Sport Specialization and the Association with History of Injury in Young Iranian Athletes

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Abstract

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Purpose: Sport specialization can cause physical injuries in athletes, but the impact of sport specialization in child and adolescent athletes aged 8 to 18 in Iran is unknown. This study aims to examine the presence of sport specialization and its associations with sex, sport type, and history of sport-related injuries.

Method: Participants completed two questionnaires. The first questionnaire consisted of the sports specialization level and participants' demographic data, including age, sex, sport type, and physical activity participation (hours of sport participation, rest days). The second questionnaire focused on participants' sport-related injury history.

Result: The study confirmed the presence of youth sport specialization among athletes in this age group in Iran. No association was found between injury history and participants' sex, sport type, or sport specialization.

Conclusion: While we found the presence of sport specialization in Iran, there was no significant association between participants' sport specialization, sex, sport type, and history of sport-related injuries. However, athletes that trained more than 8 months annually in a primary sport had a positive association with prior injuries. There was a significant difference in training intensity, particularly when exceeding 8 months per year, between those with and without a history of injury. This difference underscores the impact of extended training on injury susceptibility.

There was also an association between athletes' travel for competitions and a history of injury. These findings suggest diverse factors impacting injury patterns, highlighting the need to investigate and address training intensity and travel in injury prevention strategies.

Keywords: Sport specialization, Sport injury, sex, sport type, children, adolescent.

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Introduction

Youth engagement in sports spans a spectrum from inactivity to overactivity, each presenting its own set of potential health risks. Physical inactivity may contribute to early-onset cardiac diseases, type 2 diabetes, and hypertension.[1-4] Conversely, an excess of physical activity poses its own challenges, notably in the form of sport specialization, where young athletes focus intensively on a single sport.[1] The merits of specialization lie in the enhancement of athletic skills and the attainment of higher performance levels.[5]

Sport Specialization

To quantify the degree of sport specialization, many studies have employed components of the Jayanthi scale since its introduction in 2015.[7-9] This scale, in its two versions, assesses the extent of specialization by considering factors such as participation in a single main sport, training intensity, limitations on participation in other sports, and exclusive focus on one sport before the age of 12.[6] The original 3-point Jayanthi scale comprises three questions, while the newer 4-point scale expands on this by incorporating an additional question related to age. [7-11] Utilizing the 4-point Jayanthi scale allows for more understanding, as it measures the age of specialization alongside the three existing components. Each applicable component is assigned one point, and the cumulative score determines the level of sport specialization. A score of zero or one point is classified as low, two points as moderate, three points as high, and four points as extreme.[6]

Over the past decade, an increasing number of young athletes have become specialized in their sport.[10–12] Starting at a young age, athletes who play highly technical sports will develop their skills through repetition and often participate in elite-level competitions before reaching full maturation.[13,14] The reason for the youth sport specialization increase may originate from parents' and coaches' ideas to enhance performance and/or augment the likelihood of participation in that sport at an elite level.[12,15] Focused participation in a single sport limits opportunities or time available for other activities like participation in other sports, academics, extra-curricular activities, socialization, and community engagement.[6] Due to these factors athletes often specialize in their sport, especially between the ages 5 to 12 years old.[16]

While early sport specialization may provide opportunities to improve athletes' skill level to an elite status, it also carries an increased risk of psychological stress and/or physical injuries.[11] Sport specialization experts assert that the repetitive use of similar load structures required by a given sport within a particular time frame may lead to sport-related injuries due to a lack of diversity in movement, development of imbalances in muscle strength and flexibility, and adaptation of specific neuromuscular patterns increases injury risk.[17,18]

Studies aligned with the theory that sports-specialized athletes with a more technical and repetitive movement profile, such as volleyball or overhand sports like baseball and tennis, may be more prone to overuse injury than those with a broader movement profile such as basketball and soccer.[17,18,7] Jayanthi et al., identified an association of specialization and overuse injury in tennis and soccer youth athletes.[19] Similarly, Bell et al., showed soccer specialization is associated with increased risk of acute and overuse knee injuries.[20]

Conversely, Frome et al., study found no association of being specialized and overuse sport injuries in elite youth soccer players.[21] However, it is crucial to note that injuries sustained over time may lead to burnout, fear of re-injury, difficulty returning to pre-injury skill levels, and early sport retirement.[22] Sports-related injuries account for up to 20% of injury cases for 5 to 24 years old athletes.[18,23–27]

As athletes engage in more intensive play and training to pursue their goals, their level of specialization tends to increase, potentially impacting the quantification of overuse injury risks, including serious overuse injuries.[18,28] Previous studies have consistently observed that highly level specialized athletes were more prone to report a history of severe overuse injuries, particularly in the lower extremity and knee compared to their lower level sport specialized athletes.[6,11,15,18,29–31] A study with 579 participants between 7-18 year-old athletes established that the degree of sport specialization influenced the risk of injury, while the more specialized ones had a greater likelihood of being injured or having an overuse injury.[6] Jayanthi et al., noted that highly specialized young athletes in individual, skill-specific sports – such as dance, gymnastics, or tennis – had 1.67 times greater odds of developing an overuse injury than non-specialized team sport athletes.[14] Examining 1544 athletes across various sports in 9-12 grades of high school demonstrated that moderate and high sport specialized athlete were more likely to have lower extremity injuries than low specialized counterparts.[32] In contrast, a study with 13-18 year-old club and non-club athlete participants found no significant differences in injury history based on specialization level.[11] However, participation in club sports (organized sports outside of traditional school athletics) was associated with a higher proportion of time-loss musculoskeletal injuries, potentially attributed to the competitive nature of club sports.[11] In a retrospective study

consisting of 2099 male youth soccer players, specialization was not associated with overuse injuries.[33] Furthermore, a cross-sectional study indicated that athletes who are highly specialized at 10-13 years old are not associated with an increase in injury history compared to moderately specialized ones.[34]

Several recent publications investigated the impact of sport specialization on the different kinds of musculoskeletal injuries.[5,11,17,18,27,28] There is a lack of consistent results and complexity in the risk factor evaluation and prevention of these injuries in youth sport-specialized athletes. For example, Fabricant et al., in a systematic review, showed that the primary evidence supporting an increased risk of overuse injuries in early sport-specialized athletes under age 18 is not incredibly significant.[37] The Fabricant et al., findings did not support the idea that early sport specialization is a major cause of overuse injuries.[37] On the other hand, Ahlquist et al. found that early sport specialization in NCAA Division I athletes aged ≥18 years old who specialized before age 14 have a greater risk for injury.[22] So athletes with early specialization were more likely to report a history of injuries, multiple injuries, multiple college injuries, a greater number of total injuries, and more time out for an injury than those without.[22] A study on 7 -18 year-old specialized athletes showed that 69.1% sustained a sports-related injury.[25] Also, Pasulka et al. showed a significant correlation between early specialization and the onset of all sport-related injuries.[20] These conflicting findings in the literature underscore a significant knowledge gap in understanding the relationship between sport specialization and musculoskeletal injuries, which our study aims to address.

Sports and sport specialization have seen a notable upswing in popularity among Iranian athletes in recent years.[41] The nation's fervent sporting culture and diverse passion for various

sports have resulted in an increasing trend of sport specialization among young athletes. There have not been enough studies on sport specialization in Iran. However, few previous studies in Iran highlight a relatively high incidence of sports traumas and injuries, particularly in sports like soccer, gymnastic and basketball.[41] Existing literature review indicates that studies in the field of sports injuries in Iran have been somewhat limited, often focusing on specific sports with a small sample size in localized areas. Consequently, these studies fall short of providing comprehensive information for coaches.[41] Notably, there are currently no specific papers or studies in Iran that have investigated the association between sport specialization and sports-related injuries. Thus, there is a need to conduct further research on the topic of youth sport specialization within to the context of the Iranian sporting culture. Moreover, understanding the intricate relationship between various factors, including sex, sport type, and sport specialization level, is essential in formulating effective injury prevention strategies. Therefore, additional research focused on these variables is warranted.

The sport types

Researchers investigated what factors affect the prevalence of sports specialization and the risk of sport injuries.[6,14,34,42] It may depend on the specific sport type: team or individual.[18,32,7,34] Specialized individual-sport athletes are at a higher risk of injury compared to specialized team-sport athletes.[7,25] In Pasulka et al., study, 7 – 18 year-old athletes who are specialized in individual sports are more at risk of sustaining overuse and serious overuse injuries compared to team-sport specialized athletes.[25] Moreover, the Pasulka et al., study indicated that athletes who play tennis, baseball/softball, and volleyball have the highest risk for overuse injury, while those who play tennis, gymnastics, and dance have the highest rate for

serious overuse injury.[25] Also, athletes who specialized in team sports - such as football, cheerleading, and soccer - were more likely to sustain acute injuries.[25] Theisen et al., study showed that athletes aged 12 – 19 who play in team sports – including basketball, handball, soccer and volleyball - were generally at greater risk of suffering traumatic and overuse injuries than athletes who play individual sports - namely badminton, canoeing/kayaking, athletes, cycling, figure skating, and gymnastics, judo, karate, table tennis, tennis, triathlon, swimming- (6.16 injuries per 1000 exposure hours compared to 2.14 injuries per 1000 h); however, there were no significant differences between the injury type (traumatic versus overuse) among team- and individual-sport athletes.[43] There is a need for more exploration of the impact of sport type for estimating the rate of injury in sport-specialized athletes.

Sex differences

Another factor that may affect the risk of injury is sex.[7,30,42] Certain researchers have explored the association between specialized athlete injuries and sex differences.[7,30,42] There is always a question about why the association of sport specialization and different injuries varies between males and females. Based on the aforementioned studies, biomechanical changes occur differently for females and males undergoing puberty; for example, quadricep strength in females significantly decreases between pre-puberty and post-puberty, while it increases in males.[44] These differences may increase the rate of injuries in adolescent and mature females.[42,44] Some research indicates that females were more likely to highly specialize in basketball, have elevated participation volumes and may have an increased risk of chronic and acute injuries compared to males the same age.[7,30,42] Females also report more previous lower extremity injuries compared to their male counterparts, even after controlling age and training volume.[7,30,42]

For instance, a study on male and female athletes between 12 -18 years old participating in various organized sports (cross country running, baseball, basketball, gymnastics, football, ice hockey, lacrosse, soccer, softball, swimming/diving, tennis, volleyball, track and field and wrestling) showed that highly specialized athletes were more probable reporting acute and overuse injuries. Evaluating the results on the basis of sex showed that only highly specialized female athletes were more likely to report an acute injury.[42] Moreover, highly and moderately specialized female athletes report overuse injuries. In contrast, highly specialized male counterpart athletes did not report any acute and overuse injuries.[42] According to Hall et al., single sport specialized female basketball, soccer and volleyball players are at greater risk than males of developing anterior knee pain and other chronic knee injuries compared to multisport athletes.[41] This research also showed that female basketball athletes were nearly four times more likely to report an overuse injury than their male counterparts.[31] Jayanthi et al., study with 579 participants between 7 – 18 year-old athletes over a three-year longitudinal study period demonstrated that female athletes, including children and adolescents, were more at risk for all injury types such as overuse nontraumatic, serious and normal overuse and traumatic/acute after adjusting for covariates, such as time and age.[6] Moreover, Acute injuries were diagnoses linked to a single traumatic event, while overuse injuries were characterized by a gradual onset unrelated to a specific trauma. Within the category of overuse injuries, 'serious overuse' refers to conditions demanding a minimum of one month of sports-related rest as advised by a physician. Such conditions include spondylolysis, stress fractures in the spine or extremities, stress injuries involving physes, elbow ligament overuse injuries, and osteochondritis dissecans. [6] Therefore, females who participated in at least one organized sport showed an increase in weekly hours of physical activity, and this increase in weekly hours of organized sports was associated with

overuse injuries.[6] The lack of adherence to published recommendations was associated with increased odds of overuse injuries during the study period for each component (>2:1 sports/free play ratio: $p = .003$; weekly sports hours greater than age: $p < .001$; >8 mo/y of sports training: $p < .001$).[6] Conversely, single-sport-specialized athletes had fairly similar female and male proportions in team sports.[37,39] Further studies reported that female athletes were more likely to report elevated risks of injury than their male counterpart in their organized sports. There is a gap regarding the association between sex and injury history in sport specialization in organized sports.

Objectives

1. The main objective of this study was to determine the presence of youth sport specialization among 8-18-year-old children in Iran.
2. The second objective of this study was to determine the impact of different levels of youth sport specialization in Iran on the likelihood rate of sport-related injury history in 8-18-year-old children.
3. The third objective was to determine if there is a relationship between sport type and an increase in the likelihood rate of injury history for sport-specialized 8–18-year-old Iranian children.
4. The fourth objective was to determine if there is a relationship between sex and an increase in the likelihood rate of injury history for sport-specialized 8–18-year-old Iranian children.

Results can contribute to identifying which relationship will present risk factors for sport-related injuries.

Hypothesis

Our aim was to determine whether there is an association between injury history and sport specialization. We paid attention to sex, sport specialization level, and sport type such as individual and team sports and how these differences related to changes in injury history in 8 – 18 years old Iranian children and adolescents. Our hypothesis consisted of four main components. First, youth sport specialization exists among 8-18 years old Iranian children and adolescents. Second, a higher level of sport-specialized athlete will result in a higher injury history. Third, female athletes will have more injury history. Forth, individual sport athletes will associate with more injury history.

Methods

Study design

This cross-sectional study examined the association between sport specialization, sex, sport type and sport related injury in Iranian children and adolescents' athletes (8 – 18 years old). We assessed the sport specialization level, sex, sport type and sport related injury through one questionnaire.

Ethics approval (certificate #30018315) for this study was obtained from Concordia University Human Research Ethics Committee.

Participants

The participants were Iranian male and female children and adolescents, recruited from eight schools located in Tehran, Isfahan, and Mashhad. Recruits were included if they met the following inclusion criteria: they were 8 to18 years old and were participating in an organized school team sport, defined as the sport athletes that choose as their main sport, where they dedicate significant time, and participate in their school's team sport under coach supervision. Children and adolescents who did not participate in an organized sport were excluded.

Measures

All the data was assessed with one questionnaire consisting of demographic, sport specialization, and sport injury data parts. Within this questionnaire, the demographic section collected information on sex, age, date of birth, height, and weight.

Sport specialization

In assessing the degree of sport specialization among children and adolescents, we utilized the 4-point Jayanthi scale, categorizing specialization as low, moderate, high, or extreme based on four key questions. Participants were assigned 0 points for responding 'no' and 1 point for responding 'yes' to each of the following questions: (1) Do you have a primary sport (i.e., single-sport training)? (2) Did you quit other sports to focus on your primary sport (i.e., exclusion of other sports)? (3) Do you train more than 8 months per year (i.e., year-round training)? (4) Did you specialize (quit all other sports) under the age of 12 years? Each applicable component receives one point, and the total points accumulated determine the level of sport specialization. A final score of zero or one point is classified as low, two points as moderate, three points as high, and four points as extreme.

The sports specialization section, which was based on validated and previously tested questionnaire[6], included information on sports played throughout the year, primary sport type, sports enjoyment, and degree of sports specialization. This also covered hours per week participating in organized sports (training and competition), free play hours per week, the duration of organized sport, and free play per session.

Sport injury

Athletes who had injuries completed an additional injury section for their most severe sport-related injury and the second severe sport-related injury to report the injury area, injury type, mechanism, and date of injury. The non-injured athletes did not need to complete the additional injury section.

Procedures

Hard copy questionnaires were distributed to the athletes of organized sports teams within local and public schools by my colleagues, who served as coaches for the participants. These schools were where we also worked as coaches for their team sports. These schools were chosen based on proximity and availability of relevant age groups, and our study's inclusion criteria, which required participants to be engaged in a main sport and aged between 8-18 years old. Formal approval was obtained by communicating with school authorities and relevant review boards to ensure ethical compliance. The participants were informed about the study and its purpose and were given the opportunity to participate voluntarily. If they expressed interest, they were invited to participate in our study. For the younger participants, the same information was conveyed to them and their parents. On the first page of the survey, there is a consent form that they are asked to sign if they are willing to be in the study. Athletes aged 13 to 18 years were requested to complete the surveys on-site at their respective schools. The evaluators were readily available to address any inquiries or concerns these older athletes might have during the survey completion process.

For athletes aged 8 to 12 years, a slightly different approach was taken. The evaluators provided them with the survey materials and encouraged them to fill out the questionnaires in collaboration with their parents or guardians. These younger athletes were then instructed to return the completed surveys the following day. This method was chosen to ensure that the 8 to 12-year-old athletes had the necessary guidance and support from their parents, fostering accurate and comprehensive responses.

The meticulous data collection process, facilitating on-site survey completion for older athletes, and ensuring clear communication with both athletes and their parents or guardians, aimed to accommodate the age-specific needs of the participating athletes and maintain the quality and reliability of the collected data.

Statistical analysis

In the study, presence of youth sport specialization, the association between injury history and degree of sport specialization, the association between injury history and sport type, the association of injury history and sex type were reported. Additionally, frequencies and proportion of each sport specialization category reported for previous sport-related injury characteristics for primary sport reported, sex (biological at birth), sport type (team or individual).

To determine the presence of youth sport specialization in Iran, we compared frequencies and proportion of each sport specialization level reported. Chi-square tests were used to investigate the relationship between injury history and all the variables, including sex, sport specialization level, sport type. In the chi-square test, we conducted the test based on variables frequencies, and later calculated the percentages for additional assessment, and included these values in the results tables. In the chi-square test, dependent variable frequencies were compared with independent variable frequencies. Additionally, logistic regression tests were used to examine the effect of sex, sport type and sport specialization on injury history. Moreover, an independent sample t-test was used to compare the means of training more than 8 months per year variable in two groups with a history of injury. All statistical analysis were conducted using SPSS version 25 (IBM Corp, 2017) with a significance level set at 0.05 in all the tests. We compared all the data between different sport specialized levels athletes and determined correlations between sport specialization level, sex, sport type and sport related injury.

Results

A total of 265 participants were approached for the paper-based questionnaire, of which 215 completed it in full. Fifty (50) participants were not included in the final count as they did not fully complete the survey.

Results on demographic data

In Table 1 and Figure 1, the participants' height ranges from 115 to 195 cm, with an average of 157.54 cm (SD = 14.625). Athletes' weights vary between 20 and 90 kg, averaging 52.61 kg. (SD = 17.148).

Based on the findings presented in Table 1 and Figure 1, the participants' age ranges from 8 to 18 years old, with an average of 13.37 years old (SD = 3.180).

Result on sport specialization

Sports specialization was evaluated based on four criteria: prioritizing a main sport over others, quitting other sports, training for over 8 months annually in the chosen specialized sport, and specializing before the age of 12. The summarized responses are presented in Table 2. All participants affirmed prioritizing a main sport. Notably, 64.7% reported not quitting other sports, 58.1% indicated training less than 8 months a year in their main sport, while 41.9% practiced for more extended periods. Additionally, 73% reported not specializing in their main sport before the age of 12.

The total points across all questions were then calculated to ascertain participants' level of sports specialization. The results for this variable are presented in frequency distribution Table 3. 39.1% of participants were classified as low sport specialized, 32.1% as medium sport specialized, and 31% as both high and extreme sport specialized athletes. Based on Table 3 and the responses to the 4 points Jayanthi scale questions, we established the existence of youth sport specialization in Iran. All athletes responded, ‘yes’ to the question 'Pick a main sport that is more important than the others' on the Jayanthi scale, thereby categorizing them as sport-specialized athletes. Furthermore, the results from Table 3 provided additional evidence supporting the presence of sport specialization in Iran. However, based on table 4, there was no association between injury history and the level of sport specialization. To obtain this result, we explored the association between injury history and sport specialization questions. In Table 4 there is no significant relationship between quitting other sports and injury history ($x^2 = 0.127$, $p = 0.721$), or between an athlete's injury history and specializing in sports before the age of 12 ($x^2 = 0.034$, $p = 0.853$).

Table 5 presents insights derived from responses to in-depth questions regarding specialized sports. Notably, 79 (36.7%) participants reported practicing their main sport for less than 4 hours weekly. Additionally, a significant proportion (62.8%) indicated that each sports session averages 2 hours. Similarly, respondents reported an average of 2 hours for training sessions in other sports (89.8%). Eighty-four (39.1%) participants commenced their main sport between the ages of 8 and 10 years, with 86% having participated in sports competitions outside their province or country. Most athletes rest for 4 or 5 days a week. Furthermore, 86.5% of

athletes prioritized skill development over leisure, and 88.8% acknowledged spending less time with family and friends due to training or competition commitments.

Result on sport type

All participants engaged in six primary sports—basketball, gymnastics, soccer, swimming, tennis, and volleyball. Figure 2 illustrates that 87.88% of gymnasts have a history of sports injuries. Notably, swimming stands out with the highest incidence of injuries, with 94.29% of athletes in this discipline reporting a history of sports-related injuries. The results from Table 4 show no significant relationship ($x^2 = 0.136$, $p = 0.712$) between athletes' injury history and the type of sport (team or individual).

Results on sex differences

In Table 6, the sex distribution of the participants shows a nearly equal split, with 108 individuals (50.2 percent) being male and 107 individuals (49.8 percent) being female. Additionally, the results in table 4 indicate that there is no significant association between athletes' history of injury and sex ($x^2 = 0.25$, $p = 0.617$).

Additional results

In our supplementary analysis, in table 4, we explored relationships between an athlete's injury history and various factors, providing additional insights into the sub-question results. Firstly, our findings indicate that there is no statistically significant association between quitting other sports and an athlete's injury history ($x^2 = 0.127$, $p = 0.712$). Similarly, no relationship was

observed between an athlete's injury history and their specialization in sports before the age of 12 ($x^2 = 0.034$, $p = 0.853$). However, we conducted chi-square test on frequencies of athletes training for more than 8 months per year and injury history, and found a significant relationship between athletes training for more than 8 months per year and injury history ($x^2 = 6.123$, $p = 0.013$). This indicates that athletes who trained for more than 8 months per year had a higher incidence of injury history compared to those who trained for fewer months per year. As reported in Table 4, 97.8% of athletes who train for more than eight months per year in their main sports experience sports-related injuries. Also, 88.8% of participants who did not practice more than 8 months per year in their main sport, reported a history of injuries. Furthermore, our supplementary analysis using the Chi-square test revealed a noteworthy link between athletes' travel for competitions and a history of sports injuries ($x^2 = 53.655$, $p = 0.000$). Specifically, a significant majority (97.8%) of athletes who traveled for competitions had a history of sports injuries, while 60% of those who did not travel also reported a history of injury. Moreover, to assess the association between sports injury type and qualitative variables, a chi-square test (x^2) was conducted using a Crosstab table. The results, detailed in Table 7, indicate that sex and the occurrence of sports injuries were found to be independent ($x^2 = 1.214$, $p = 0.545$). However, a significant association was observed between sports specialization and the history of injuries (x^2 =28.016, $p = 0.000$). Specifically, individuals with low and medium sports specialization levels exhibited a higher incidence of acute injuries compared to those at extreme specialization levels. Furthermore, the type of sport (team/individual) demonstrated a significant relationship with sports injury type ($x^2 = 55.559$, $p = 0.000$). Acute sports injuries were more prevalent in team sports (86.3%) compared to individual sports (40.8%). Additionally, a significant relationship was found between the type of main sport (e.g., basketball, gymnastics) and the incidence of

sports injuries ($x^2 = 86.031$, $p = 0.000$). For instance, soccer (92.9%), volleyball (82.8%), and basketball (82.6%) showed higher rates of acute injuries compared to sports like swimming (31.4%) and tennis (23.3%).

Logistic regression analysis of injury history

The utilization of logistic regression allows for the examination of the impact of various variables on a dichotomous outcome, such as injury history, where individuals are categorized as either having experienced an injury or not. This study employed logistic regression to investigate the influence of sex, sport type, and sport specialization on injury history, with the subsequent results outlined Table 8. Furthermore, the results of logistic regression indicate that none of the examined variables exhibit a significant impact on the history of injuries among 8-18-year-old Iranian students. While linear regression typically employs the coefficient of determination to gauge explanatory power, logistic and rank regression methodologies do not allow for a direct calculation of this measure. Instead, approximately 2.9% to 7.1% of the variability in injury history can be attributed to the independent variables of the model. Table 9 provides estimations of the current parameters within the rank regression model. The findings indicate that none of the examined variables exhibit a significant impact on the history of injuries.

Comparing mean quantitative variables between groups with injury history

Given the normal distribution of certain research variables, such as training more than 8 months per year, the comparison of their means across two groups with injury history utilized the independent samples t-test. The ensuing results are detailed in table 10. In analyzing the

outcomes of the independent samples t-test, an initial assessment of the equality of variances between the two groups was conducted through the Lunn test. Subsequently, we used the t-test to determine differences. The analysis reveals a statistically significant difference between participants with a history of injury and those without, regarding training intensity in their primary sport for over 8 months per year (t= -2.235, $p = 0.026$). This finding underscores the genuine impact of prolonged training periods exceeding 8 months per year on the likelihood of sustaining a history of injury.

Discussion

Our investigation into the relationship between sport specialization, sex, sport type, and sports-related injuries among Iranian children and adolescent athletes aged 8 to 18 has yielded insightful findings. We hypothesized the presence of youth sport specialization among Iranian children and adolescents aged 8-18 years. Our analysis, as demonstrated in Table 3 and through the results obtained from the Jayanthi scale, confirms the existence of youth sport specialization among athletes in this age group within Iran.

Our findings are consistent with existing literature regarding the prevalence of youth sport specialization. For instance, Jayanthi et al. identified youth sport specialization among athletes aged 7-18 in the United States, aligning closely with our observations among Iranian athletes in the same age range.[9]

We hypothesized that higher level of sport specialized athletes will result in a higher rate of injury history. Contrary to our hypothesis, our chi-square test revealed no significant association between injury history, the sports specialization level ($x^2 = 3.250$, $p = 0.355$) .This result showed that sport specialization is not associated with whether an athlete has experienced an injury, or not, between 8-18-year-old Iranian athletes.

Our assessment of sport specialization levels using the 4-point Jayanthi scale provided a perspective in a relationship between being a sport specialized athlete before the age of 12, and injury history. In our analysis, we found no significant relationship between quitting other sports and injury history. Additionally, no association observed between athlete's injury history and specialization in sports before the age of 12. However, a finding emerged, indicating that athletes

engaged in training for more than 8 months per year exhibited a significant relationship with injury history. This underscores the importance of considering training intensity and duration as influential factors in injury susceptibility.

Our results align with some existing literature on sport specialization and its potential consequences. Previous studies have suggested a complex relationship between specialization and injury risk.

Frome et al.'s study found no significant association between specialization and overuse injuries in elite youth soccer players, highlighting the variability in outcomes across different factors, which supports our findings. Nevertheless, notable distinctions exist between the study by Frome et al. and our thesis.[21] Their research focused specifically on specialized male youth soccer athletes, comparing them with non-specialized counterparts. In contrast, our study examined the broader spectrum of injury risk, considering factors such as sex, sport type, and sport level. Furthermore, the study by Frome et al. concentrated on males with an average age of 13.2 ± 1.8 years, whereas our thesis included both females and males aged between 8 and 18 years. Our study's findings align with Frome et al.'s, indicating a lack of significant association between specialization and injury risk. In contrast, our results differ from those of Jayanthi et al., who identified an association between specialization and overuse injuries in youth tennis and soccer athletes.[18]

Additionally, Whatman et al. conducted a cross-sectional study in 11-16 years old Canadian junior high schools, providing a valuable parallel to our research. While the age range in their study slightly differs from ours (11-16 years old compared to our 8-18 years old

participants), the results align in several aspects. Whatman et al. included 238 participants, slightly more than our 215 participants. Notably, 18% of their participants reported high specialization.[39] Importantly, both studies found no significant associations between sport specialization and variables such as sex, grade, school size, and history of injury. Our chi-square test revealed a significant relationship between athletes engaging in training for more than 8 months per year and a history of sports injuries ($x^2 = 6.123$, $p = 0.013$). This finding aligns with the observations made by Whatman et al. in their cross-sectional study. They reported that approximately one-third of Canadian high school adolescent students (14-19 years old) participating in sports were classified as highly specialized. [40] The study reports an increased risk of musculoskeletal injury history associated with intensive training, spending more than 8 months per year in a single sport, and concussions.[40] The consistency between our findings and those of Whatman et al. underscores the strength of the relationship between extended training duration, high sport specialization, and the elevated risk of sports-related injuries among adolescent athletes. These congruent findings contribute to the more validity of our results and emphasize the consistency of the relationship between sport specialization and injury patterns.

The next hypothesis proposed that sport type would influence the rate of injury history in sport-specialized athletes. However, the chi-square test results showed no significant association between the history of injury and sport type. In contrast to our hypothesis, our findings diverge from a substantial body of prior research consistently indicating a heightened risk of injuries among specialized individual-sport athletes compared to their specialized team-sport counterparts. For instance, Pasulka et al., in their study involving athletes aged 7–18, highlighted that specialized individual-sport athletes are more susceptible to sustaining overuse and serious

overuse injuries than their counterparts in specialized team sports. [25] Conversely, Theisen et al.'s research involving athletes aged 12–19 demonstrated that team sport athletes were generally at a greater risk of suffering both traumatic and overuse injuries than their individual-sport counterparts.[43] Our study's findings contradict the expected relationship between sport type and injury history among sport-specialized athletes, highlighting the intricate relationship between various factors that influence injury patterns. Furthermore, it is interesting to break down the components of sport type and examine them individually, such as scrutinizing sport injuries in basketball, badminton, swimming, and more. Perhaps this approach would provide a more comprehensive picture of the impact of sport type on sport-related injuries in Iran, allowing for more targeted preventive measures and athlete support strategies. Further research is imperative to delve into the nuanced factors contributing to these disparities and refine strategies for enhancing athlete well-being within the Iranian context.[22]

The next hypothesis posited that sex would impact the rate of injury history in sport-specialized athletes across all sport specialized level, with the expectation that female athletes would exhibit a higher incidence of injury history in comparison to their male counterparts. However, following a chi-square test, our results indicated that no significant association between the history of injury and sex. In contrast, a wealth of prior studies consistently reported a heightened risk of injuries among specialized female athletes compared to males. For instance, Biese et al. conducted a study on highly sport-specialized female athletes aged 12–18, reporting that females were more likely to experience injuries than their male counterparts.[42] Similarly, Hall et al. found that female basketball athletes were nearly four times more likely to report overuse injuries than their male counterparts. Moreover, Jayanthi et al.'s research on athletes

aged 7–18 showed that female athletes were more susceptible to acute, overuse, or serious overuse injuries.[6]

The unexpected deviation in our study's findings regarding the impact of sex on the rate of injury history among sport-specialized athletes warrants careful consideration. In contradiction to established literature, our results revealed no significant association between sex and the history of injuries in sport-specialized individuals. This contrast may be attributed to unique socio-cultural or training factors within the Iranian context. For instance, socio-cultural factors such as cultural norms and negative attitudes towards female participation in sports, including potential disparities in access to training resources, support from coaches and peers, and overall participation levels, could play a role. Additionally, training factors such as fewer variations in training programs for females compared to males may contribute to this disparity. These factors underscore the necessity for context-specific investigations to comprehend injury patterns among female athletes in Iran. Further research is imperative to elucidate the contributing factors behind this disparity and to refine injury prevention strategies tailored to the Iranian female athletic population.

The sample in our study comprised sport-specialized athletes aged 8-18 years old. While our findings may be applicable to similar age groups of sport-specialized athletes in other cities or regions, including rural areas of Iran and potentially globally, it's important to exercise caution in generalizing the results. Further research is needed to validate the transferability of our findings across diverse populations and settings. Additionally, variations in socio-cultural factors, access to resources, and training environments may impact the applicability of our findings to different contexts. Therefore, future studies should employ more diverse sampling

methods and consider broader geographical representations to enhance the generalizability of the research outcomes.

In essence, our study provides more information about how sport specialization relates to sports-related injuries in Iranian children and adolescent athletes. By synthesizing our findings with the broader literature, we emphasize the need for a context-specific understanding of these dynamics, recognizing the diverse nature of sports and the intricate factors influencing injury risk.

Limitations

There are several limitations to our research project that could potentially account for the discrepancy between the literature and our study. The first is the relatively small sample size. Due to many websites and links are filtered and inaccessible in Iran, participants prefer the paper-based questionnaire, and we were not able to send the preprepared lime survey to all potential participants and other schools.

In the course of this research, it is pertinent to note that, to the best of our knowledge, no prior literature has specifically investigated the proposed hypothesis within the context of Iran. The scarcity of relevant studies in the Iranian setting posed challenges in terms of directly comparing our findings with existing research, underscoring the need for caution in generalizing our results beyond the scope of this study.

Conclusion

In conclusion, our result showed youth sport specialization exist among 8-18-year-old Iranian children. Also, our study on the relationship between sport specialization, sex, sport type, and sports-related injuries among Iranian youth athletes may challenges previous studies. Contrary to expectations, we found no significant association between the sport specialization and injury history and nor did we find any association between the level of sports specialization and injury history.

Surprisingly, our results revealed no significant association between sex and injury history among sport-specialized individuals, suggesting unique factors in the Iranian context. Regarding sport type, our study contradicts common perceptions by showing no significant link between injury history and the type of sport. However, extended training (over 8 months per year) showed a significant association with injury history, aligning with similar findings in the literature.

These unexpected outcomes emphasize the complexity of factors influencing injury patterns in sport-specialized athletes. Our research underscores the need for context-specific understanding in injury prevention, particularly tailored strategies for the 8-18-year-old Iranian sport specialized athletes. As the field advances, our findings contribute valuable insights to the ongoing dialogue on sport specialization and injury prevention.

Tables and Figures

Table 1: Distribution of weight and height frequency

	N	Mean	Median	Std. Deviation	Minimum	Maximum
Weight	215	52.61	50.00	17.148	20	90
Height	215	157.54	157.00	14.625	115	195
Age	215	13.37	13.00	3.180	8	18

Table 2: Distribution of sport specialization criteria

		Frequency	Percent
Pick a main sport that is important than the others	No	0	0.0%
	Yes	215	100.0%
Quit other sports	No	139	64.7%
	Yes	76	35.3%
Practice more than 8 months a year	No	125	58.1%
	Yes	90	41.9%
Expertise in sports before the age of 12	No	157	73.0%
	Yes	58	27.0%

Table 3: Frequency of participants' sport specialized level

Sport Specialization	Frequency	Percent
Low (1.00)	84	39.1
Medium (2.00)	69	32.1
High (3.00)	31	14.4
Extreme (4.00)	31	14.4
Total	215	100.0

Table 4: Relation between injury history and all variables

Injury history								
		No Frequency	Percent	Yes Frequency	Percent	Chi-square	df	Sig.
Sex	Female	7	6.5%	100	93.5%	0.25	1	0.617
	Male	9	8.3%	99	91.7%			
Main sport	Basketball	3	6.5%	43	93.5%	1.301	5	0.935
	Gymnastic	4	12.1%	29	87.9%			
	Soccer	3	7.1%	39	92.9%			
	Swimming	2	5.7%	33	94.3%			
	Tennis	2	6.7%	28	93.3%			
	Volleyball	2	6.9%	27	93.1%			

Sport type	Individual	8	8.2%	90	91.8%			
	Team	8	6.8%	109	93.2%	0.136	1	0.712
Quit	No	11	7.9%	128	92.1%			
	Yes	5	6.6%	71	93.4%	0.127	1	0.721
8month/year	No	14	11.2%	111	88.8%			
	Yes	2	2.2%	88	97.8%	6.123	1	0.013
12 years	No	12	7.6%	145	92.4%			
	Yes	4	6.9%	54	93.1%	0.034	1	0.853
Travel	No	12	40.0%	18	60.0%			
	Yes	4	2.2%	181	97.8%	53.655	1	0.000
Sport specialization	1.00	8	9.5%	76	90.5%			
	2.00	5	7.2%	64	92.8%			
	3.00	3	9.7%	28	90.3%			
	4.00	0	0.0%	31	100.0%	3.250	3	0.355

Table 5: Distribution of in-depth questions regarding specialized sports

Questions about sport specialization		Frequency	Percent
How many hours per week, on average, do you train?	<=4	79	36.7%
	5-7	54	25.1%
	8-10	49	22.8%
	11+	33	15.3%
How long, on average, does your training in your main sport take per session?	<=2	135	62.8%
	3-4	71	33.0%
	5+	9	4.2%
How long, on average, does your training in other sports (PE classes) take per session?	1	12	5.6%
	2	193	89.8%
	3	9	4.2%
	5	1	0.5%
At what age did you start competing in your main sport?	<=5	16	7.4%
	6-7	26	12.1%
	8-10	84	39.1%
	11-12	32	14.9%
	13+	57	26.5%
Do you travel out of province or country to compete?	No	30	14.0%
	Yes	185	86.0%
How many rest days do you have on average per week?	1	9	4.2%
	2	16	7.4%
	3	36	16.7%
	4	62	28.8%
	5	59	27.4%
	6	33	15.3%
During practice, I think learning something new or improving my skill is more important than only having fun.	Agree	186	86.5%
	Disagree	18	8.4%
	Uncertain	11	5.1%

I often miss spending time with my friends and/or family who don't participate in my sport because I have practice or competition.	Agree	191	88.8%
	Disagree	18	8.4%
	Uncertain	6	2.8%

Table 6: Distribution of sex frequency

Sex	Frequency	Percent
Female	107	49.8
Male	108	50.2
Total	215	100.0

Table 7: Sport injury type, numbers, and associations with sex, sport type, and specialization

Sport injury type and numbers										
		Harmless		Chronic		Acute		Chi-Square	df	Sig.
		Count	% within sex	Count	% within sex	Count	% within sex			
Sex	Female	7	6.5%	26	24.3%	74	69.2%	1.214	2	0.545
	male	9	8.3%	32	29.6%	67	62.0%			
Sport Specialization	Low	8	9.5%	11	13.1%	65	77.4%			
	Medium	5	7.2%	18	26.1%	46	66.7%			
	High	3	9.7%	18	58.1%	10	32.3%			
	Extreme	0	0.0%	11	35.5%	20	64.5%	28.016	6	0.000
Individual or team	Individual	8	8.2%	50	51.0%	40	40.8%			
	Team	8	6.8%	8	6.8%	101	86.3%	55.559	2	0.000
Main sport	Basketball	3	6.5%	5	10.9%	38	82.6%			
	Gymnastic	4	12.1%	7	21.2%	22	66.7%			
	Soccer	3	7.1%	0	0.0%	39	92.9%			
	Swimming	2	5.7%	22	62.9%	11	31.4%			
	Tennis	2	6.7%	21	70.0%	7	23.3%			
	Volleyball	2	6.9%	3	10.3%	24	82.8%	86.031	10	0.000

Table 8: Effect of sex, sport type, and sport specialization on injury history

Pseudo-statistics of the coefficient of determination		
-2 log likelihood	Cox & Snell R Square	Nagelkerke R Square
107.521	0.029	0.071

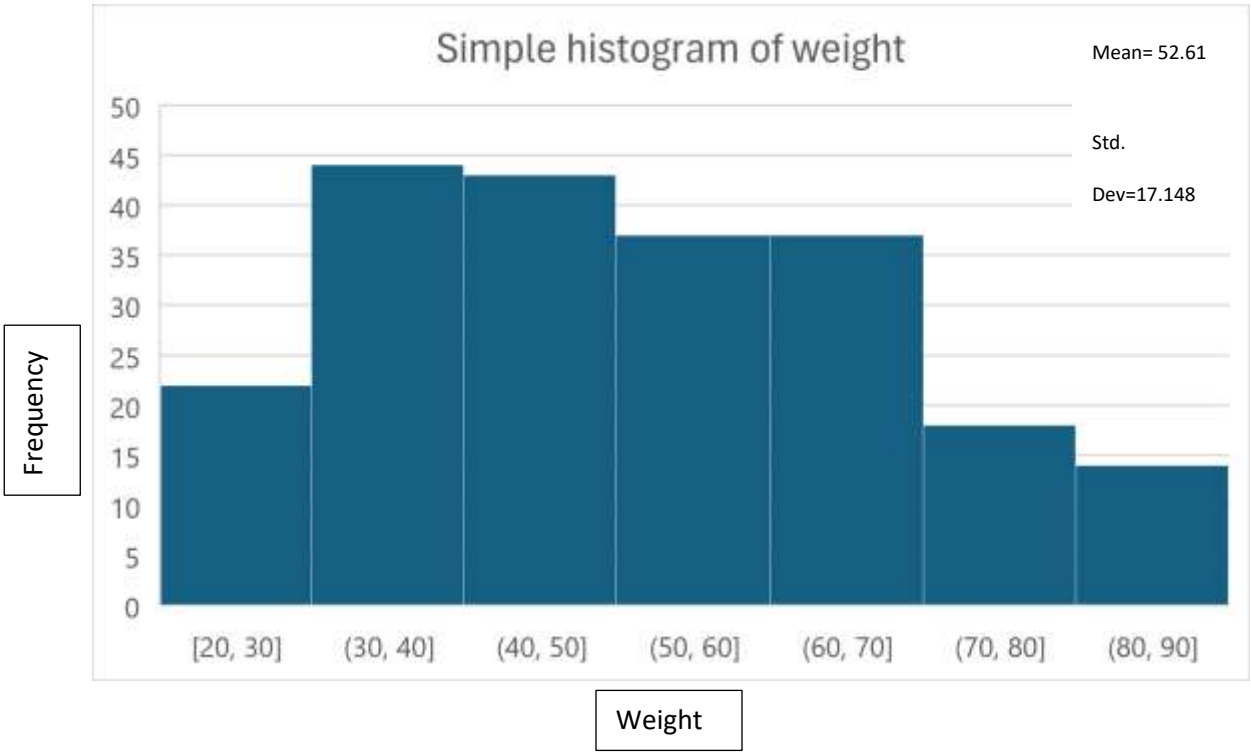
Table 9: Estimation of parameters in rank regression model

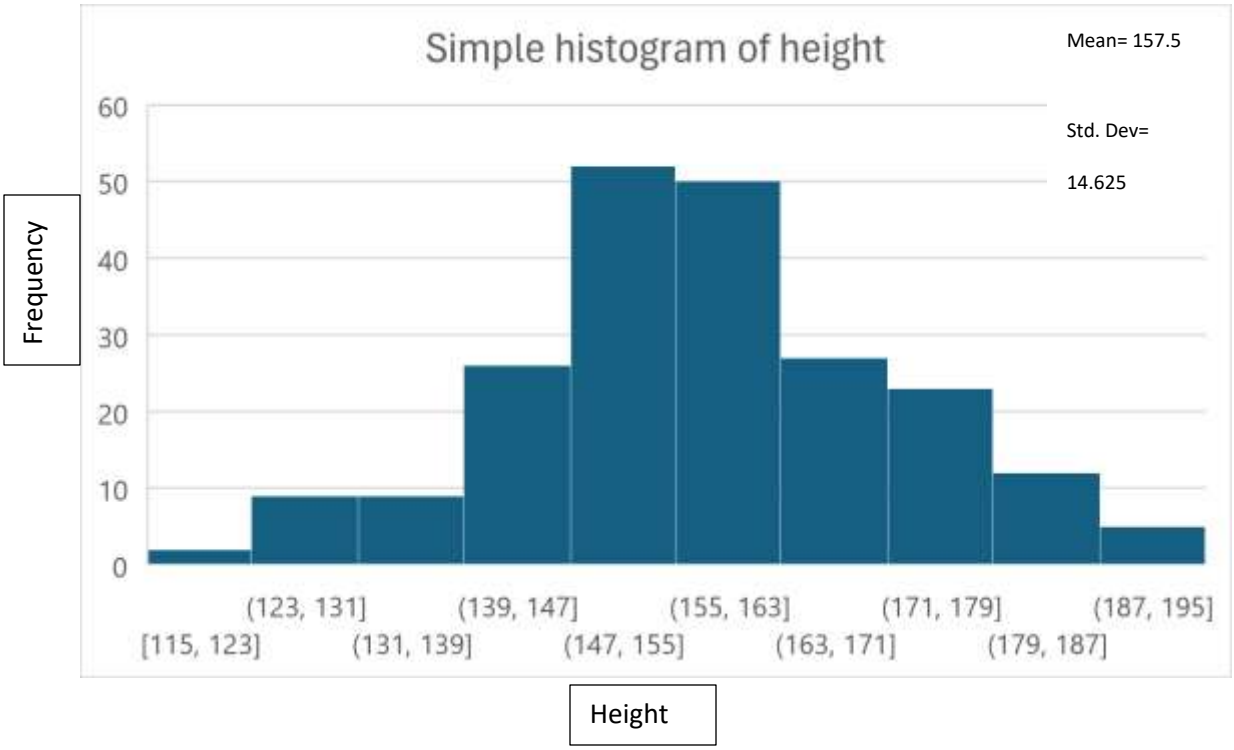
Parameters in rank regression model estimation						
	B	S.E.	Wald	df	Sig.	Exp(B)
Sex (1)	0.229	0.543	0.178	1	0.673	1.257
Individual or team (1)	-0.721	0.602	1.436	1	0.231	0.486
Sport Specialization	0.272	0.408	0.444	1	0.505	1.312
Constant	0.341	1.281	0.071	1	0.790	1.407

Table 10: Comparing mean quantitative variables between groups with injury history

	Group Statistic				Levene's test for equality of variances		T-test for equality of means		
	Injury history	N	Mean	Std. Deviation	F	Sig.	t	df	Sig.
Training 8 months/year	No	16	2.59	0.76	2.489	0.116	-2.235	213	0.026
	Yes	199	2.95	0.60					

Figure 1: Distribution of weight, height, and frequency




Simple histogram of height
Mean= 157.5
Std. Dev=
14.625
Frequency
60
50
40
30
20
10
0
[115, 123]
(123, 131]
(131, 139]
(139, 147]
(147, 155]
(155, 163]
(163, 171]
(171, 179]
(179, 187]
(187, 195]
Height

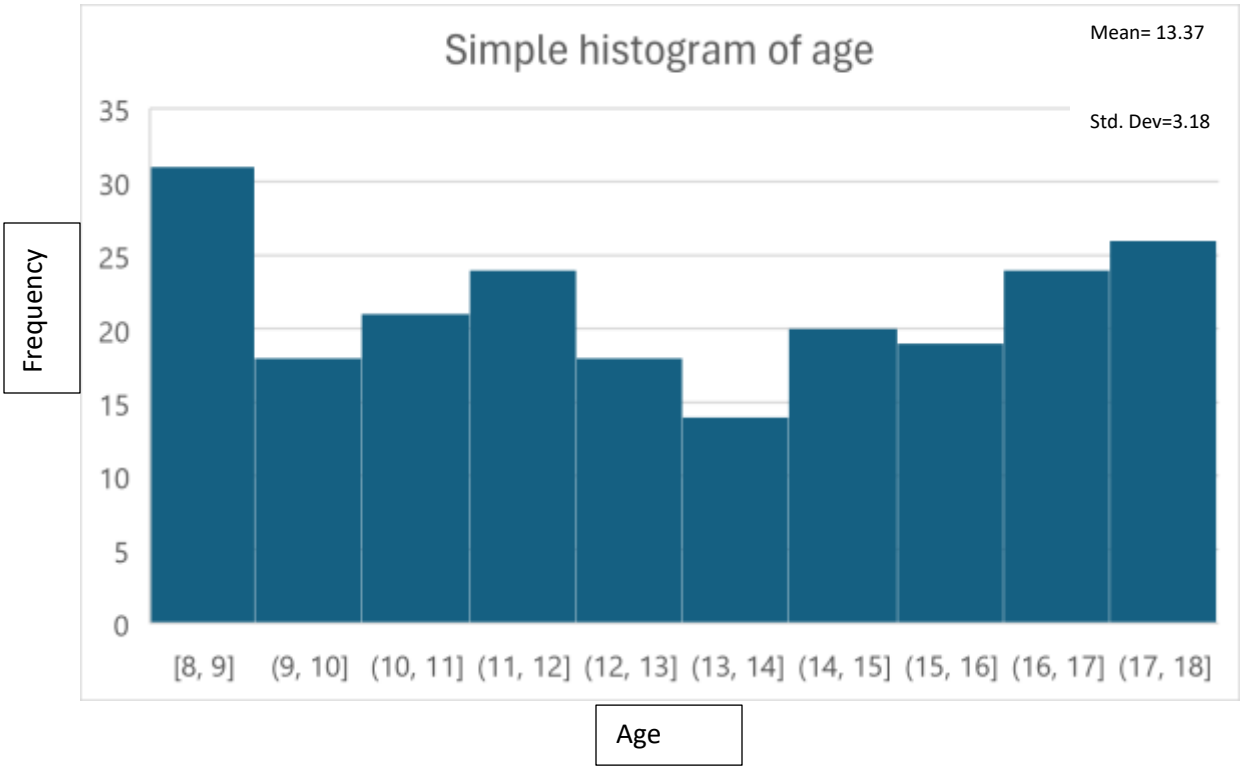

Simple histogram of age
Mean= 13.37
Std. Dev=3.18
Frequency
35
30
25
20
15
10
5
0
[8, 9]
(9, 10]
(10, 11]
(11, 12]
(12, 13]
(13, 14]
(14, 15]
(15, 16]
(16, 17]
(17, 18]
Age

Figure 2: Percentage of injuries in main sports

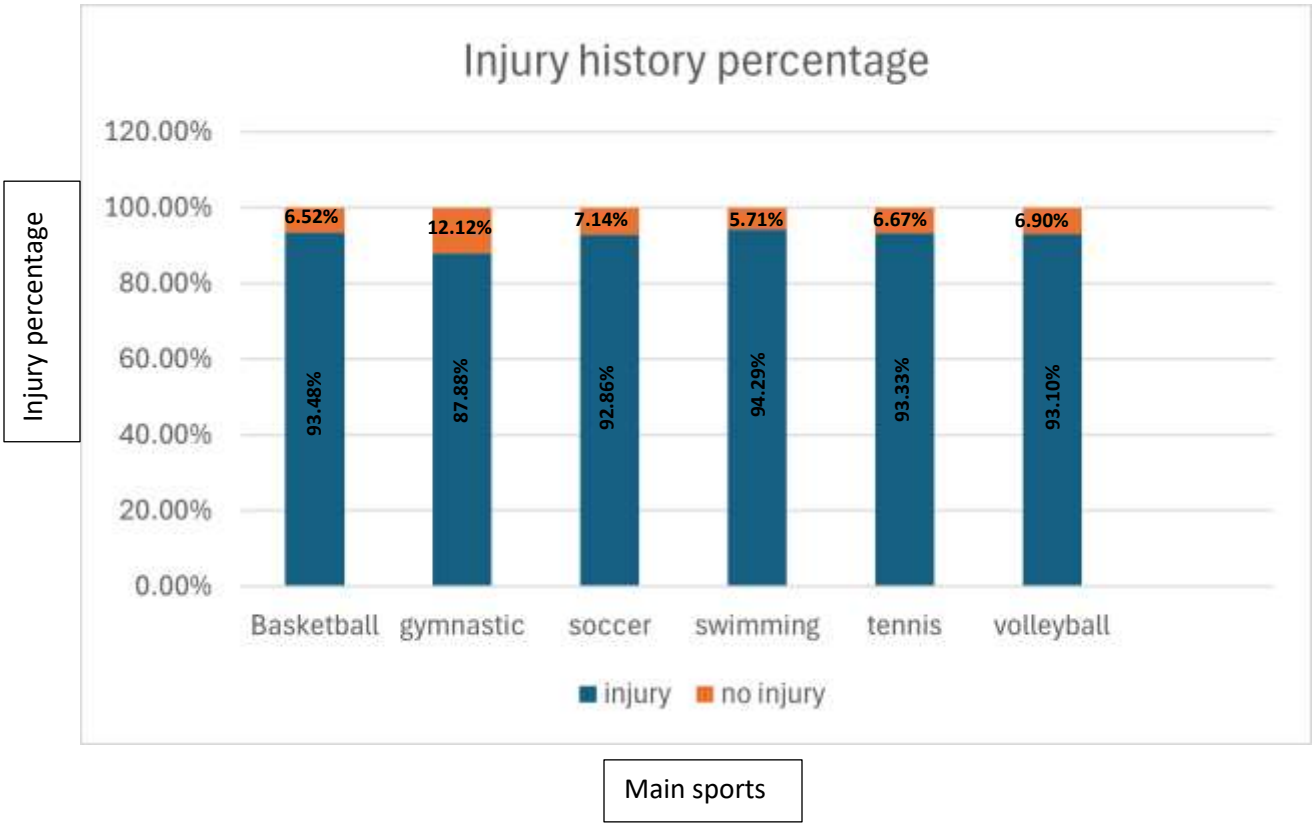


Figure 3: Sex differences in injury history percentage

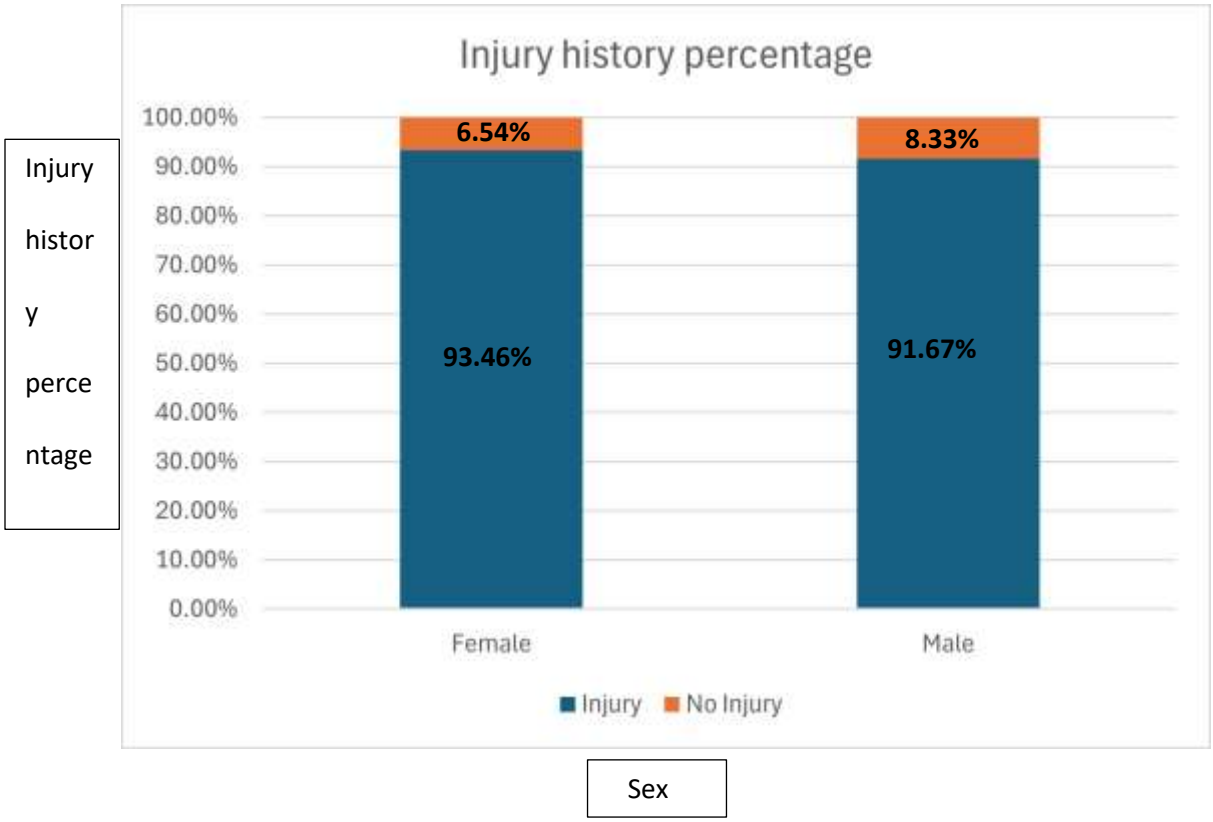


Figure 4: Sport type differences in injury history percentage

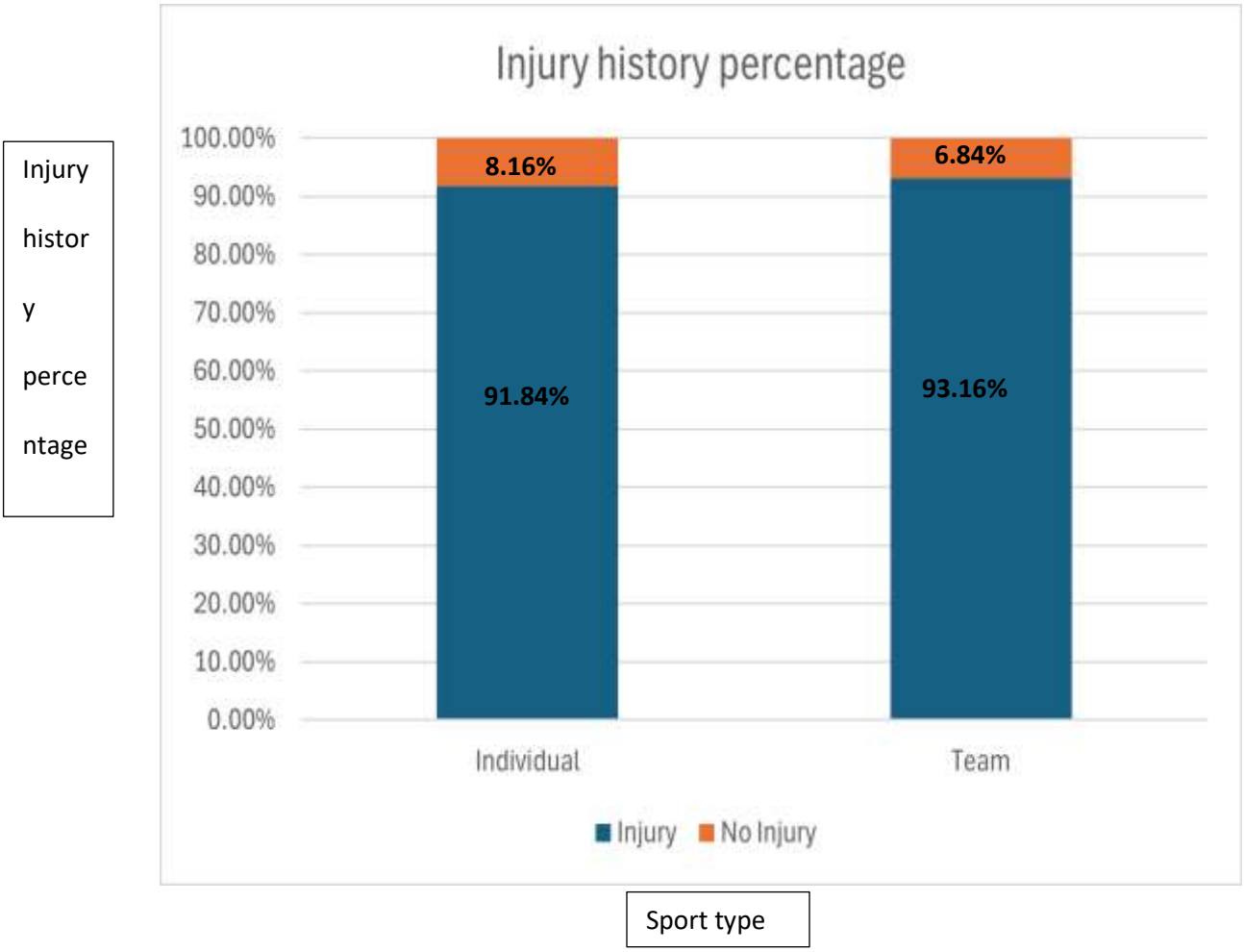


Figure 5: Training more than 8 months in injury history percentage

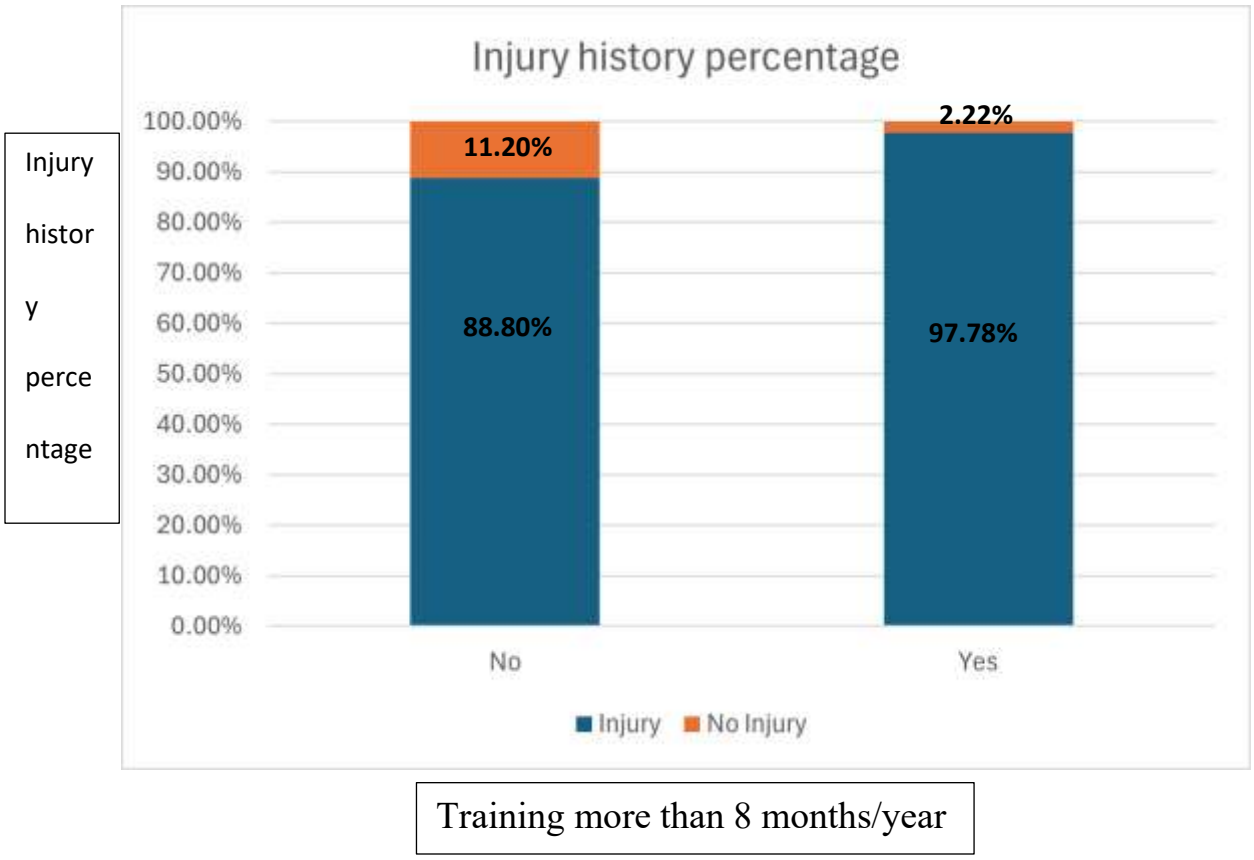


Figure 6: Becoming specialized athletes before age 12 in injury history percentage

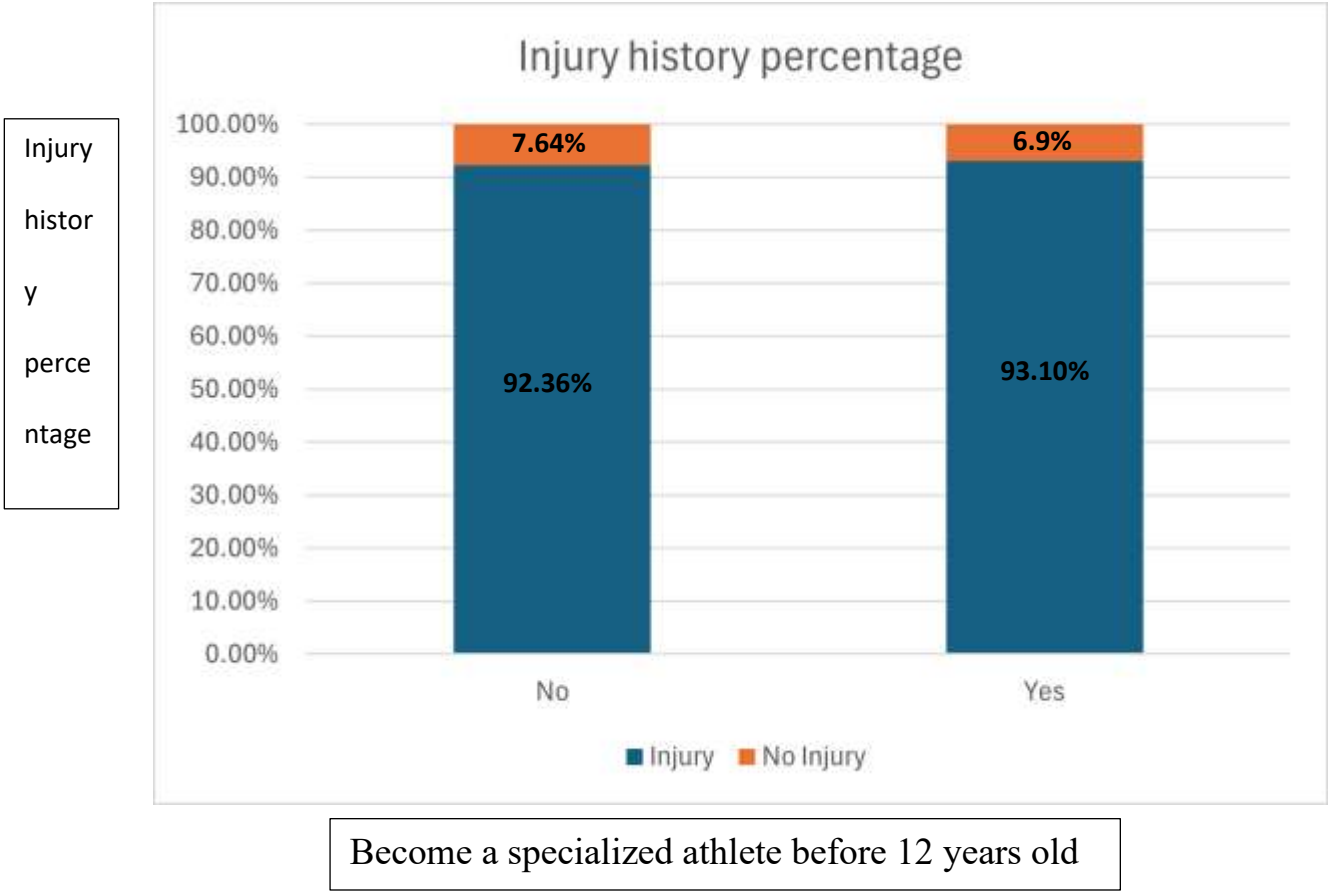
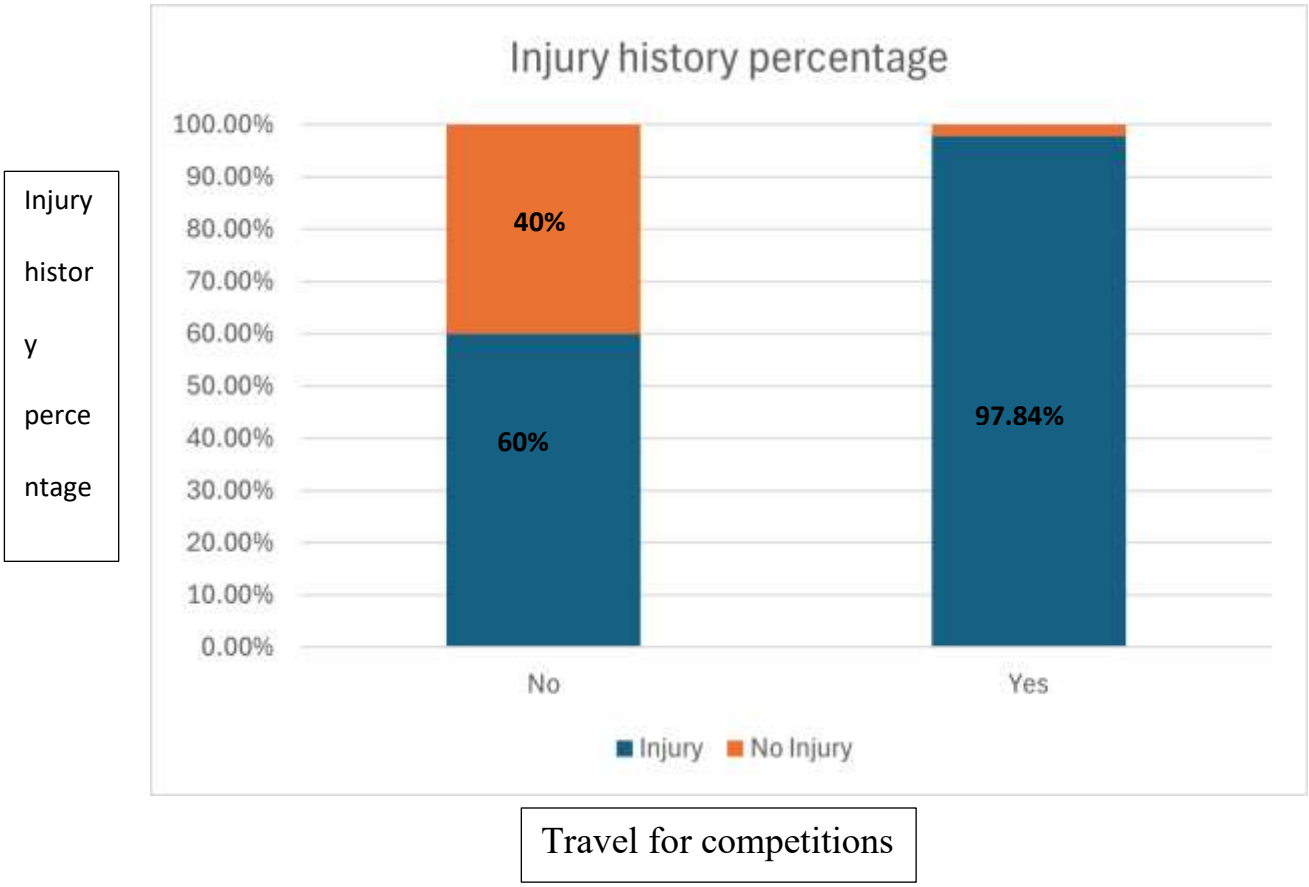


Figure 7: Travel for competitions in injury history percentage



References

1 Feeley BT, Agel J, LaPrade RF. When Is It Too Early for Single Sport Specialization? *Am J Sports Med*. 2016;44(1):234-241. doi:10.1177/0363546515576899

2. Ganjeh P, Meyer T, Hagmayer Y, et al. Physical Activity Improves Mental Health in Children and Adolescents Irrespective of the Diagnosis of Attention Deficit Hyperactivity Disorder (ADHD)—A Multi-Wave Analysis Using Data from the KiGGS Study. *IJERPH*. 2021;18(5):2207. doi:10.3390/ijerph18052207

3. Gallego-Méndez J, Perez-Gomez J, Calzada-Rodríguez JI, et al. Relationship between Health-Related Quality of Life and Physical Activity in Children with Hyperactivity. *IJERPH*. 2020;17(8):2804. doi:10.3390/ijerph17082804

4. González K, Fuentes J, Márquez JL. Physical Inactivity, Sedentary Behavior and Chronic Diseases. *Korean J Fam Med*. 2017;38(3):111. doi:10.4082/kjfm.2017.38.3.111

5. Jayanthi N, Pinkham C, Dugas L, Patrick B, LaBella C. Sports Specialization in Young Athletes: Evidence-Based Recommendations. *Sports Health*. 2013;5(3):251-257. doi:10.1177/1941738112464626

6 Jayanthi N, Kleithermes S, Dugas L, Pasulka J, Iqbal S, LaBella C. Risk of Injuries Associated With Sport Specialization and Intense Training Patterns in Young Athletes: A Longitudinal Clinical Case-Control Study. *Orthop J Sports Med*. 2020;8(6):2325967120922764. doi:10.1177/2325967120922764

7. Post EG, Biese KM, Schaefer DA, et al. Sport-Specific Associations of Specialization and Sex With Overuse Injury in Youth Athletes. *Sports Health*. 2020;12(1):36-42. doi:10.1177/1941738119886855

8. Dahab K, Potter MN, Provance A, Albright J, Howell DR. Sport Specialization, Club Sport Participation, Quality of Life, and Injury History Among High School Athletes. *Journal of Athletic Training*. 2019;54(10):1061-1066. doi:10.4085/1062-6050-361-18

9. Jayanthi NA, LaBella CR, Fischer D, Pasulka J, Dugas LR. Sports-Specialized Intensive Training and the Risk of Injury in Young Athletes: A Clinical Case-Control Study. *Am J Sports Med*. 2015;43(4):794-801. doi:10.1177/0363546514567298

10. Bell DR, DiStefano L, Pandya NK, McGuine TA. The Public Health Consequences of Sport Specialization. *Journal of Athletic Training*. 2019;54(10):1013-1020. doi:10.4085/1062-6050-521-18

11. Dahab K, Potter MN, Provance A, Albright J, Howell DR. Sport Specialization, Club Sport Participation, Quality of Life, and Injury History Among High School Athletes. *J Athl Train*. 2019;54(10):1061-1066. doi:10.4085/1062-6050-361-18

12 Bell DR, Snedden T, Biese K, et al. Consensus Definition of Sport Specialization in Youth Athletes Using a Delphi Approach. *Journal of Athletic Training*. Published online March 31, 2021. doi:10.4085/1062-6050-0725.20

13. Kliethermes SA, Marshall SW, LaBella CR, et al. Defining a research agenda for youth sport specialisation in the USA: the AMSSM Youth Early Sport Specialization Summit. *Br J Sports Med*. 2021;55(3):135-143. doi:10.1136/bjsports-2020-102699

14. Jayanthi NA, Post EG, Laury TC, Fabricant PD. Health Consequences of Youth Sport Specialization. *J Athl Train*. 2019;54(10):1040-1049. doi:10.4085/1062-6050-380-18

15. Buckley PS, Bishop M, Kane P, et al. Early Single-Sport Specialization: A Survey of 3090 High School, Collegiate, and Professional Athletes. *Orthop J Sports Med*. 2017;5(7):2325967117703944. doi:10.1177/2325967117703944

16. Brenner JS, COUNCIL ON SPORTS MEDICINE AND FITNESS. Sports Specialization and Intensive Training in Young Athletes. *Pediatrics*. 2016;138(3). doi:10.1542/peds.2016-2148

17. DiFiori JP, Benjamin HJ, Brenner J, et al. Overuse injuries and burnout in youth sports: a position statement from the American Medical Society for Sports Medicine. *Clin J Sport Med*. 2014;24(1):3-20. doi:10.1097/JSM.0000000000000060

18. Jayanthi NA, LaBella CR, Fischer D, Pasulka J, Dugas LR. Sports-Specialized Intensive Training and the Risk of Injury in Young Athletes: A Clinical Case-Control Study. *Am J Sports Med*. 2015;43(4):794-801. doi:10.1177/0363546514567298

19. Jayanthi NA, Durazo R, Dugas L, Luke A. Training and sports specialization risks in junior elite tennis players. *J Med Sci Tennis*. 2011;2011;16:14-20.

20. Bell DR, Lang PJ, Valovich McLeod TC, et al. Sport Specialization Is Associated With Injury History in Youth Soccer Athletes. *Athletic Training & Sports Health Care*. 2018;10(6):241-246. doi:10.3928/19425864-20180813-01

21. Frome D, Rychlik K, Fokas J, Chiampas G, Jayanthi N, LaBella C. Sports Specialization Is Not Associated With Greater Odds of Previous Injury in Elite Male Youth Soccer Players. *Clinical Journal of Sport Medicine*. 2019;29(5):368-373. doi:10.1097/JSM.0000000000000643

22. Ahlquist S, Cash BM, Hame SL. Associations of Early Sport Specialization and High Training Volume With Injury Rates in National Collegiate Athletic Association Division I Athletes. *Orthopaedic Journal of Sports Medicine*. 2020;8(3):232596712090682. doi:10.1177/2325967120906825

23. Bell DR, Post EG, Trigsted SM, et al. Sport Specialization Characteristics Between Rural and Suburban High School Athletes. *Orthop J Sports Med*. 2018;6(1):2325967117751386. doi:10.1177/2325967117751386

24. Padaki AS, Popkin CA, Hodgins JL, Kovacevic D, Lynch TS, Ahmad CS. Factors That Drive Youth Specialization. *Sports Health*. 2017;9(6):532-536. doi:10.1177/1941738117734149

25. Pasulka J, Jayanthi N, McCann A, Dugas LR, LaBella C. Specialization patterns across various youth sports and relationship to injury risk. *The Physician and Sportsmedicine*. 2017;45(3):344-352. doi:10.1080/00913847.2017.1313077

26. Yang J, Mann BJ, Guettler JH, et al. Risk-Prone Pitching Activities and Injuries in Youth Baseball: Findings From a National Sample. *Am J Sports Med*. 2014;42(6):1456-1463. doi:10.1177/0363546514524699

27. O'Kane JW, Neradilek M, Polissar N, Sabado L, Tencer A, Schiff MA. Risk Factors for Lower Extremity Overuse Injuries in Female Youth Soccer Players. *Orthop J Sports Med*. 2017;5(10):2325967117733963. doi:10.1177/2325967117733963

28. Myer GD, Jayanthi N, Difiori JP, et al. Sport Specialization, Part I: Does Early Sports Specialization Increase Negative Outcomes and Reduce the Opportunity for Success in Young Athletes? *Sports Health*. 2015;7(5):437-442. doi:10.1177/1941738115598747

29. Bell DR, Post EG, Trigsted SM, Hetzel S, McGuine TA, Brooks MA. Prevalence of Sport Specialization in High School Athletics: A 1-Year Observational Study. *Am J Sports Med*. 2016;44(6):1469-1474. doi:10.1177/0363546516629943

30. Post EG, Trigsted SM, Riekena JW, et al. The Association of Sport Specialization and Training Volume With Injury History in Youth Athletes. *Am J Sports Med*. 2017;45(6):1405-1412. doi:10.1177/0363546517690848

31. Hall R, Barber Foss K, Hewett TE, Myer GD. Sport specialization's association with an increased risk of developing anterior knee pain in adolescent female athletes. *J Sport Rehabil*. 2015;24(1):31-35. doi:10.1123/jsr.2013-0101

32. McGuine TA, Post EG, Hetzel SJ, Brooks MA, Trigsted S, Bell DR. A Prospective Study on the Effect of Sport Specialization on Lower Extremity Injury Rates in High School Athletes. *Am J Sports Med*. 2017;45(12):2706-2712. doi:10.1177/0363546517710213

33. Frome D, Rychlik K, Fokas J, Chiampas G, Jayanthi N, LaBella C. Sports Specialization Is Not Associated With Greater Odds of Previous Injury in Elite Male Youth Soccer Players. *Clinical Journal of Sport Medicine*. 2019;29(5):368-373. doi:10.1097/JSM.0000000000000643

34. McGowan J, Whatman C, Walters S. The associations of early specialisation and sport volume with musculoskeletal injury in New Zealand children. *Journal of Science and Medicine in Sport*. 2020;23(2):139-144. doi:10.1016/j.jsams.2019.09.002

35. LaPrade RF, Agel J, Baker J, et al. AOSSM Early Sport Specialization Consensus Statement. *Orthopaedic Journal of Sports Medicine*. 2016;4(4):232596711664424. doi:10.1177/2325967116644241

36. Jayanthi NA, LaBella CR, Fischer D, Pasulka J, Dugas LR. Sports-Specialized Intensive Training and the Risk of Injury in Young Athletes: A Clinical Case-Control Study. *Am J Sports Med*. 2015;43(4):794-801. doi:10.1177/0363546514567298

37. Fabricant PD, Lakomkin N, Sugimoto D, Tepolt FA, Stracciolini A, Kocher MS. Youth sports specialization and musculoskeletal injury: a systematic review of the literature. *The Physician and Sportsmedicine*. 2016;44(3):257-262. doi:10.1080/00913847.2016.1177476

38. Huard Pelletier V, Lemoyne J. Early Sport Specialization and Relative Age Effect: Prevalence and Influence on Perceived Competence in Ice Hockey Players. *Sports*. 2022;10(4):62. doi:10.3390/sports10040062

39. Whatman C, van den Berg C, Palacios-Derflingher L, Emery C. Sport Specialization, Physical Performance and Injury History in Canadian Junior High School Students. *International Journal of Sports Physical Therapy*. 2021;16(6). doi:10.26603/001c.29590

40. Whatman C, van den Berg C, Black AM, et al. High Sport Specialization Is Associated With More Musculoskeletal Injuries in Canadian High School Students. *Clinical Journal of Sport Medicine*. 2023;33(3):233-238. doi:10.1097/JSM.0000000000001100

41. Saber Azami-Aghdash, Homayoun Sadeghi-Bazarghani2,SHahriyar Mokhtari3,Mahdiyeh Heydari3,Ramin Rezapour3,Naser Derakhshani2*. Epidemiology of Sports Injuries in Iran. *ARC Journal of Research in Sports Medicine*. 2017;Volume-2(Issue-2,):Page No: 1-8.

42. Biese KM, Post EG, Schaefer DA, et al. Evaluation of adolescent sport specialization and injury mechanism by sex: A secondary analysis. *Journal of Science and Medicine in Sport*. 2020;23(8):721-725. doi:10.1016/j.jsams.2020.01.012

43. Theisen D, Frisch A, Malisoux L, Urhausen A, Croisier JL, Seil R. Injury risk is different in team and individual youth sport. *J Sci Med Sport*. 2013;16(3):200-204. doi:10.1016/j.jsams.2012.07.007

44. DiStefano LJ, Martinez JC, Crowley E, et al. Maturation and Sex Differences in Neuromuscular Characteristics of Youth Athletes. *Journal of Strength and Conditioning Research*. 2015;29(9):2465-2473. doi:10.1519/JSC.0000000000001052

45. LaPrade RF, Agel J, Baker J, et al. AOSSM Early Sport Specialization Consensus Statement. *Orthopaedic Journal of Sports Medicine*. 2016;4(4):232596711664424. doi:10.1177/2325967116644241

46. McGuine TA, Post EG, Hetzel SJ, Brooks MA, Trigsted S, Bell DR. A Prospective Study on the Effect of Sport Specialization on Lower Extremity Injury Rates in High School Athletes. *Am J Sports Med*. 2017;45(12):2706-2712. doi:10.1177/0363546517710213

47. Post EG, Bell DR, Trigsted SM, et al. Association of Competition Volume, Club Sports, and Sport Specialization With Sex and Lower Extremity Injury History in High School Athletes. *Sports Health*. 2017;9(6):518-523. doi:10.1177/1941738117714160

48. Post EG, Trigsted SM, Riekena JW, et al. The Association of Sport Specialization and Training Volume With Injury History in Youth Athletes. *Am J Sports Med*. 2017;45(6):1405-1412. doi:10.1177/0363546517690848

49. Cross MJ, Williams S, Trewartha G, Kemp SPT, Stokes KA. The Influence of In-Season Training Loads on Injury Risk in Professional Rugby Union. *International Journal of Sports Physiology and Performance*. 2016;11(3):350-355. doi:10.1123/ijspp.2015-0187

50. Lyman S, Fleisig GS, Waterbor JW, et al. Longitudinal study of elbow and shoulder pain in youth baseball pitchers: *Medicine and Science in Sports and Exercise*. 2001;33(11):1803-1810. doi:10.1097/00005768-200111000-00002

51. Kipp S, Leahy MG, Hanna JA, Sheel AW. Perceived exertion and dyspnea while cycling during a hypoxic and hyperoxic placebo. *Appl Physiol Nutr Metab*. 2022;47(12):1134-1142. doi:10.1139/apnm-2022-0179

52. Williams N. The Borg Rating of Perceived Exertion (RPE) scale. *Occupational Medicine*. 2017;67(5):404-405. doi:10.1093/occmed/kqx063

53. Borg, GA. Psychophysical bases of perceived exertion. *Med Sci Sports Exerc*. PMID: 7154893.(1982;14(5):377-81.).

54. Eckard TG, Padua DA, Hearn DW, Pexa BS, Frank BS. The Relationship Between Training Load and Injury in Athletes: A Systematic Review. *Sports Med*. 2018;48(8):1929-1961. doi:10.1007/s40279-018-0951-z

55. Ferioli D, La Torre A, Tibiletti E, Dotto A, Rampinini E. Determining the relationship between load markers and non-contact injuries during the competitive season among professional and semi-professional basketball players. *Research in Sports Medicine*. 2021;29(3):265-276. doi:10.1080/15438627.2020.1808980

56. Fanchini M, Rampinini E, Riggio M, Coutts AJ, Pecci C, McCall A. Despite association, the acute:chronic work load ratio does not predict non-contact injury in elite footballers. *Science and Medicine in Football*. 2018;2(2):108-114. doi:10.1080/24733938.2018.1429014

57. McCall A, Dupont G, Ekstrand J. Internal workload and non-contact injury: a one-season study of five teams from the UEFA Elite Club Injury Study. *Br J Sports Med*. 2018;52(23):1517-1522. doi:10.1136/bjsports-2017-098473

58. Borg GA. Perceived exertion as an indicator of somatic stress. Scand J Rehab Med.(1970;2:92–8.).

59. Huard Pelletier V, Lemoyne J. Early Sport Specialization and Relative Age Effect: Prevalence and Influence on Perceived Competence in Ice Hockey Players. *Sports*. 2022;10(4):62. doi:10.3390/sports10040062

Appendix

Questionnaire

Demographics

The survey: Sport specialization and the risk of injury in young athletes

Informed consent

Dear athletes, You are invited to participate in a research study of the sport specialization and the risk of injury. You were selected as a possible participant because of your sport experiences. Please read this form carefully and ask any questions you may have before agreeing to be in the study. You must be between 8 to 18 years old to participate in the study. Key information about this research study: The following is a short summary of this study to help you decide whether to be a part of this study. Study purpose: This study aims to determine whether there is an association between sport-related injury history and early specialization. Procedures for the study: You will be asked to take 15 minutes to complete all questions. We understand that some questions may be difficult to answer independently, which is why we would appreciate your parents' assistant in completing the survey. We kindly ask that you take some time to sit down with your parents and complete the survey together. Please ensure that you and your parents read and understand each question before providing a response. Also, we would appreciate it if your parents could supervise the survey completion process to ensure that accurate and honest responses are provided. Confidentiality: Your responses to questions and your data will be confidential. No personal questions besides your demographic data will be collected. The results of this study may be used in reports, presentations, or publications. All your data will be stored in a password-protected computer that is only accessible by the researchers. Voluntary participation: Taking part in this study is voluntary. You may choose not to take part or may leave the study at any time. Benefits of taking part in the study: There are no direct benefits to participation in this study, however, your participation will help us understand whether there is an association between sport-related injury history and early specialization.

Contact information: If you have questions about the study, please email me at niki.memarian@mail.concordia.ca

Participant's consent: By signing below, you are giving consent to participate in the study.

Signature of the participants:

Date:

پرسشنامه:

تخصص ورزش و خطر آسیب در ورزشکاران جوان

رضایت آگاهانه

ورزشکاران عزیز از شما دعوت می شود در یک مطالعه تحقیقاتی در مورد تخصص ورزش و خطر آسیب شرکت کنید. شما به دلیل تجربیات ورزشی خود به عنوان یک شرکت کننده احتمالی انتخاب شده اید. لطفاً این فرم را به دقت بخوانید و هر گونه سؤالی که ممکن است دارید قبل از موافقت با شرکت در مطالعه بپرسید. برای شرکت در مطالعه باید بین 8 تا 18 سال سن داشته باشید. اطلاعات کلیدی در مورد این مطالعه پژوهشی: در زیر خلاصه ای کوتاه از این مطالعه آمده است تا به شما کمک کند تصمیم بگیرید که آیا بخشی از این مطالعه باشید یا خیر. هدف مطالعه: این مطالعه با هدف تعیین اینکه آیا ارتباطی بین سابقه آسیب های مرتبط با ورزش و تخصص اولیه وجود دارد یا خیر. مراحل مطالعه: از شما خواسته می شود 15 دقیقه برای تکمیل تمام سوالات وقت بگذارید. ما می دانیم که پاسخ به برخی از سؤالات ممکن است به طور مستقل دشوار باشد، به همین دلیل است که از دستیار والدین شما در تکمیل نظرسنجی قدردانی می کنیم. از شما خواهشمندیم که کمی وقت بگذارید و با والدین خود بنشینید و نظرسنجی را با هم تکمیل کنید. لطفاً مطمئن شوید که شما و والدینتان قبل از ارائه پاسخ، هر سؤال را خوانده و درک می کنید. همچنین، اگر والدین شما بتوانند بر روند تکمیل نظرسنجی نظارت کنند تا اطمینان حاصل شود که پاسخ‌های دقیق و صادقانه ارائه می‌شود، خوشحال خواهیم شد. محرمانه بودن: پاسخ شما به سوالات و داده های شما محرمانه خواهد بود. هیچ سوال شخصی علاوه بر اطلاعات جمعیتی شما جمع آوری نخواهد شد. نتایج این مطالعه ممکن است در گزارش ها، ارائه ها یا انتشارات مورد استفاده قرار گیرد. تمام داده های شما در یک رایانه محافظت شده با رمز عبور ذخیره می شود که فقط توسط محققان قابل دسترسی است. مشارکت داوطلبانه: شرکت در این مطالعه داوطلبانه است. شما می توانید انتخاب کنید که در هر زمانی شرکت نکنید یا مطالعه را ترک کنید. مزایای شرکت در مطالعه: هیچ مزیت مستقیمی برای شرکت در این مطالعه وجود ندارد، با این حال، مشارکت شما به ما کمک می کند تا بفهمیم آیا ارتباطی بین سابقه آسیب های مرتبط با ورزش و تخصص اولیه وجود دارد یا خیر.

اطلاعات تماس: اگر در مورد مطالعه سؤالی دارید، لطفاً به من ایمیل بزنید niki.memarian@mail.concordia.ca

رضایت شرکت کننده: با امضای زیر، رضایت خود را برای شرکت در مطالعه اعلام می کنید.

امضای شرکت کنندگان:

How old are you? (Current)

در حال حاضر چند سال دارید؟

- ○ هشت سال/8
- ○ ده سال/9
- ○ ده سال/10
- ○ یازده سال/11
- ○ دوازده سال/12
- ○ سیزده سال/13
- ○ چهارده سال/14
- ○ پانزده سال/15
- ○ شانزده سال/16
- ○ هفده سال/17
- ○ هیجده سال/18

Gender/Sex (biological at birth)
جنسیت شما در زمان تولد چیست؟

- Male/مرد
- Female/زن

Date of birth. Format: day/month/year
تاریخ تولد. به فرمت روز/ماه/ سال

Height (Cm)
قد (به سانتی متر)

Weight (Kg)
وزن (به کیلوگرم)

Please answer the following questions about the reality of your sporting season:
لطفاً به سؤالات زیر در مورد واقعیت فصل ورزشی خود پاسخ دهید:

Can you pick a main sport that is more important than the others?
آیا می توانید یک ورزش اصلی را انتخاب کنید که از بقیه ی ورزش ها مهمتر باشد؟

- Yes/بله
- No/نه

If yes, Please type your main sport name? For example, Football, figure skating or ...
اگر بله,لطفا نام ورزش اصلی خود را بنویسید. به عنوان مثال: فوتبال، اسکیت نمایشی، و غیره

If you cannot pick a main sport, please write all the other sports you partake in. Type as many that apply. For example, Football, Dancing, etc.

اگر نمی توانید یک ورزش اصلی را انتخاب کنید، لطفاً همه ورزش های دیگری را که در آن شرکت می کنید بنویسید. به عنوان مثال، فوتبال، رقص و غیره.

Is your main sport categorized as an individual or team sport?
آیا ورزش اصلی شما در دسته ی ورزش های افرادی دسته بندی میشود یا گروهی؟

- Individual sport/انفرادی
- Team sport/ تیمی

Have you quit other sports to focus on the main sport?
آیا ورزش های دیگر را رها کرده اید تا روی ورزش اصلی تمرکز کنید؟

- No/خیر
- Yes/بله

If yes, Please indicate at what age?
اگر بله، لطفاً مشخص کنید در چه سنی؟

- 4 years old/4 سال سن
- 5 years old/5 سال سن
- 6 years old/6 سال سن
- 7 years old/7 سال سن
- 8 years old/8 سال سن
- 9 years old/9 سال سن
- 10 years old/10 سال سن
- 11 years old/11 سال سن
- 12 years old/12 سال سن
- 13 years old/13 سال سن
- 14 years old/14 سال سن
- 15 years old/15 سال سن
- 16 years old/16 سال سن
- 17 years old/17 سال سن
- 18 years old/18 سال سن

Do you train/compete more than 8 months in a year in your main sport?
آیا در ورزش اصلی خود بیش از 8 ماه در سال تمرین /مسابقه می کنید؟

- ○ No/خیر
- ○ Yes/بله

Did you specialize in your main sport before the age of 12?
آیا قبل از 12 سالگی در ورزش اصلی خود تخصص پیدا کردید؟

- ○ Yes/بله
- ○ No/خیر

Please answer the following questions about your 'main sport'(the sport you devote most of your time to) and what a regular season would look like. If you cannot choose a main sport, choose the sport you complete in at the highest level:
How many hours per week, on average, do you train? Round up.
لطفاً به سؤالات زیر در مورد "ورزش اصلی" خود (ورزشی که بیشتر وقت خود را به آن اختصاص می دهید) و اینکه یک فصل معمولی چگونه خواهد بود پاسخ دهید. اگر نمی توانید یک ورزش اصلی را انتخاب کنید، ورزشی را که در بالاترین سطح انجام می دهید انتخاب کنید: به طور متوسط چند ساعت در هفته تمرین می کنید؟ گرد کنید

- ○ less than 1 hour/کمتر از یک ساعت
- ○ 1hour/یک ساعت
- ○ 2hours/دو ساعت
- ○ 3hours/سه ساعت
- ○ 4hours/چهار ساعت
- ○ 5hours/پنج ساعت
- ○ 6hours/ شش ساعت
- ○ 7hours/ هفت ساعت
- ○ 8hours/ هشت ساعت
- ○ 9hours/ نه ساعت
- ○ 10hours/ ده ساعت
- ○ 11hours/ یازده ساعت
- ○ 12hours/ دوازده ساعت
- ○ More than 12 hours/ بیشتر از دوازده ساعت

How long, on average, does your training in your main sport take per session? please choose one of the following options.

بطور متوسط تمرین شما در ورزش اصلی در هر جلسه چقدر طول می کشد؟

- ○ less than 1 hour/کمتر از یک ساعت
- ○ 1hour/یک ساعت
- ○ 2hours/دو ساعت
- ○ 3hours/سه ساعت
- ○ 4hours/چهار ساعت
- ○ 5hours/پنج ساعت
- ○ 6hours/ شش ساعت
- ○ 7hours/ هفت ساعت
- ○ 8hours/ هشت ساعت
- ○ 9hours/ نه ساعت
- ○ 10hours/ ده ساعت
- ○ 11hours/ یازده ساعت
- ○ 12hours/ دوازده ساعت
- ○ More than 12 hours/ بیشتر از دوازده ساعت

How many hours per week, on average, do you train in other sports (PE classes)?

به طور متوسط چند ساعت در هفته در ورزش های دیگر تمرین می کنید؟ مانند کلاسها و زنگ های ورزشی مدرسه

- ○ less than 1 hour/کمتر از یک ساعت
- ○ 1hour/یک ساعت
- ○ 2hours/دو ساعت
- ○ 3hours/سه ساعت
- ○ 4hours/چهار ساعت
- ○ 5hours/پنج ساعت
- ○ 6hours/ شش ساعت
- ○ 7hours/ هفت ساعت
- ○ 8hours/ هشت ساعت
- ○ 9hours/ نه ساعت
- ○ 10hours/ ده ساعت
- ○ 11hours/ یازده ساعت

- ○ 12hours/ دوازده ساعت
- ○ More than 12 hours/ بیشتر از دوازده ساعت

At what age did you start competing in your main sport?
ورزش اصلی خود را از چه سنی شروع کردید؟

- ○ 3 years old/سه سال
- ○ 4 years old/چهار سال
- ○ 5 years old/پنج سال
- ○ 6 years old/شش سال
- ○ 7 years old/ هفت سال
- ○ 8 years old/هشت سال
- ○ 9 years old/نه سال
- ○ 10 years old/ده سال
- ○ 11 years old/یازده سال
- ○ 12 years old/دوازده سال
- ○ 13 years old/سیزده سال
- ○ 14 years old/ چهارده سال
- ○ 15 years old/پانزده سال

Do you travel out of province or country to compete?
آیا برای مسابقه به خارج از استان یا کشور سفر می کنید؟

- ○ No/خیر
- ○ Yes/بله

How many rest days do you have on average per week?
به طور متوسط در هفته چند روز استراحت دارید؟
Definition of a rest day: A Day where you do not practice any type of organized sport.
تعریف روز استراحت: روزی که در آن هیچ نوع ورزش سازماندهی شده ای را انجام نمی دهید.

- ○ 1/یک
- ○ 2/دو
- ○ 3/سه

- ○ 4/چهار
- ○ 5/پنج
- ○ 6/شش

During practice, I think learning something new or improving my skill is more important than only having fun.

در طول تمرین، فکر می‌کنم یادگیری چیزهای جدید یا بهبود مهارت‌هایم مهم‌تر از لذت بردن است.

- ○ Agree/موافقم
- ○ Uncertain/مطمین نیستم
- ○ Disagree/مخالفم

I often miss spending time with my friends and/or family who do not participate in my sport because I have practice or competition.

من اغلب وقت گذراندن با دوستان یا فامیل هایم که در رشته ی ورزشی من نیستن را از دست میدهم. چون من تمرین یا مسابقه دارم.

- ○ Agree/موافقم
- ○ Uncertain/مطمین نیستم
- ○ Disagree/مخالفم

I spend more than 75% of my weekly sport/practice time in my main sport. (I spend most of my weekly training time in my main sport).

من بیش از 75 درصد از زمان ورزش/تمرین هفتگی خود را در ورزش اصلی خود می گذرانم. (من بیشتر زمان تمرین هفتگی خود را در ورزش اصلی خود می گذرانم).

- ○ Agree/موافقم
- ○ Uncertain/مطمین نیستم
- ○ Disagree/مخالفم

Injury History:

Please fill in the following questions based on your sport-related injuries.

1. In which part of your body did the most severe sport-related injury occur? please choose one answer.

تاریخچه آسیب های ورزشی:

لطفاً سوالات زیر را بر اساس آسیب های ورزشی خود پر کنید. 1. شدیدترین آسیب ورزشی در کدام قسمت از بدن شما رخ داده است؟ لطفا یک گزینه را انتخاب کنید

- Cervical Spine (neck)/گردن
- Thoracic spine (upper/middle spine)/ بالا یا میانه ی ستون فقرات
- Lumbar spine (lower spine)/پایین ستون فقرات
- Shoulder/chest/شانه و/یا قفسه سینه
- Elbows/forearm/ارنج و/یا ساعد
- Wrist/مچ دست
- Hand/fingers/دست و/یا انگشتان
- Hip/thigh/لگن و / یا ران
- Knee/lower leg/زانو و / یا پایین پا

Please indicate the type of injury (Acute vs. chronic)
لطفاً نوع آسیب را مشخص کنید (حاد یا مزمن)
Acute definition: (sudden injury/wound with a mechanism such as strains, sprains, fractures, etc.). Chronic definition: (long-term injury such as tendonitis, tendinopathy, etc.)
تعریف آسیب حاد (آسیب/زخم ناگهانی با مکانیسمی مانند کشیدگی، رگ به رگ شدن، شکستگی و غیره). تعریف آسیب مزمن (آسیب طولانی مدت مانند تاندونیت، تاندونوپاتی و غیره)

- Acute/حاد
- Chronic/مزمن

When did it most recently happened? format: month/day/year
اخیراً چه زمانی اتفاق افتاد؟ به این فرمت بنویسید: روز/ماه/سال

Which side?
در چه سمتی از بدن؟

- Right/راست
- Left/چپ

What type of injury was it? Please describe?

چه نوعی از آسیب بود؟ لطفا توصیف کنید.

Type of injury: Muscle strain, Disc injury, Fracture, Bruise, etc.

نوع آسیب: کشیدگی عضلانی، آسیب دیسک، شکستگی، کبودی و غیره.

Were you playing/practicing your main sport when this injury happened?

زمانی که این آسیب دیدگی رخ داد، ورزش اصلی خود را انجام می دادید یا تمرین می کردید؟

- No/خیر
- Yes/بله

If you choose No, Please type what kind of sport/activity you were doing when this injury happened?

اگر خیر را انتخاب کنید، لطفاً نوع ورزش/فعالیتی را که در زمان وقوع این آسیب انجام می‌دادید، تایپ کنید؟ .

In which part of your body did the second severe sport-related injury occur?

دومین آسیب شدید ورزشی در کدام قسمت از بدن شما رخ داد؟

- Cervical Spine (neck)/گردن
- Thoracic spine (upper/middle spine)/ بالا یا میانه ی ستون فقرات
- Lumbar spine (lower spine)/پایین ستون فقرات
- Shoulder/chest/شانه و/یا قفسه سینه
- Elbows/forearm/ارنج و/یا ساعد
- Wrist/مچ دست
- Hand/fingers/دست و/یا انگشتان
- Hip/thigh/لگن و / یا ران
- Knee/lower leg/زانو و / یا پایین پا

Please indicate the type of injury (Acute vs. chronic)

لطفاً نوع آسیب را مشخص کنید (حاد یا مزمن)

Acute definition: (sudden injury/wound with a mechanism such as strains, sprains, fractures, etc.). Chronic definition (long-term injury such as tendonitis, tendinopathy, etc.)

تعریف آسیب حاد (آسیب/زخم ناگهانی با مکانیسمی مانند کشیدگی، رگ به رگ شدن، شکستگی و غیره).تعریف آسیب مزمن (آسیب طولانی مدت مانند تاندونیت، تاندونوپاتی و غیره)

- Acute/حاد
- Chronic/مزمن

When did it most recently happened? format: month/day/year

اخیراً چه زمانی اتفاق افتاد؟ به این فرمت بنویسید: روز/ماه/سال

Which side? در چه سمتی از بدن؟

- Right/راست
- Left/چپ

What type of injury was it? Please describe?

.چه نوعی از آسیب بود؟ لطفا توصیف کنید

Type of injury: Muscle strain, Disc injury, Fracture, Bruise, etc

نوع آسیب: کشیدگی عضلانی، آسیب دیسک، شکستگی، کبودی و غیره .

Were you playing/practicing your main sport when this injury happened?

زمانی که این آسیب دیدگی رخ داد، ورزش اصلی خود را انجام می دادید یا تمرین می کردید؟

- No/خیر
- Yes/بله

If you choose No, Please type what kind of sport/activity you were doing when this injury happened? . اگر خیر را انتخاب کنید، لطفاً نوع ورزش/فعالیتی را که در زمان وقوع این آسیب انجام می‌دادید، تایپ کنید؟