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ORIGINAL ARTICLE

EARLY AND MIDDLE ADOLESCENT AGE ATHLETES HAVE HIGHER ATHLETIC IDENTITIES AND LOWER FEAR AVOIDANCE THAN LATE ADOLESCENT AGE ATHLETES DURING THE RETURN TO SPORTS PHASE OF REHABILITATION

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LEVEL OF EVIDENCE: 2b, cohort study

ABSTRACT

Background: Early (11-14 years of age) and middle (15-17 years of age) adolescent athletes (EMA) may be more likely to sustain musculoskeletal injury or re-injury than late adolescent (LA) athletes (≥18 years of age), and strong athletic identity (AI) is a factor. This study evaluated the influence of adolescent age on fear avoidance (FA) and AI during the return to sports (RTS) phase of rehabilitation.

Materials and Methods: From 159 patients, 60 (32 females, 28 males) (16.9 ± 3 years of age) completed the 7-item Athletic Identity Measurement Scale (AIMS), the 10-item Athletic Fear Avoidance Questionnaire (AFAQ), and the AFAQ with two added movement-related fear and pain questions (AFAQ+). EMA (n = 40) and LA (n = 20) groups were compared ($p \leq 0.05$).

Results: EMA athletes had higher AIMS scores than LA athletes (40.74 ± 5.24 vs. 34.85 ± 7.12, Cohen's d = 0.94, p = 0.002). EMA athletes had higher "social identity" (20.13 ± 1.30 vs. 18.00 ± 2.71, Cohen's d = 1.00, p = 0.006) and "exclusivity" (10.30 ± 2.98 vs. 7.29 ± 2.97, Cohen's d = 1.01, p = 0.002) AIMS subscale scores than LA athletes. LA athletes had higher AFAQ (25.7 ± 8 vs. 19.2 ± 5, Cohen's d = 0.97, p = 0.001) and AFAQ+ scores (31.70 ± 9.04 vs. 23.42 ± 6.21, Cohen's d = 0.94, p = 0.003) than EMA athletes.

Conclusion: Athletes with stronger AI had weaker FA. From early-to-late adolescence, AI weakened, and FA strengthened. Early identification and surveillance of the subset with stronger, more exclusive AI and weaker FA may decrease re-injury risk through adjusted rehabilitation progressions and RTS timing.

KEYWORDS

Adolescent athlete, musculoskeletal injury, psychology, rehabilitation

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INTRODUCTION

Adolescence represents a time period of considerable physical, mental, emotional, and behavioral development[1], being a critical phase of pubertal physical changes, cognitive development, modified social expectations, and self-perceptions[2,3]. As they progress in sports from early to late adolescence athletes often enter a more challenging development stage associated with increased specialization, and become more vulnerable to feelings of stress and burnout[2]. Adolescent athletes are at risk of chronic stress exposure due to increased sport specialization, training loads, and social pressures from responsibilities outside of sport[4].

Sport participation influences adolescent athlete psychological and social health by improving their emotional well-being and self-perceptions and reducing social anxiety[5]. Adolescent involvement in organized sports is related to a positive physical self-concept[6], however, sport participation carries an injury risk with incidence rates of 2.64/1000 hours[7] and 46% over a 12 month period in organized sport[8]. Sports injuries can have a significant and multifaceted impact on the adolescent athlete at each stage of recovery, with injury experiences spanning physical, emotional, psychological and social domains[9,10]. Previous sport injury is one of the greatest predictors of future sport injury[11] and recurrent injury increases the likelihood of premature drop out from sport[12]. These injuries can decrease adult sports participation or free-time physical activity leading to an increase in chronic health conditions such as obesity and heart disease[13].

As middle adolescents grow, performance pressure increases with subsequent greater demands for time and commitment required for training and competitions[2]. Middle adolescents reported higher sport devaluation scores than early adolescents, reflecting a negative and detached attitude toward sport and their involvement in it, resulting in a decreased concern and care for sport and performance quality[14]. A gap exists in our current understanding of subjective adolescent experiences in the context of sport injury management and recovery[9]. An adolescent's initial response to injury is often characterized by fear or anxiety, concerns about possible long-term implications, doubts about getting back to previous performance levels, and injury recurrence risk[9]. Fear avoidance (FA) behaviors such as kinesiophobia (debilitating fear of movement or re-injury) can have significant ramifications and poorer clinical outcomes[15], with a decreased likelihood of returning back to sport post-musculoskeletal injury[16]. Since emotional regulation can be a challenge for many adolescents, post-injury emotions can be particularly challenging and effective coping strategies are greatly needed[9].

Successful RTS after serious musculoskeletal injury is associated with overlapping psychological traits such as self-efficacy, locus of control, resilience, catastrophizing, and kinesiophobia[17]. Negative psychological traits such as FA may be modified through increased awareness, and early mindfulness interventions, however, this can be challenging in adolescent sport because adequate healthcare team support is generally lacking[9]. Although sports injury management strategies target the affected adolescent athlete, an extension of educational interventions beyond the adolescent athlete, to include their peers, family and schools or clubs is needed[9]. Comprehensive sports injury management includes a heightened awareness of their emotional and psychological impact with extended support, not just from healthcare clinicians, but also from teachers, parents, friends and coaches[9]. This may be particularly important in helping to mitigate re-injury fear during the RTS phase of rehabilitation[9].

Although adolescence spans approximately 11-21 years of age, the abundance of multi-system development that occurs during this period has led the American Academy of Pediatrics to further divide it into early (11-14 years of age), middle (15-17 years of age), and late (18-21 years of age) phases[18]. Concurrently, athletic identity (AI) can have a strong influence on the social identity (i.e., the degree to which the adolescent perceives themselves as occupying the athlete role), exclusivity (i.e., the degree to which an individual's self-worth is established through participating in the athletic role) and negative affectivity (i.e., the degree to which an individual experiences negative emotions from unwanted sporting outcomes)[19,20]. These factors, in addition to the often high passion that adolescent athletes often possess for their sport may contribute to an elevated injury risk[20-22] and may influence FA perceptions[24,25]. Epidemiological studies have shown that adolescent athletes may be more likely to sustain sports injury than adult athletes[7,26-28] and may also be at greater re-injury risk after successful rehabilitation[9,29,30]. The purpose of this prospective cross-sectional pilot study, which was an extension of a previously reported study[24], was to evaluate the influence of adolescent age phase on AI and FA levels during the return to sport phase of post-injury rehabilitation.

MATERIALS AND METHODS

Institutional approval was obtained from the Spalding University Research Ethics Committee (#202206). Written informed consent was obtained from all participants. Written parental consent and child assent were obtained for participants < 18 years of age.

Inclusion criteria

Study participants were adolescent athletes between 14-22 years of age who had sustained a musculoskeletal injury with acute symptoms and were referred to outpatient physical therapy. This age range was selected based on a synthesis of the World Health Organization (10 to 24 years of age for adolescent/young adult)[31], US Department of Health, and the US Food and Drug Administration (12 to 21

years of age)[32] and American Academy of Pediatrics (11 to 21 years of age) descriptions with further division into early (11 to 14 years of age), middle (15 to 17 years of age) and late (18 to 21 years of age) group definitions[18].

Exclusion criteria

From 159 consecutive potential study participants, 99 were excluded because they either were not an athlete, had experienced a previous injury to the site of their current injury (i.e., revision ACL reconstruction), had sustained a musculoskeletal injury that did not have acute symptom onset, the injury was not sport-related, or they were <14 or >22 years of age *(Fig. 1)*.

After providing written informed consent, participants completed a written survey consisting of demographic questions about gender, age, weight, height, primary sport played, years of experience playing the sport, injury location, time lost from injury, injury diagnosis, and if they had undergone surgery for the injury. Following this, participants completed the 10-item, Athletic Fear Avoidance Questionnaire (AFAQ). The AFAQ is a validated questionnaire developed to assess athlete fear avoidance perceptions based on their fear of pain, kinesiophobia, FA belief, or catastrophizing[33].

Further validation has been performed with adolescent athletes[34-36]. The FA model has been widely used to explain the cycle of FA and disuse for many musculoskeletal conditions with a range of biological, psychological and social factors[34,37]. Although the AFAQ has been validated for both injured and non-injured athletes, it does not include any questions specific to "movement." Therefore, two 5-item Likert scale type movement-related fear ("I am afraid of movements that mimic the ones that caused my injury") or movement-related pain ("If a movement causes pain, it should not be done") questions were added with the same end-range descriptors (AFAQ+). Following this, participants completed the 7-item Athletic Identity Measurement Scale (AIMS)[6]. The AIMS has been validated and applied to elite athletes, recreational athletes, adolescent athletes and non-athletic populations[20,38-40]. This questionnaire used 5-point Likert scale questions with end-range descriptors of completely disagree or completely agree. The AIMS measures athletic identity (AI) in 3 dimensions ("social identity," "exclusivity," and "negative affectivity").

Questions 1-3 measured "social identity," or how much participants viewed themselves as inhabiting the athlete role; questions 4-5 measured "exclusivity," or how much the participant's identity and self-worth were determined solely by their performance in the athlete role; and questions 6-7 measured "negative affectivity," or their negative experiences in response to undesirable outcomes within the athletic role and space[41]. Data collection took place at an outpatient sports physical therapy clinic.

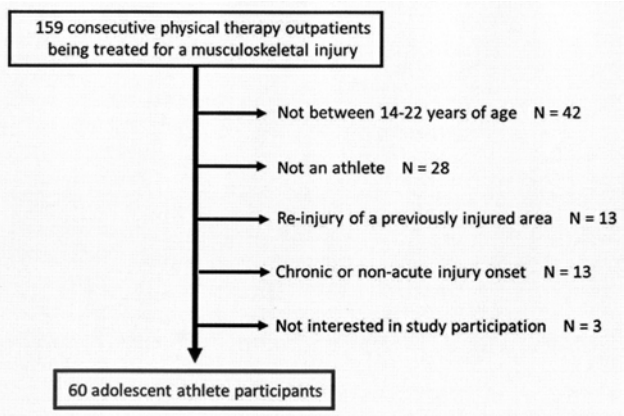


Figure 1. *Early or Middle Adolescent Phase subjects displayed higher AIMS scores and significantly lower AFAQ and AFAQ+ scores than Late Adolescent Phase subjects.*

	Early and middle adolescent group (n = 40)	Late adolescent group (n = 20)	p
Age (years)	15.57 ± 1.22 (13-17)	19.58 ± 2.01 (18-22)	<0.001*
Gender	Female = 22 (54%)	Female = 8 (42%)	0.39
Height (cm)	171.56 ± 9.83 (154.94 – 190.50)	174.99 ± 10.57 (149.86 – 187.96)	0.24
Weight (kg)	66.46 ± 14.9 (45.81 – 99.79)	73.08 ± 13.18 (52.16 – 90.72)	0.11
Sport played	Soccer = 9, basketball = 1, lacrosse = 5, football = 4, baseball/soft ball = 6, track/cross country = 3, field hockey = 4, gymnastics = 2, volleyball = 5, tennis = 1	Soccer = 4, basketball = 2, lacrosse = 4, football = 2, baseball/soft ball = 2, track/cross country = 2, field hockey = 2, volleyball = 1, tennis = 1	0.77
Injury location	Knee = 22, hip/groin = 1, shoulder/elbow = 5, ankle/foot/lower leg = 10, low back = 2	Knee = 13, hip/groin = 2, shoulder/elbow = 4, ankle/foot/lower leg = 1	0.10
Years played	8.89 ± 3.19 (2-14)	10.47 ± 3.58 (3-15)	0.10
Days lost	196.50 ± 166.30 (95% CI = 136.54 – 256.48)	184.56 ± 114.47 (95% CI = 127.63 – 241.48)	0.79
ACL reconstruction	N = 20 (50%)	N = 11 (55%)	0.78

Table 1. *Subject group demographics.*

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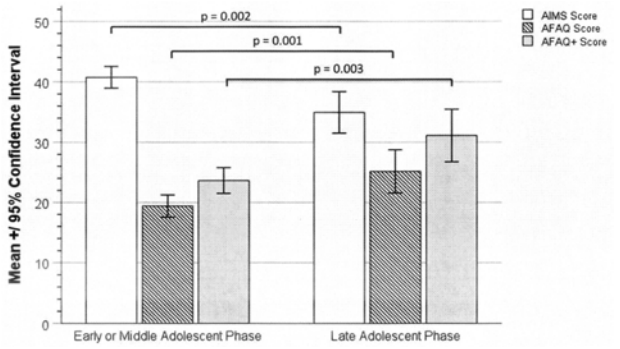


Figure 2. *Athletes who were EMA displayed higher overall AIMS scores compared to LA athletes (40.74 ± 5.24 vs. 34.85 ± 7.12, Cohen's d = 0.94, p = 0.002). In contrast, athletes who were LA displayed higher AFAQ (25.75 ± 8.47 vs. 19.20 ± 5.36, Cohen's d = 0.97, p = 0.001) and AFAQ+ scores (31.70 ± 9.04 vs. 23.42 ± 6.21, Cohen's d = 0.94, p = 0.003) than EMA athletes. Adolescent athletes who were recovering from musculoskeletal conditions were in the RTS phase of rehabilitation tended to display lower AI and higher FA during LA compared to EMA.*

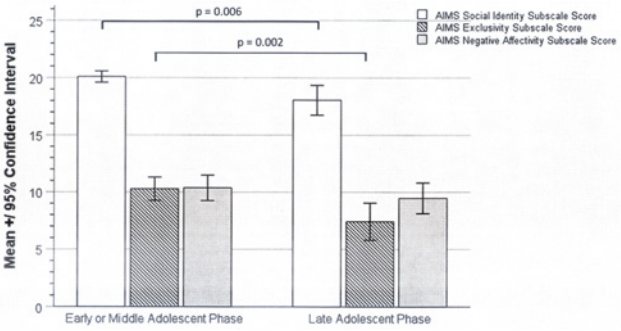


Figure 3. *For AIMS subscale scores, EMA age athletes displayed significantly higher "social identity" (20.13 ± 1.30 vs. 18.00 ± 2.71, Cohen's d = 1.00, p = 0.006) and "exclusivity" (10.30 ± 2.98 vs. 7.29 ± 2.97, Cohen's d = 1.01, p = 0.002) scores compared to LA athletes. Statistically significant differences were not observed for "negative affectivity" (10.30 ± 3.43 vs. 9.52 ± 2.87, Cohen's d = 0.27, p = 0.44). The higher social identity and exclusivity that EMA athletes place on sports participation may contribute to the lower FA, injury risk and re-injury risk in this group.*

Statistical analysis

Shapiro-Wilk tests were used to confirm data normality. Independent sample t-tests were used to compare continuous group variables. Chi-square or Fisher's Exact tests were used to compare categorical group variables. An alpha level of p ≤0.05 was selected to indicate statistically significant group differences. All comparisons were made using specialized statistical software (version 28.0, IBM-SPSS, Armonk, NY, USA).

RESULTS

From 159 consecutive physical therapy outpatients, 60 (32 female, 28 male) adolescent athletes (mean 16.9 ± 3 years of age, range 14 to 22) completed the 7-item Athletic Identity Measurement Scale (AIMS), the 10-item Athletic Fear Avoidance Questionnaire (AFAQ), and the AFAQ with two additional movement-related fear and pain questions (AFAQ+). Subjects were divided into early or middle adolescent (EMA)(age = 14-17 years, n = 40) or late adolescent (LA)(age ≥18, n = 20) groups with otherwise comparable demographics *(Table 1)*.

Adolescent athletes were receiving treatment for musculoskeletal injuries sustained during soccer (n = 13), lacrosse (n = 9), baseball (n = 7), volleyball (n = 6), basketball (n = 5), field or ice hockey (n = 5), track or cross country (n = 5), American football (n = 4), softball (n = 2), tennis (n = 2), and gymnastics (n = 2). Lower extremity conditions included anterior cruciate ligament reconstruction (n = 29) or other lower extremity condition (n = 20). Upper extremity conditions included shoulder dislocation or labral repair (n = 7), elbow sprain or fracture (n = 3), and clavicle fracture (n = 1). Athletes who were EMA displayed higher overall AIMS scores compared to LA athletes (40.74 ± 5.24 vs. 34.85 ± 7.12, Cohen's d = 0.94, p = 0.002). In contrast, athletes who were LA displayed higher AFAQ (25.75 ± 8.47 vs. 19.20 ± 5.36, Cohen's d = 0.97, p = 0.001) and AFAQ+ scores (31.70 ± 9.04 vs. 23.42 ± 6.21, Cohen's d = 0.94, p = 0.003) than EMA athletes *(Fig. 2)*. For AIMS subscale scores, EMA age athletes displayed significantly higher "social identity" (20.13 ± 1.30 vs. 18.00 ± 2.71, Cohen's d = 1.00, p = 0.006) and "exclusivity" (10.30 ± 2.98 vs. 7.29 ± 2.97, Cohen's d = 1.01, p = 0.002) scores compared to LA athletes. Statistically significant differences were not observed for "negative affectivity" (10.30 ± 3.43 vs. 9.52 ± 2.87, Cohen's d = 0.27, p = 0.44) *(Fig. 3)*.

DISCUSSION

The most important study finding was that during the RTS phase of sports injury rehabilitation, EMA athletes displayed stronger overall AI than LA athletes. Specifically they obtained greater social identity from athletic participation and exclusivity toward athletic participation than LA athletes. EMA athletes also displayed less FA than LA athletes. Reasons for these findings may be related to the greater commitment to, or passion for sports often observed in EMA athletes[42,43]. Compared to 12-14 year olds, 15-17 year olds are known to possess lower global physical self-perception, and self-esteem scores, and higher scores on social physique anxiety, reduced sense of accomplishment, and sport devaluation[7]. The greater social identity and exclusivity AIMS subscale scores in EMA age athletes may be related to the high injury[7,8] and re-injury[11,12] rates observed in this vulnerable age group. Sport participation can result in psychosocial and health-related benefits, fostering youth development such as increased self-esteem, emotional control, academic achievement, leadership, and social skills[44]. Harris and Watson[42] reported that 15-17 year olds experienced significantly more exhaustion and reduced sport accomplishment than younger children. It may be that as the adolescent grows up and their sport competence increases, so does the pressure and expectations that lead

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to higher levels of exhaustion[43].

Early identification of EMA athletes who possess a strong AI with low FA avoidance during rehabilitation may facilitate improved RTS criteria screening with greater consideration given to psychological constructs, not just physiological factor time, distance, and perceived function monitoring[44,45]. Future prospective longitudinal studies should also evaluate the influence of social identity and exclusivity AI factors in healthy adolescent athletes to determine how they and FA shift as the athlete transitions from early to late adolescence, and their relationship to sports injury or re-injury occurrence. To promote optimal sport experiences, motivation, and well-being of athletes, coaches play a vital role in promoting adaptative psychological outcomes in their athletes[46,47].

Adolescent athletes may struggle in recognizing their identity after having to discontinue their chosen sport[48]. To help them more accurately self-access injury risk perceptions, they may need to be counseled about how to cognitively appraise and re-appraise fear or anxiety[28]. Risk perception development is a psychological process in which athletes recognize, predict, and control risk events during training and competition with consideration of their inherent personality traits and past experiences[49].

By providing adolescent athletes with some decision-making autonomy about their participation in sports training and competition, coaches can help to foster positive psychological adaptations[50]. Adolescent athlete competence can be improved by providing informative feedback focused on setting realistic goals, and designing practice and competition environments that match the individual's skill levels and abilities[50]. Increased competence (possession of the needed skills and knowledge) likely leads to greater confidence (belief in oneself and one's abilities). However, from an injury prevention standpoint, the capacity to cognitively appraise and re-appraise one's true sport movement and skills abilities within the context of possessing a rational fear or anxiety level may be an important characteristic to develop. This also provides an opportunity for the healthcare team, the coach, the athletes and parents to discuss and agree upon training goals and plans, including creating time for active recovery between training sessions and competitions[52].

Rather than encouraging expressive suppression (hiding emotions), coaches and the healthcare team should help athletes develop an adaptive emotion regulation style, focused on cognitive appraisal and re-appraisal to improve their sporting experience and well-being[51]. For this to happen, open communication is essential with athletes being encouraged to express their feelings and their willingness to identify, reframe, and cognitively reappraise dysfunctional thoughts and emotions in training and competition[51,53]. Within this context, open communication about FA and perceived confidence levels during sports task performance may likewise be helpful.

Study limitations

This study has several important limitations. The study population consisted of a small cohort of consecutive athletically active adolescent patients receiving rehabilitation for differing musculoskeletal sports injury diagnoses at the same outpatient physical therapy center in the USA. At the time of data collection, all were participating in the RTS phase of musculoskeletal injury rehabilitation. This, and the fact that the cross-sectional study design precludes drawing cause and effect conclusions, may limit the generalizability of the findings. To determine causality, longitudinal or experimental studies are needed to assess the effect of one variable on other variables over time, or as a result of an intervention. To better delineate AI and FA relationship changes across the entire adolescent age range, future longitudinal studies should include non-injured adolescent athletes and non-athletic adolescent control groups. Nonetheless, this pilot study provides important foundational information about AI and FA differences between EMA and LA.

CONCLUSION

Adolescent athletes with stronger AI perceptions during the RTS preparation phase of musculoskeletal injury rehabilitation had weaker FA perceptions. As age increased from early-to-late adolescence, AI perceptions weakened, and FA perceptions strengthened. To decrease re-injury rates, early identification and surveillance of injured adolescent athletes who possess stronger, more exclusive AI perceptions and weaker FA perceptions may lead to slower rehabilitation program progressions and greater restriction with RTS timing decisions.

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