 $\pm$ 4.14	4.874	0.001*
	CAI	89.58 $\pm$ 5.52		

Also, the mean and standard deviation of the scores obtained in the subscale and the main components of the Mental Skills Questionnaire are specified in Table 2. Examination of the mental skills profile in Table 2 shows that in Coper athletes the highest score was related to goal setting skills (24.26), Self-confidence (23.60) and the lowest score was related to Refocusing skills (19.76) and fear control (22.06). Also, in athletes with CAI, the highest score was related to goal-setting skills (21.66), Imagery (20.20) and the lowest score was related to Refocusing skills (17.66) and fear control (16.90).

Table 2
Mean and SD of subscale and main components of mental skills in two group

Basic skills	Mental skill subscales	Coper	CAI
		Mean $\pm$ SD	Mean $\pm$ SD
Foundation skills	goal setting	24.26 $\pm$ 3.01	21.66 $\pm$ 4.20
	Self confidence	23.60 $\pm$ 3.21	19.76 $\pm$ 4.26
	commitment	22 $\pm$ 2.61	18.06 $\pm$ 2.74
Psychosomatic skills	Relaxation	22.43 $\pm$ 2.83	19.96 $\pm$ 2.15
	Fear control	20.06 $\pm$ 3.56	16.90 $\pm$ 1.88
	Activation	20.33 $\pm$ 2.58	19.76 $\pm$ 2.58
	stress reactions	20.83 $\pm$ 2.58	18.60 $\pm$ 2.22
Cognitive skills	Focusing	21.70 $\pm$ 2.23	18.90 $\pm$ 3.52
	Refocusing	19.76 $\pm$ 2.75	17.66 $\pm$ 1.88
	Imagery	20.76 $\pm$ 2.50	20.20 $\pm$ 1.97
	Mental practice	21.40 $\pm$ 4.31	18.33 $\pm$ 3.04
	Competition Planning	20.33 $\pm$ 3.28	19.40 $\pm$ 2.95
Foundation skills		55.20 $\pm$ 4.20	49.85 $\pm$ 6.98
Psychosomatic skills		68.04 $\pm$ 5.80	61.28 $\pm$ 3.32
Cognitive skills		87.70 $\pm$ 4.78	78.98 $\pm$ 4.29

According to the normal distribution of mental skills questionnaire information, multivariate analysis of variance was used. The results of this test in Table 3 show that in the field of basic mental skills, there was a significant difference between Coper and CAI athletes in all three skills of goal setting, self-confidence and commitment ($P < 0.05$). In the field of psychosomatic skills, there was a significant difference between Coper and CAI athletes in relaxation, fear control and stress reactions skills ($P < 0.05$), But there was no significant difference in activation skills ($P > 0.05$). In the field of cognitive skills, there was a significant difference between Coper and CAI athletes in Focusing, Refocusing and Mental practice skills ($P < 0.05$), But there was no significant difference in Imagery and Competition Planning skills ($P > 0.05$). Overall, Coper athletes scored higher than CAI athletes in Mental Skills Questionnaire.

Table 3
Results MANOVA to compare the subscale of mental skills between the two groups

Basic skills	Mental skill subscales	Sum of Squares	df	F	P	Eta Squared
Foundation skills	goal setting	101.400	1	7.574	0.008*	0.115
	Self confidence	220.417	1	25.954	0.001*	0.309
	commitment	232.067	1	32.366	0.001*	0.358
Psychosomatic skills	Relaxation	91.267	1	14.371	0.001*	0.199
	Fear control	150.417	1	18.540	0.001*	0.242
	Activation	4.817	1	1.012	0.319	0.017
	stress reactions	74.817	1	12.862	0.001*	0.183
Cognitive skills	Focusing	117.60	1	13.507	0.001*	0.189
	Refocusing	66.150	1	11.914	0.001*	0.170
	Imagery	4.817	1	0.950	0.334	0.016
	Mental practice	141.067	1	10.103	0.002*	0.148
	Competition Planning	13.067	1	1.339	0.252	0.023
* P<0.05						

Then, in order to obtain information and compare the main components of mental skills between Coper and CAI, an independent t-test was used. The results of independent t-test in Table 4 showed that there was a significant difference between Coper and CAI athletes in all three mental skills (Foundation, psychosomatic and cognitive mental skills) (P <0.05).

Table 4
Independent t-test results to compare the three main mental skills between the two groups

Basic skills	Levin test		T test		
	F	Sig.	T	df	Sig.
Foundation skills	0.402	0.529	3.588	58	0.001*
Psychosomatic skills	0.245	0.610	5.533	58	0.001*
Cognitive skills	0.226	0.636	7.422	58	0.001*
* P<0.05					

Discussion

The aim of this study was to compare the results of the psychological profile of athlete's suffering from Coper ankle sprain individuals and those who demonstrate chronic ankle instability. Based on the results, as expected, we found that Coper group participants scored higher than the chronic instability group in a structure related to their basic psychological skills, psychosomatic skills, and cognitive skills. In particular, our study was consistent with Kelly et al study. They showed that participants with lower ankle instability scored lower in the depression short form, which contributes to the general mental domain of Patient-Reported Outcomes Measurement Information System (PROMIS). This suggests that factors associated with CAI may play a role in increasing feelings of sadness or negative feelings (11). Using a questionnaire from the American Academy of Lower Limb Orthopedic Surgeons (Form SF-36, version 2), Simon Docherty reported reduced ankle function and poorer physical health among middle-aged adults with ankle instability than the non-injured control group (22). In a systematic review, Houston et al. found that people with CAI reported lower regional health-related quality of life than Coper and the injury control group (23). Most previous studies on people with ankle injuries have been in the area of quality of life, but in the present study the Ottawa Mental Skills Assessment Questionnaire (OMSAT-3) was used. This version includes 48 items and 12 mental skill scales that are placed in three broader conceptual components of basic, psychosomatic and cognitive skills, indicating that the proposed model fits well with the data (21). The results showed that there was a significant difference between the two groups in all three mental skills (basic mental skills, psychosomatic and cognitive) and Coper athletes scored higher than CAI athletes. In previous studies, OMSAT-3 has significantly differentiated between competitive and elite athletes (21).

It has been shown that differences in mental skills are a determining factor that creates elite and non-elite athletes, successful and unsuccessful, national or club (24-26) Findings show that higher levels of mental skills in elite players may be one of the reasons for their success. A review of research conducted in the field of sports psychology shows that mental skills play an important role in achieving excellent performance and this issue has been confirmed multiple times in various studies(25-27). Thus many sports psychologists in recent years have focused on psychological and cognitive preparation through the training of mental skills, a comparison to muscle memory can be achieved and lead to an increase in developed mental skills (26, 27). Consistent with the above, the study found that people with CAI scored lower on mental skills. Therefore, it is important to be aware of the mental states of athletes and their relationship with the field of injury in them. It will be much easier to prevent injuries by identifying psychological factors that increase or decrease the risk of injury in athletes. For example, one of the techniques that psychologists work with injured athletes is relaxation techniques that are used in the physical and mental rehabilitation of athletes (28). Several studies have addressed the importance of psychological interventions in preventing injury and reducing the level of injury in athletes, and the results of studies have shown that these interventions and planning in the rehabilitation stages of athletes, reduce and prevent re-injury (29, 30). In a meta-analysis conducted by Rao et al. (2015) on injured athletes, it was found that mental training is effective in regaining techniques and tactics (32) and also promotes the acceleration of the injured athlete to exercise (31). There was a significant difference

between the two groups in examining the components of mental skills in goal-setting skills, commitment, relaxation, fear control and stress reactions, Focusing, Refocusing, and Mental practice ($P < 0.05$) and athletes with CAI has lower scores than Coper athletes. To prioritize each dimension of mental skill in athletes with chronic ankle instability, their ranking was determined.

In order to rank the components of mental skills according to the level of significance, goal setting, Imagery, relaxation, activation, self-confidence, competition design, stress reactions, Focusing, mental practice, and Refocusing, commitment and fear control were respectively. Arranging these mental skills will make psychologists and sports coaches more aware of the main components involved in ankle injuries, and using the information obtained can be helpful in rehabilitating injured people. Johnson et al. found that goal-setting skills and self-confidence training were effective in reducing sports injuries (32) and it was found that injured athletes have less self-confidence than healthy athletes (33) which was consistent with the results of the present study. Also, the goal setting component, which increases the skill of competition design, mental training and self-confidence, can reduce sports injuries (32). Imagery, which was the second component in terms of prioritization of mental skills, can be effective in reducing sports injury (36, 37) and it has been argued that skilled people use imagery more than beginners (34). Other important priorities are activation or relaxation. Increasing the strength will probably increase the athletes' ability to get up pre-race and ultimately improve their performance, which in turn will reduce the sports injuries caused by fatigue (35). On the other, relaxation techniques and rest of players in matches are directly related to the prevalence of injury. It has been found that relaxation exercises have been useful among professionals more so than non-professionals, and the study of relaxation techniques on self-esteem has shown that these exercises have caused psychological peace and elevated self-esteem in athletes (36, 37). One of the other things that should be paid special attention to is the competition plan. Dominikus et al. (2009) stated that athletes who have a high level of competition design skills are better able to cope with different situations that occur in sports (38) and based on the findings of Tranaeus U (2015) match designing helps prevent re-injury (29). In conclusion, it should be said that considering the role of psychological training in controlling the incidence of sports injuries, it seems that the use of knowledge of sports psychology and the application of athletes' mental rehabilitation program can be useful to prevent and reduce sports injuries. This study, like all studies, had its limitations. The impossibility of examining the issues related to the daily life of the participants in the questionnaire was one of the limitations of the research and the researcher was satisfied with the score that the person had from his body. However, due to the methodological limitations of cross-sectional questionnaire design, there are significant warnings, and one of these cases is that the possibility of bias, like other questionnaire-based studies, is inevitable. Finally, according to the research findings, the study of the perceived effects of ankle sprain on mental health should be suggested through qualitative research and more longitudinal group studies. It is also suggested that the screening and evaluation of a larger sample and different sports teams and more diverse age groups be studied to increase the generalizability and confirm the results of this study. Also, the use of mental skills rehabilitation exercises in injured athletes should be prioritized in order to achieve uniform and valid results through various studies.

Conclusion

The results showed that athletes with CAI scored lower than Coper athletes and performed weakly on the Mental Skills Questionnaire. Considering the role of psychological skills in preventing sports injuries and considering the importance of prioritizing the mental components of goal setting, imagery, relaxation, activation, self-confidence, the competition planning should rehabilitate these items as a priority. Therefore, coaches and sports experts are advised to improve mental skills in athletes who suffer from sports injuries in order to control and reduce the incidence of sports injuries.

Declarations

Ethical Considerations

This study was approved by the Research Ethics Committees of Hamadan University of Medical Science (Code: IR.UMSHA.REC.1400.542).

Consent for publication

All ethical principles are considered in this article. Also, before starting the research process, all participants completed and approved the individual and informed consent form to participate in the research.

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Authors' contributions

Original idea, writing the manuscript, protocol development, abstract, and data analysis: All authors.

Conflict of interest

According to the authors of this article, there is no conflict of interest.

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References

1. Gribble PA, Bleakley CM, Caulfield BM, Docherty CL, Fourchet F, Fong DT-P, et al. Evidence review for the 2016 International Ankle Consortium consensus statement on the prevalence, impact and long-term consequences of lateral ankle sprains. *British Journal of Sports Medicine*. 2016;50(24):1496-505.
2. Burcal CJ, Wikstrom EA. Plantar Cutaneous Sensitivity With and Without Cognitive Loading in People With Chronic Ankle Instability, Copers, and Uninjured Controls. *The Journal of orthopaedic and sports physical therapy*. 2016;46(4):270-6.
3. Doherty C, Delahunt E, Caulfield B, Hertel J, Ryan J, Bleakley C. The incidence and prevalence of ankle sprain injury: a systematic review and meta-analysis of prospective epidemiological studies. *Sports medicine (Auckland, NZ)*. 2014;44(1):123-40.
4. Wikstrom EA, Tillman MD, Chmielewski TL, Cauraugh JH, Naugle KE, Borsa PA. Dynamic postural control but not mechanical stability differs among those with and without chronic ankle instability. *Scandinavian journal of medicine & science in sports*. 2010;20(1):e137-44.
5. Wikstrom EA, Fournier KA, McKeon PO. Postural control differs between those with and without chronic ankle instability. *Gait & posture*. 2010;32(1):82-6.
6. Wikstrom EA, Tillman MD, Chmielewski TL, Cauraugh JH, Naugle KE, Borsa PA. Discriminating Between Copers and People With Chronic Ankle Instability. *Journal of athletic training*. 2012;47(2):136-42.
7. Wikstrom EA, Hass CJ. Gait termination strategies differ between those with and without ankle instability. *Clinical biomechanics (Bristol, Avon)*. 2012;27(6):619-24.
8. Hiller CE, Nightingale EJ, Lin CW, Coughlan GF, Caulfield B, Delahunt E. Characteristics of people with recurrent ankle sprains: a systematic review with meta-analysis. *Br J Sports Med*. 2011;45(8):660-72.
9. Kemler E, van de Port I, Valkenberg H, Hoes AW, Backx FJ. Ankle injuries in the Netherlands: Trends over 10-25 years. *Scandinavian journal of medicine & science in sports*. 2015;25(3):331-7.
10. Hadadi M, Haghighat F, Hossein I. Comparison of Health-Related Quality of Life in Different Types of Chronic Ankle Instability. *Physikalische Medizin, Rehabilitationsmedizin, Kurortmedizin*. 2020;23.
11. Kosik KB, Johnson NF, Terada M, Thomas-Fenwick AC, Mattacola CG, Gribble PA. Health-Related Quality of Life Among Middle-Aged Adults With Chronic Ankle Instability, Copers, and Uninjured Controls. *Journal of athletic training*. 2020;55(7):733-8.
12. Ware JE, Jr. Standards for validating health measures: definition and content. *Journal of chronic diseases*. 1987;40(6):473-80.
13. Arnold BL, Wright CJ, Ross SE. Functional ankle instability and health-related quality of life. *J Athl Train*. 2011;46(6):634-41.
14. Houston MN, Van Lunen BL, Hoch MC. Health-related quality of life in individuals with chronic ankle instability. *Journal of athletic training*. 2014;49(6):758-63.
15. Clement D, Granquist MD, Arvinen-Barrow MM. Psychosocial aspects of athletic injuries as perceived by athletic trainers. *Journal of athletic training*. 2013;48(4):512-21.

16. Rahmani M, Bahari M, Ahmadi P. Comparison of Mental Skills of Athletes of the Iranian National Team in Asian Games in 2006 and 2018. *Sport Psychology Studies*. 2020;9(33):1-18.
17. Heever ZVd, Grobbelaar HW, Potgieter JC. A survey of psychological skills training in South African netball psychology. *African Journal for Physical Health Education, Recreation and Dance*. 2007;13(3):254-66.
18. Ross SE, Guskiewicz KM, Gross MT, Yu B. Assessment tools for identifying functional limitations associated with functional ankle instability. *Journal of athletic training*. 2008;43(1):44-50.
19. Wright CJ, Arnold BL, Ross SE, Ketchum J, Ericksen J, Pidcoe P. Clinical examination results in individuals with functional ankle instability and ankle-sprain copers. *Journal of athletic training*. 2013;48(5):581-9.
20. Carcia CR, Martin RL, Drouin JM. Validity of the Foot and Ankle Ability Measure in athletes with chronic ankle instability. *Journal of athletic training*. 2008;43(2):179-83.
21. Durand-Bush N, Salmela J, Green-Demers I. The Ottawa Mental Skills Assessment Tool (OMSAT-3*). *IEEE Transactions on Signal Processing*. 2001;15:1-19.
22. Simon JE, Docherty CL. Health-related quality of life is decreased in middle-aged adults with chronic ankle instability. *Journal of science and medicine in sport*. 2018;21(12):1206-9.
23. Houston MN, Hoch MC, Hoch JM. Health-Related Quality of Life in Athletes: A Systematic Review With Meta-Analysis. *Journal of athletic training*. 2016;51(6):442-53.
24. Ercj_ S. Comparison of Mental Skills of Elite and Non-Elite Athletes. *Journal of education and training studies*. 2018;6:72-5.
25. Pierrot EK, Aboubacar DS, Alassane BB, Coovi AAP. Mental skills assessment of Niger men and women s senior national volleyball teams. *International journal of physical education, sports and health*. 2019;6:157-62.
26. Davidson DL, Edwards SD. Evaluation of a mental skills training programme for high school rugby players : sport and exercise psychology. *African Journal for Physical Health Education, Recreation and Dance*. 2014;20(21):511-29.
27. Sanchez-Lopez J, Fernandez T, Silva-Pereyra J, Martinez Mesa JA, Di Russo F. Differences in Visuo-Motor Control in Skilled vs. Novice Martial Arts Athletes during Sustained and Transient Attention Tasks: A Motor-Related Cortical Potential Study. *PLOS ONE*. 2014;9(3):e91112.
28. , Kenneth S. Pope MJTV, et al. *Ethics in psychotherapy and counseling: A practical guide* 2016.
29. Tranaeus U, Ivarsson A, Johnson U. Evaluation of the effects of psychological prevention interventions on sport injuries: A meta-analysis. *Science & Sports*. 2015;30.
30. Arvinen-Barrow M, Clement D, Hamson-Utley JJ, Zakrajsek RA, Lee SM, Kamphoff C, et al. Athletes' use of mental skills during sport injury rehabilitation. *Journal of sport rehabilitation*. 2015;24(2):189-97.
31. Heaney CA, Walker NC, Green AJ, Rostron CL. Sport psychology education for sport injury rehabilitation professionals: a systematic review. *Physical therapy in sport : official journal of the*

- Association of Chartered Physiotherapists in Sports Medicine. 2015;16(1):72-9.
32. Urban J, Johan E, Mark BA. Injury Prevention in Sweden: Helping Soccer Players at Risk. *Journal of Sport and Exercise Psychology*. 2005;27(1):32-8.
 33. Ranjit Kumar Singh DJSY, Dr. Santosh Bajpai. . Effect of sports injury on self confidence of national male hockey players. *Int J Phys Educ Sports Health*. 2021.
 34. Holmes P, Calmels C. A neuroscientific review of imagery and observation use in sport. *Journal of motor behavior*. 2008;40(5):433-45.
 35. Gledhill A, Forsdyke D, Murray E. Psychological interventions used to reduce sports injuries: a systematic review of real-world effectiveness. *Br J Sports Med*. 2018;52(15):967-71.
 36. Slimani M, Bragazzi NL, Znazen H, Paravlic A, Azaiez F, Tod D. Psychosocial predictors and psychological prevention of soccer injuries: A systematic review and meta-analysis of the literature. *Physical therapy in sport : official journal of the Association of Chartered Physiotherapists in Sports Medicine*. 2018;32:293-300.
 37. Hooi LB WT. . Injured Athletes and a New Invention of Relaxation Techniques. *International Research Journal of Pharmacy and Medical Sciences (IRJPMS)*. 2018;1(4):78-81.
 38. Dominikus F, Fauzee MSO, Abdullah M, Meesin C, Choosakul C, editors. Relationship between mental skill and anxietyinterpretation in secondary school hockey athletes2009.