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Kinesiophobia, exercise addiction and mindfulness in athletes

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Abstract

Background and Study Aim: Since athletes tend to be addicted to exercise, they are at a higher risk of experiencing sports injuries compared to others. Exercise addiction and kinesiophobia, which is the fear of (re)injury and movement after an injury, are distinct but related concepts for athletes. It has been stated that mindfulness helps individuals to diminish their kinesiophobia. However, little is known about the relationship between exercise addiction, kinesiophobia, and mindfulness among athletes. Therefore, the aim of the study was to investigate kinesiophobia, exercise addiction, and mindfulness among athletes and to examine the effect of certain variables on these three concepts.

Material and Methods: The sample of the study consisted of 313 athletes over the age of 18. Participants were included in the study on a voluntary basis, using the convenience sampling method. Study data were collected with the 'Demographic Form', the 'Tampa Scale for Kinesiophobia', and the 'Exercise Addiction Scale'.

Results: The study discovered that national athletes exhibited statistically higher levels of exercise addiction compared to non-national athletes. Similarly, athletes suffering from chronic pain showed higher exercise addiction scores than those without chronic pain. Furthermore, athletes who had sustained sports injuries demonstrated higher exercise addiction levels compared to those who had not. It was also determined that athletes with pain or movement limitations due to sports injuries exhibited increased levels of kinesiophobia compared to those without such limitations. In addition, athletes with chronic pain reported higher levels of kinesiophobia compared to their counterparts without chronic pain. Female athletes were found to have higher levels of mindful awareness compared to male athletes. Additionally, when analyzing the relationship between these three parameters, a negative correlation was observed between kinesiophobia and mindfulness among athletes.

Conclusions: While kinesiophobia and exercise addiction are not directly related, there is a negative relationship between kinesiophobia and mindfulness. Furthermore, chronic pain and limitations in movement after a sports injury are identified as risk factors for kinesiophobia. Additionally, being a national athlete, experiencing chronic pain, and sustaining sports injuries are considered risk factors for exercise addiction.

Keywords: kinesiophobia, exercise addiction, mindfulness, athletes

Introduction

In some sports disciplines, individuals' desire for success leads to high competition both on and off the field. This is particularly true among athletes, creating pressures [1]. Such environments of high competition and pressure can lead to various negative consequences, including sports injuries. Athletes inevitably face sports injuries throughout their careers [2]. Maladaptive psychological factors, such as excessive fear, can lead to long-term pain and dysfunction after an injury [3]. Kinesiophobia is defined as the avoidance of physical movement and fear of performing activities due to the risk of re-injury [4]. This fear of re-injury and the subsequent fear of movement can negatively impact injury recovery and the ability to return to sports [5]. Studies have reported that kinesiophobia can lead to chronic musculoskeletal disorders [6], as well as pain, injury, and reduced quality of life [3, 7]. Related interventions can encourage individuals to engage in functional exercises and physical activities by alleviating their kinesiophobia. For example, Su et al. [8] found that a 12-week exercise intervention showed promising results in decreasing the level of kinesiophobia. Similarly, Chen et al. [9] discovered that regular exercise reduced anxiety-related amygdala activation.

Exercise addiction [10], characterized by excessive physical activity and a loss of control over this activity, can adversely affect individuals' functionality. It is distinct from kinesiophobia, which is defined as a fear of movement. This distinction raises the question of whether exercise addiction in athletes can prevent or, conversely, contribute to the development of kinesiophobia [11, 12, 13, 14]. However, a review of the relevant literature reveals that the relationship between exercise addiction and

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kinesiophobia has not been explicitly established.

Cognitive Behavioral Therapy (CBT) is a psychotherapeutic approach employed to address kinesiophobia [15, 16]. It focuses on identifying and modifying maladaptive thought patterns that negatively influence an individual's emotions and behaviors, replacing them with more adaptive ones [17]. Research has demonstrated that CBT is more effective in reducing agoraphobia compared to traditional exercise methods [18]. Moreover, studies have established a link between the level of mindfulness and the severity of pain and kinesiophobia [19]. As a result, Mindfulness-Based Therapies, which represent a type of third-wave CBT, have proven effective in diminishing kinesiophobia, especially when integrated with exercise treatments [20, 21]. Despite these findings, the relationship between mindfulness and kinesiophobia has yet to be thoroughly explored within the athlete population.

This study aimed to investigate the relationship between kinesiophobia, mindfulness, and exercise addiction among athletes. The current study was formulated around two main hypotheses:

H1a: There is a negative relationship between kinesiophobia and exercise addiction among athletes. This hypothesis seeks to explore whether exercise addiction, characterized as a form of addiction, can act as a protective factor against kinesiophobia. Such a relationship could potentially facilitate a smoother treatment process after injury and expedite the return to sports activities.

H1b: There is a negative relationship between kinesiophobia and mindfulness among athletes. This hypothesis underscores the need to assess mindfulness levels in athletes with kinesiophobia. Additionally, it aims to highlight the significance of cultivating awareness among athletes to ensure that acute injuries do not adversely impact their lives.

Materials and Methods

Participants

The sample of the current study comprised 313 athletes, all over the age of 18. The majority were male (65.2%) and university students (83.1%), with football being the most common sport among participants (31.6%). Among them, 17.3% were national athletes, with the majority (89.3%) having held this status for between 1 and 10 years. Additionally, 17.6% of the participants reported experiencing chronic pain. A significant portion of the sample had suffered sports injuries (68.7%), with 43.26% experiencing pain or movement restrictions as a result. Detailed demographic characteristics of the sample are presented in Table 1.

Research Design

All procedures in this study involving human participants were conducted in accordance with the ethical standards of the Yalova University Human Research Ethics Committee, approved on 08.05.2023 under approval number 2023/78. Following ethical approval, data were collected using a convenience sampling method. Participants provided their informed consent before voluntarily participating in the study. As part of the study, participants were asked to complete a demographic form and various scales. The entire process took approximately 15 minutes.

Demographic Form

Participants' age, gender, educational level, weight, height, and sports discipline were collected through a demographic form. Additionally, information regarding their status as national athletes, the duration of being national athletes, the presence of chronic pain, experience of sports injuries, and any pain or movement restrictions caused by injuries were also gathered from the participants.

Tampa Scale for Kinesiophobia

The Tampa Scale for Kinesiophobia (TSK) was developed to measure the fear of movement/(re) injury [22], although its publication occurred later. After obtaining the necessary permissions, Vlaeyen et al. [23] published the scale. The scale comprises 17 items on a 4-point Likert scale ranging from 1 (Strongly Disagree) to 4 (Strongly Agree), where higher scores indicate a higher level of fear of movement/(re)injury. Additionally, a cut-off score of 37 is used to categorize individuals regarding their fear of movement, with scores higher than 37 indicating a significant fear of movement [24]. The scale was adapted to Turkish by Tunca-Yılmaz and colleagues [25], with a test-retest reliability of .81. In the current study, its internal consistency was found to be .77.

Exercise Addiction Scale

The Exercise Addiction Scale (EAS) was designed to assess the level of sports addiction [26]. This scale includes three subscales and features 17 items, each rated on a 5-point Likert scale (1 = Strongly Disagree; 5 = Strongly Agree). Scoring is categorized as follows: 1-17 indicates a normal group; 18-34 indicates a low risk group; 35-51 indicates a medium risk group; 52-69 indicates an addicted group; and 70-85 indicates a highly addicted group. The scale's Cronbach alpha was found to be .88 for the total scale, with subscale values ranging from .77 to .88. In the current study, the total score of the scale was utilized, and its Cronbach alpha was determined to be .87.

Athlete Mindfulness Scale

The Athlete Mindfulness Scale (AMS) was designed to assess the level of mindfulness skills in athletes [27]. This scale features three subscales — Awareness, No Judgment, and Refocusing — and includes 15 items, each rated on a 6-point Likert scale (1 = Almost Never; 6 = Almost Always). Higher

Table 1. Demographic Characteristics of the Sample (n=313)

Variables		$\bar{x}$	Min.	Max.
Weight (kg)		69.11 ± .77	40.0	114.0
Height (cm)		174.41 ± .59	140.0	208.0
Characteristics			**n**	**%**
Gender		Male	204	65.2
		Female	109	34.8
Educational Level		Primary School	1	.3
		High School	39	12.5
		University	260	83.1
		Master's Degree	12	3.8
		Doctorate Degree	1	.3
Branches of Sport		Football	99	31.6
		Basketball	29	9.3
		Volleyball	30	9.6
		Wrestling	33	10.5
		Other	142	39.0
National Athlete		Yes	54	17.3
		No	259	82.7
Duration of Being National Athlete		1-10 Years	48	89.3
		11-20 Years	3	5.6
		21-30 Years	1	1.9
		+30 Years	2	3.7
Chronic Pain		Yes	55	17.6
		No	258	82.4
Sport Injury		Yes	215	68.7
		No	98	31.3
Pain/Movement Restriction Caused by Sport Injury		Yes	93	43.3
		No	122	56.7

scores indicate a higher level of mindfulness. The scale was adapted to Turkish by Tingaz in 2020 [28]. Its test-retest reliability was established at .89, and its Cronbach alpha was initially calculated at .82. In the current study, the scale's Cronbach alpha was determined to be .84

Statistical Analysis

The data were analyzed using SPSS Version 25. Before proceeding with descriptive and inferential analyses, the normal distribution of the variables was assessed using skewness and kurtosis values, with a cutoff point of -1.5 and +1.5 [29]. Following this preliminary check, descriptive analyses of the continuous variables were conducted. Correlational analyses were then performed to examine the relationships among variables. To analyze group differences in the levels of kinesiophobia, exercise addiction, and mindfulness, independent t-tests were conducted based on independent variables such as gender, national athlete status, chronic pain, sports injury, and pain/movement restriction caused by sports injury. In these independent t-tests, the results of Levene's Test for Equality of Variances – Equal Variances Not Assumed – were reported, as the variances between the groups were not equal.

Results

Descriptive characteristics of the continuous variables are presented in Table 2. As indicated in Table 2, based on the skewness and kurtosis values, the assumption of normality for all continuous variables was satisfied.

Utilizing the cutoff score of 37 for kinesiophobia, 69% of the participants exhibited a fear of movement/(re)injury (Table 3). Additionally, with respect to exercise addiction scores, not a single participant was classified as having a normal level of exercise; furthermore, more than half of them (58.1%) were identified as being addicted to exercise. This is further corroborated by the data in Table 2, where the total mean score for exercise addiction was 59.28, indicating a prevalent experience of exercise

Table 2. Descriptive Characteristics of the Continuous Variables (n = 313)

Variables	$\bar{X}$ ± SD	S. E. Mean	Min.	Max.	Skewness	Kurtosis
Kinesiophobia	38.61 ± 5.47	.31	19.00	57.00	-.33	.62
Exercise Addiction	59.28 ± 12.14	.69	18.00	90.00	-.36	.39
Mindfulness	60.86 ± 7.02	.40	37.00	88.00	.22	1.04

Note. SD = Standard Deviation, S. E. Mean = Mean of Standard Error, Min. = Minimum Value, Max. = Maximum Value.

Table 3. Grouping Participants Regarding Continuous Variables (n = 313)

Variables		n	Percentage
Kinesiophobia	No	97	31.0
	Yes	216	69.0
Variables	**Group**	**n**	**Percentage**
Exercise Addiction	Normal Group	0	0
	Low Risk Group	12	3.8
	Middle Risk Group	60	19.2
	Addicted Group	182	58.1
	Highly Addicted Group	59	18.8

Note. By grouping participants, the cut-off scores given at the section of measurement tools were used.

Table 4. Correlations Between Variables (N = 313)

Variables		1	2	3
1.Kinesiophobia	r	1	-.03	-.18
	p		.65	.001**
2.Exercise Addiction	r		1	.04
	p			.45
3. Mindfulness	r			1

Note. **p = .001

addiction among the participants.

As shown in Table 4, kinesiophobia was found to be negatively associated with mindfulness (r = -.18, p = .001), with other associations being non-significant (p > .05).

Following the data presented in Table 5, female athletes exhibited a higher level of mindfulness compared to male athletes [t(311) = 2.42, p < .05]. National athletes displayed a higher level of exercise addiction than non-national athletes [t(311) = 2.13, p < .05]. Athletes suffering from chronic pain showed higher levels of kinesiophobia and exercise addiction compared to those not suffering from chronic pain [t(311) = 2.75, p < .05; t(311) = 2.41, p < .05, respectively]. Additionally, athletes who had experienced a sports injury had a higher level of exercise addiction than those who had not [t(154.18) = 2.20, p < .05]. Athletes with pain/movement restrictions caused by a sports injury also had a higher level of kinesiophobia than those without such restrictions [t(311) = 3.57, p < .001]. Differences in other groups regarding the dependent variables were not significant (p > .05).

Discussion

The study aimed to investigate the relationship between kinesiophobia, mindfulness, and exercise addiction among athletes, with an additional focus on how these factors vary according to gender, national athlete status, presence of chronic pain, history of sports injuries, and injury-related pain and movement restrictions.

Significantly, the study revealed that a considerable portion of participants reported experiencing fear of movement (kinesiophobia) as well as exercise addiction. Previous research on kinesiophobia among athletes has indicated that those who have sustained sports injuries tend to exhibit higher levels of this fear [30]. Furthermore, there is evidence suggesting that athletes might be more susceptible to exercise addiction [12, 13, 14].

Mindfulness, a skill designed to alter individuals' relationship with their thoughts and emotions without directly changing them [31], has been demonstrated to positively affect athlete performance. This includes reductions in anxiety levels and enhancements in motor control [32]. In this study, it was discovered that female athletes

Table 5. Descriptive Statistics of the Variables and the Results of Independent T-test Analyses

DV			KP			EA			MIND		
IV	**Groups**	**n**	**$\bar{X}$ ± SD**	**t**	**p**	**$\bar{X}$ ± SD**	**t**	**p**	**$\bar{X}$ ± SD**	**t**	**p**
Gender	Female	109	39.12 ± 5.33	1.12	.23	58.96 ± 11.89	-.34	.74	62.17 ± 6.95	2.42	.02*
	Male	204	38.34 ± 5.54			59.44 ± 12.29			60.17 ± 6.98		
National Athlete	No	259	38.34 ± 5.48	1.95	.05	58.61 ± 12.20	2.13	.03*	60.87 ± 7.36	-.04	.98
	Yes	54	39.93 ± 5.28			62.46 ± 11.40			60.83 ± 5.11		
Chronic Pain	No	258	38.23 ± 5.41	2.75	.01*	58.52 ± 11.98	2.41	.02*	60.93 ± 7.13	-.37	.72
	Yes	55	40.44 ± 5.45			62.84 ± 12.35			60.55 ± 6.54		
Sport Injury	No	98	38.15 ± 5.05	1.01	.32	56.86 ± 14.00	2.20	.03*	60.80 ± 7.11	.11	.91
	Yes	215	38.82 ± 5.65			60.38 ± 11.04			60.89 ± 7.00		
Pain & Movement Restriction	No	220	37.91 ± 5.22	3.57	.00**	58.45 ± 12.37	1.87	.06	60.94 ± 7.30	-.30	.77
	Yes	93	40.28 ± 5.72			61.25 ± 11.39			60.68 ± 6.35		

Note. KP = Kinesiophobia, EA = Exercise Addiction, MIND = Mindfulness, IV = Independent Variables, DV = Dependent Variables, N = Number of Samples, SD = Standard Deviation. *p < .05, **p < .001

exhibit higher levels of mindfulness compared to their male counterparts, a finding echoed by similar research [33, 34]. Conversely, research focused on elite athletes identified no significant gender differences in mindfulness levels [35], a conclusion also reached in studies involving university student-athletes [36]. The variation in these findings could be attributed to factors such as the specific sports disciplines involved and the average age of the participants in the sample groups.

One notable finding from the study is that national athletes exhibit higher levels of exercise addiction compared to non-national athletes. Factors such as dedication to exercise routines and participation in intense training programs have been identified as contributors to the risk of developing exercise addiction among athletes [37, 38]. Furthermore, it has been reported that athletes with higher status and who compete at more competitive levels are at an increased risk for exercise addiction [39]. Athletes engaged in international competitions also face a greater risk of developing exercise addiction compared to their counterparts who compete in local or regional competitions or those who exercise recreationally [40]. In summary, the elevated status and competitive environment of national athletes, along with their involvement in international competitions and rigorous training schedules, may significantly contribute to a heightened risk of exercise addiction.

In this study, it was also found that athletes suffering from chronic pain exhibited higher levels of exercise addiction and kinesiophobia compared to those without chronic pain, while their mindfulness scores remained similar. This observation aligns with findings from previous research. For instance, Caru et al. [41] identified elevated levels of exercise addiction in athletes dealing with chronic pain. Contrarily, Lichtenstein et al. [42] suggested that pain does not significantly affect the continuity of exercise among athletes. Moreover, Bordeleau et al. [43] discovered a correlation between kinesiophobia and pain intensity in individuals with chronic pain, further corroborating this study's results. Hence, athletes reporting chronic pain also demonstrated increased levels of kinesiophobia and exercise addiction.

Observing exercise addiction alongside movement avoidance in individuals with chronic pain presents an unusual phenomenon. The precise reason behind this result remains unclear, primarily because the level of chronic pain was not measured in this study, nor was it directly correlated with kinesiophobia. A critical factor to consider is the potential for sports injuries to lead to chronic pain. In our study, participants were simply asked whether they experienced chronic pain, without further inquiry into the pain's origin, which constitutes a limitation of our research. It's possible that the chronic pain reported by participants was not a result of exercise and thus did not influence their exercise commitment. Furthermore, the chronic pain they experienced might have been related to daily life activities rather than exercise-specific movements, potentially leading to the avoidance of certain movements. Future research exploring the relationship between exercise addiction and kinesiophobia should thoroughly investigate chronic pain and its impacts.

In the investigation of exercise addiction in relation to sports injuries, it was discovered that athletes who had sustained an injury exhibited higher levels of exercise addiction compared to their uninjured counterparts. This suggests that athletes prone to exercise addiction may be at a greater risk of sustaining injuries and are likely to continue exercising despite pain or injury [44]. Given that all study participants were potentially at risk of developing exercise addiction, this finding was anticipated. However, this study also found that levels of kinesiophobia and mindfulness were

similar among athletes, regardless of whether they had experienced sports injuries. This observation is consistent with other research indicating that sustaining an injury does not necessarily correlate with levels of kinesiophobia and mindfulness [28, 45].

In this study, it was observed that athletes experiencing movement restrictions and pain due to sports injuries exhibited higher levels of kinesiophobia compared to those without such limitations. Interestingly, the levels of exercise addiction and mindfulness were similar between the two groups. Additionally, athletes with chronic pain demonstrated higher levels of kinesiophobia than those without chronic pain. Research has shown that an increase in kinesiophobia levels correlates with a heightened risk of pain and injury [3]. The pain fear-avoidance model [23, 46] suggests that catastrophizing thoughts about pain and the fear of its recurrence lead to avoidance behaviors, an overreaction to potential threats, and ultimately, movement avoidance [46, 47]. Individuals who engage in avoidance behaviors are more likely to suffer from chronic musculoskeletal pain after an injury [46]. The findings of this study lend support to the pain fear-avoidance model. It is posited that negative perceptions of pain may cause acute pain from sports injuries to evolve into chronic pain in athletes who develop kinesiophobia. Moreover, the avoidance of movement, stemming from these fears, may lead to reduced levels of physical activity.

Another result of the study was that as athletes' levels of mindfulness increased, their levels of kinesiophobia decreased. Mindfulness is a mental state that enables individuals to focus on the present moment without judgment, experiencing it in its purest form [48, 49]. It is a skill that assists individuals in recognizing negative emotions and understanding that these are temporary experiences [50, 51]. Kabat et al. [52] conducted the first trials on mindfulness and meditation practices, which have been supported as effective in reducing pain. Furthermore, studies have demonstrated that mindfulness-based therapy can reduce kinesiophobia [20, 21, 53]. These findings support the results of the present study. The absence of previous research directly investigating the relationship between mindfulness and kinesiophobia levels in athletes underscores the unique contribution of this study.

Contrary to the hypothesis, this study found no negative relationship between exercise addiction and kinesiophobia. This suggests that the level of movement avoidance does not necessarily correlate with high or low levels of exercise addiction in athletes. This finding is in contrast to previous studies [11] that posited exercise addiction and kinesiophobia as opposing concepts. The lack of additional studies examining the relationship between kinesiophobia and exercise addiction in athletes limits the discussion of this result.

Furthermore, the study revealed no relationship between exercise addiction and mindfulness. This finding suggests that exercise addiction in athletes may reflect their intense passion and commitment to their sport, which forms a significant part of their identity, rather than a pathological tendency. This aligns with the findings of Juwono et al. [54], which recommend a re-evaluation of the concept of exercise addiction in athletes. The inconsistencies observed in this study regarding exercise addiction may stem from the ambiguous definition of addiction within the athletic population.

Future research should explore the implementation of mindfulness-based practices among athletes to investigate their impact on reducing levels of kinesiophobia. Such studies could provide valuable insights into effective interventions for managing fear of movement and injury in sports settings.

Conclusions

The study explored the relationship between kinesiophobia, exercise addiction, and mindfulness in athletes aged 18 and older, considering various risk factors. It was found that chronic pain and pain or movement restriction due to sports injuries are significant risk factors for kinesiophobia. Meanwhile, being a national athlete, experiencing chronic pain, and sustaining sports injuries emerged as risk factors for exercise addiction. Importantly, athletes in this group displayed high levels of both exercise addiction and kinesiophobia. However, an increase in mindfulness levels was associated with a decrease in kinesiophobia levels. Thus, organizing mindfulness practices or interventions could enhance athletes' mindfulness and mitigate kinesiophobia. Implementing mindfulness practices proactively, before athletes suffer injuries, could positively alter their attitudes towards sports injuries and enhance the quality of rehabilitation post-injury, facilitating a quicker return to sports, reducing the costs associated with sports injuries, and discouraging athletes from quitting sports altogether. Additionally, no support was found for a relationship between exercise addiction and either kinesiophobia or mindfulness. It is possible that high levels of exercise addiction among athletes stem from a competitive drive, passion for their sport, and professional commitments rather than being indicative of a pathological addiction. This suggests that the addiction observed may align more closely with the principles of sportsmanship.

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Conflict of Interest

There is no conflict of interest between the authors in the study.

References

1. Karaman T. Teknik Dırektörlerin Futbolculuk Kariyerleri Üzerinden Kulüp İstikrar Düzeylerinin İncelenmesi [Examining Club Stability Levels of Coaches Based on Their Football Careers]. *SPORMETRE Beden Eğitimi ve Spor Bilimleri Dergisi*, 2023;21(100. Years Special Issues):91–100. (In Turkish . https://doi.org/10.33689/Spormetre.1285551
2. Moss RA, Slobounov S. Neural, behavioral and psychological effects of injury in athletes. *Foundations of Sport-Related Brain Injuries*. 2006: 407–430. https://doi.org/10.1007/0-387-32565-4_18
3. Luque-Suarez A, Martinez-Calderon J, Falla D. Role of kinesiophobia on pain, disability and quality of life in people suffering from chronic musculoskeletal pain: A systematic review. *British Journal of Sports Medicine,* 2019;53(9):554–5. https://doi.org/10.1136/bjsports-2017-098673
4. Kori S, Miller R, Todd D. Kinesiophobia: a new view of chronic pain behavior. *Pain Manage*. 1990;3:35–43.
5. Hsu CJ, Meierbachtol A, George SZ, Chmielewski TL. Fear of reinjury in athletes: implications for rehabilitation. *Sports Health*. 2017;9(2):162–167. https://doi.org/10.1177/1941738116666813
6. Domenech J, Sanchis-Alfonso V, López L, Espejo B. Influence of kinesiophobia and catastrophizing on pain and disability in anterior knee pain patients. Knee Surg. *Sports Traumatol Arthrosc* 2013;21:1562–158. https://doi.org/10.1007/s00167-012-2238-5
7. Oskay D, Tuna Z, Düzgün İ, Elbasan B, Yakut Y, Tufan A. Relationship between kinesiophobia and pain, quality of life, functional status, disease activity, mobility, and depression in patients with ankylosing spondylitis. *Turkish Journal of Medical Sciences*. 2017;47(5):1340–1347. https://doi.org/10.3906/sag-1702-93
8. Su Y, Huang L, Liu H, Chen S, Peng L. The Effect of Exercise Intervention on Disability and Kinesiophobia in a Retired Athlete With Old Patella Fracture: A Case Report. *Frontiers in Psychology*. 2021;12:744433. https://doi.org/10.3389/fpsyg.2021.744433
9. Chen YC, Chen C, Martínez RM, Etnier JL, Cheng Y. Habitual physical activity mediates the acute exercise-induced modulation of anxiety-related amygdala functional connectivity. *Scientific Reports*. 2019;9(1):19787. https://doi.org/10.1038/s41598-019-56226-z
10. Szabo A, Demetrovics Z. *Passion and Addiction in Sports and Exercise*. New York (NY): Routledge, 2022. https://doi.org/10.4324/9781003173595
11. Hasenbring MI, Chehadi O, Titze C, Kreddig N. Fear and anxiety in the transition from acute to chronic pain: there is evidence for endurance besides avoidance. *Pain Management*. 2014;4(5):363–374. https://doi.org/10.2217/pmt.14.36
12. Smith D, Wright C, Winrow D. Exercise dependence and social physique anxiety in competitive and non-competitive runners. *International Journal of Sport and Exercise Psychology*. 2010;8(1):61–69. https://doi.org/10.1080/1612197X.2010.9671934
13. De La Vega R, Parastatidou IS, Ruíz-Barquín R, Szabo A. Exercise addiction in athletes and leisure exercisers: The moderating role of passion. *Journal of Behavioral Addictions*. 2016;5(2):325-331. https://doi.org/10.1556/2006.5.2016.043
14. Szabo A, De La Vega R, Ruiz-Barquín R, Rivera O. Exercise addiction in Spanish athletes: Investigation of the roles of gender, social context and level of involvement. *Journal of Behavioral Addictions*. 2013;2(4):249–252. https://doi.org/10.1556/jba.2.2013.4.9
15. Archer KR, Devin CJ, Vanston SW, et al. Cognitive-behavioral–based physical therapy for patients with chronic pain undergoing lumbar spine surgery: a randomized controlled trial. *The Journal of Pain*. 2016;17(1):76–89. https://doi.org/10.1016/j.jpain.2015.09.013
16. Cai L, Gao H, Xu H, Wang Y, Lyu P, Liu Y. Does a program based on cognitive behavioral therapy affect kinesiophobia in patients following total knee arthroplasty? A randomized, controlled trial with a 6-month follow-up. *The Journal of Arthroplasty*. 2018;33(3):704–710. https://doi.org/10.1016/j.arth.2017.10.035
17. Hofmann SG, Asnaani A, Vonk IJ, Sawyer AT, Fang A. The efficacy of cognitive behavioral therapy: a review of meta-analyses. *Cognitive Therapy and Research.* 2012;36:427–40. https://doi.org/10.1007/s10608-012-9476-1
18. Monticone M, Ambrosini E, Rocca B, Cazzaniga D, Liquori V, Foti C. Group-based task-oriented exercises aimed at managing kinesiophobia improved disability in chronic low back pain. *European Journal of Pain*. 2016;20(4):541–551. https://doi.org/10.1002/ejp.756
19. Rezaei S, Hassanzadeh S. Are mindfulness skills associated with reducing kinesiophobia, pain severity, pain catastrophizing and physical disability? Results of Iranian patients with chronic musculoskeletal pain. *Health Psychology Report*. 2019;7(4):276–285.
20. Bagheri S, Naderi A, Mirali S, Calmeiro L, Brewer BW. Adding mindfulness practice to exercise therapy for female recreational runners with patellofemoral pain: A randomized controlled trial. *Journal of Athletic Training*. 2021;56(8):902–911. https://doi.org/10.4085/1062-6050-0214.20
21. Yumeng Z, Juan M. Effects of mindfulness therapy on patients with kinesiphobia after total hip replacement. *MEDS Public Health and Preventive Medicine.* 2023;3(5):66–72. https://doi.org/10.23977/phpm.2023.030510
22. Miller RP, Kori SH, Todd DD. The Tampa Scale: A measure of kinesiophobia. *The Clinical Journal of Pain*. 1991;7(1):51–52. https://doi.org/10.1097/00002508-199103000-00053
23. Vlaeyen JW, Linton SJ. Fear-avoidance and its consequences in chronic musculoskeletal pain: a state of the art. *Pain*. 2000;85(3):317–332. https://doi.org/10.1016/S0304-3959(99)00242-0

24. Heuts PHT, Vlaeyen JW, Roelofs J, et al. Pain-related fear and daily functioning in patients with osteoarthritis. *Pain.* 2004;110(1):228–235. https://doi.org/10.1016/j.pain.2004.03.035
25. Tunca-Yılmaz Ö, Yakut Y, Uygur F, Uluğ, N. Tampa Kinezyofobi Ölçeği'nin Türkçe versiyonu ve test-tekrar test güvenirliği. *Fizyoterapi Rehabilitasyon*. 2011;22(1):44–9.
26. Tekkurşun-Demir G, Hazar Z, Cicioğlu Hİ. Egzersiz bağımlılığı ölçeği (EBÖ): Geçerlik ve güvenirlik çalışması [Exercise addiction scale (EDS): Validity and reliability study]. *Kastamonu Eğitim Dergisi*. 2018;26(3):865-874. (In Turkish). https://doi.org/10.24106/kefdergi.413383
27. Thienot E, Jackson B, Dimmock J, Grove JR, Bernier M, Fournier JF. Development and preliminary validation of the mindfulness inventory for sport. *Psychology of Sport and Exercise*. 2014;15(1), 72–80. https://doi.org/10.1016/j.psychsport.2013.10.003
28. Tingaz EO, Ekiz MA, Çakmak S. Examination of mindfulness and impulsiveness in university student-athletes in terms of sports injury development history. *Current Psychology*. 2020:41(8):1–9. https://doi.org/10.1007/s12144-020-01024-4
29. Tabachnick BG, Fidell LS. *Using Multivariate Statistics* (5th ed.). Boston, MA: Pearson; 2007.
30. Çevi K, Saldiran T, Atici E, Öztürk Ö, Akgöl AC, Özkeski NM, Aydin G, et al. Lower Limb Injury History in Elite Athletes: Relationship with Kinesiophobia and Effect on Physical Performance. *Turkiye Klinikleri Journal of Sports Sciences*, 2020;12(1): 1–8. https://doi.org/10.5336/sportsci.2019-70271
31. Anderson SA, Haraldsdottir K, Watson D. Mindfulness in athletes. *Current Sports Medicine Reports*. 2021;20(12):655-660. https://doi.org/10.1249/JSR.0000000000000919
32. Bühlmayer L, Birrer D, Röthlin P, Faude O, Donath L. Effects of mindfulness practice on performance-relevant parameters and performance outcomes in sports: A meta-analytical review. *Sports Medicine*. 2017; 47:2309–2321. https://doi.org/10.1007/s40279-017-0752-9
33. Bulğay C, Tingaz EO, Bayraktar I, Çetin E. Athletic performance and mindfulness in track and field athletes. *Current Psychology*. 2022;41(7):4482–4489. https://doi.org/10.1007/s12144-020-00967-y
34. Nicholls AR, Polman RC, Levy AR, Backhouse SH. Mental toughness in sport: Achievement level, gender, age, experience, and sport type differences. *Personality and İndividual Differences*. 2009;47(1):73–75. https://doi.org/10.1016/j.paid.2009.02.006
35. Cathcart S, McGregor M, Groundwater E. Mindfulness and flow in elite athletes. *Journal of Clinical Sport Psychology*. 2014;8(2):119–141. https://doi.org/10.1123/jcsp.2014-0018
36. Metin SN, Uzgur K, Akkoyunlu Y, Konar N. The relationship between burnout levels and mindfulness of university students-athletes. *Physical Education of Students*. 2023;27(3):97–103. https://doi.org/10.15561/20755279.2023.0301
37. Szabo A. *Addiction to exercise: A symptom or a disorder?* New York, NY: Nova Science Publishers; 2010.
38. Lichtenstein MB, Hinze CJ, Emborg B, Thomsen F, Hemmingsen SD. Compulsive exercise: links, risks and challenges faced. *Psychology research and behavior management*. 2017;10:85–95. https://doi.org/10.2147/PRBM.S113093
39. Conesa MDPV, Plaza FJP, Palacios CDF. Can motives lead athletes to suffer from exercise dependence? Risk of exercise dependence according to motives for practice. *Journal of Physical Education and Sport.* 2017;17(4):2405–2411. https://doi.org/10.7752/jpes.2017.04266.
40. Weinstein A, Maayan G, Weinstein Y. A study on the relationship between compulsive exercise, depression and anxiety. *Journal of Behavioral Addictions.* 2015;4(4):315–318. https://doi.org/10.1556/2006.4.2015.034.
41. Caru M, Poulnais S, Gorwood P, Kern L. Exercise addiction, pain and injuries in amateur athletes. *Sport Sciences for Health*. 2022;18(4):1253–1261. https://doi.org/10.1007/s11332-022-01004-0
42. Lichtenstein MB, Nielsen RO, Gudex C, Hinze CJ, Jørgensen U. Exercise addiction is associated with emotional distress in injured and non-injured regular exercisers. *Addictive behaviors reports*. 2018;8:33–39. https://doi.org/10.1016/j.abrep.2018.06.001
43. Bordeleau M, Vincenot M, Lefevre S, et al. Treatments for kinesiophobia in people with chronic pain: A scoping review. *Frontiers in Behavioral Neuroscience*. 2022;16:933483. https://doi.org/10.3389/fnbeh.2022.933483
44. Lichtenstein MB, Christiansen E, Elklit A, Bilenberg N, Støving RK. Exercise addiction: a study of eating disorder symptoms, quality of life, personality traits and attachment styles. *Psychiatry Research*. 2014;215(2):410–416. https://doi.org/10.1016/j.psychres.2013.11.010
45. Ünver G, Kara E, Yoldaş A. Investigation of Sports Injuries and Kinesiophobia in Volleyball Players. *Gaziantep Üniversitesi Spor Bilimleri Dergisi*. 2020;5(4):443–455. https://doi.org/10.31680/gaunjss.779513
46. Leeuw M, Goossens ME, Linton SJ, Crombez G, Boersma K, Vlaeyen JW. The fear-avoidance model of musculoskeletal pain: current state of scientific evidence. *Journal of Behavioral Medicine*. 2007;30:77–94.https://doi.org/10.1007/s10865-006-9085-0
47. Lundberg M, Grimby-Ekman A, Verbunt J, Simmonds MJ. Pain-related fear: a critical review of the related measures. *Pain Research and Treatment*. 2011; 494196. https://doi.org/10.1155/2011/494196
48. Segal ZV, Williams JMG, Teasdale JD. *Mindfulness-based cognitive therapy for depression*. New York: Guilford Press; 2013.
49. Desbordes G, Gard T, Hoge EA et al. Moving beyond mindfulness: Defining equanimity as an outcome measure in meditation and contemplative research. *Mindfulness*. 2015;6:356–372. https://doi.org/10.1007/s12671-013-0269-8
50. Bishop SR, Lau M, Shapiro S, et al. Mindfulness: A proposed operational definition. *Clinical Psychology: Science and Practice*. 2006;11:230–241. https://doi.

org/1.1093/clipsy.bph077
51. Azad Marzabadi E, Hashemi Zadeh SM. The effectiveness of mindfulness training in improving the quality of life of the war victims with post-traumatic stress disorder (PTSD). *Iranian Journal of Psychiatry*. 2014;9(4):228–236.
52. Kabat-Zinn J. *Full catastrophe living, revised edition: how to cope with stress, pain and illness using mindfulness meditation*. UK: Hachette; 2013.
53. Demirci C, Oksul M, Ozer N, Ozdemir, L. Effect of mindfulness on fatigue, kinesiophobia and quality of life in patients with acute myocardial infarction. *Annals of Clinical and Analytical Medicine*. 2023;14(2):110–11. https://doi.org/10.4328/ACAM.21365
54. Juwono ID, Tolnai N, Szabo A. Exercise addiction in athletes: A systematic review of the literature. *International Journal of Mental Health and Addiction*. 2022;20(5):3113–3127. https://doi.org/10.1007/s11469-021-00568-1

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