PROSPECTIVE PILOT STUDY OF MOOD IN HIGHLY SPECIALIZED YOUTH

MALE SOCCER ATHLETES

by

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DEDICATION

To my best friends and my heroes, my parents, Maurizio and Carla Mattioli. There are no words to describe the amount of appreciation I have for you both. Thank you for sharing with me your cultures and morals, which have shaped me to become the unique person that I am. Thank you for being my coach, my soundboard, and my number 1 fan on and off the field, as the athlete and as the athletic trainer. Thank you for teaching me to be courageous, independent, and to seize every opportunity that I get. The unconditional love and support you both have shown and given me my whole life, through the triumphs and obstacles, means absolutely everything. I could not have made it this far without the foundation you both have given me. The strength and bravery you each possess to have started a family so far from your own inspires me to also make bold and daring decisions of my own. I hope to make you both proud and to inspire you both as you do me.

Eu amo vocês. Ti voglio bene.

Bianca Mattioli

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LIST OF ABBREVIATIONS

Abbreviation	Description
AT-G	Attraction to Group Task
AT-S	Attraction to Group Social
CI	Confidence Interval
COVID-19	Coronavirus Disease 2019
DTLI	Differentiated Transformational Leadership Inventory
FT-A	Full Time Athlete
GAD-7	Generalized Anxiety Disorder 7-Item Scale
GEQ	Group Environment Questionnaire
GI-S	Group Integration Social
GI-T	Group Integration Task
GPS	Global Positioning System
HA	Healthy Athlete
HADS	Hospital Anxiety and Depression Scale
HC	Head Coach
IA	Injured Athlete
MLS	Major League Soccer
P	Parent
PSS-4	Perceived Stress Scale 4

PTSD	Post-Traumatic Stress Disorder
RM-ANOVA	Repeated Measures Analysis of Variance
RPE	Rating of Perceived Exertion
SD	Standard Deviation
SRC	Sport-related concussion
SS	Support Staff
U14	Under 14 years old
U15	Under 15 years old
U17	Under 17 years old
US	United States
X	Mean

ABSTRACT

Context: Sport specialization rates have risen among athletes leading to an increase in injury rates at younger age; however, the research investigating the effects of sport specialization on mental health is lacking. **Objective:** To examine the changes in mood scores among highly specialized youth soccer players throughout one season and explore potential factors contributing to their stress and anxiety levels. **Design:** Prospective repeated-measures pilot study. **Setting:** Survey and a Major League Soccer (MLS) Next Academy. **Patients or Other Participants:** From one MLS Next Academy team, 16 players and 15 parents participated. **Main Outcome Measures:** Stress (Perceived Stress Scale 4, PSS-4) and anxiety (Generalized Anxiety Disorder 7, GAD-7) scores were collected from all participants at baseline, midseason, and postseason to determine change scores over time. Information about win-loss records, perceived pressure, leadership, and team cohesion metrics were also collected from the players to investigate additional factors that may have altered their mood states. **Results:** Over the course of the season, PSS-4 and GAD-7 change scores for athletes ($F_{(2,22)}=2.26$, $P=0.13$) ($F_{(2,22)}=0.77$, $P=0.48$) and parents ($F_{(2,25)}=0.661$, $P=0.525$) ($F_{(2,25)}=0.98$, $P=0.39$) were not statistically different, respectively. All other comparisons were also not significant ($P > 0.05$). **Conclusion:** Stress and anxiety scores remained consistently low throughout the season for both athlete and parents. There was no significant change in either of the mood scores in either group independently of each other over the course of the season. Overall, both athlete and parent average scores for the PSS-4 and GAD-7

were low and were lower in the current study than reported in previous studies. Nonetheless, some athletes did present with elevated scores at different timepoints. This indicates that further research needs to be done to elaborate on the current study's findings such as investigating mood scores of athlete's teachers and coaches, asking athletes perceive pressure on themselves, and/or including GPS data for objective workload.

1. INTRODUCTION

In 2016, 72% of school aged children participated in at least one organized sport team.[1] The rise in sport participation among children equates to the increased recognition of the benefits associated with participating in sports. These benefits include healthy living, building social relationships, and improving self-image.[2] Sport specialization has increased as well, with children starting as early as seven years old.[3] Sport specialization is defined as the participation of one sport at the exclusion of other sports for at least eight months during a year.[3,4] It is theorized by coaches and parents that specializing as early as possible will help guarantee their athlete and/or child will achieve elite status. However, the phenomenon has increased attention within the medical community due to the increased number of injuries associated with sport specialization. Every year, an estimated 22 million student-athletes ages 5-22 years-old sustain a sport-related injury.[5] Numerous studies investigating the benefits of early sport specialization have shown that early specialization does not indicate a child will reach the professional level later in life.[4,6,7] Additionally, research about the risks associated with early sport specialization, like concussions and other sport-related injuries, have risen. However, very little research on the psychological impact of early sport specialization exists, including, what factors are associated with changes in stress and anxiety among highly specialized youth male soccer athletes throughout a season.

1.1 Stress and anxiety in youth

Adolescence is a transitional period in a young person's life where they could experience much stress and anxiety. In young people, stress can come from academics, intrapersonal relations, relationships, and career exploration.[8] These stressors can cause

emotional, psychological, and behavioral problems in young people.[8] Anxiety has become a prevalent mental health issue among youth and adolescent in more recent years.[9] Pediatric anxiety disorder is a predictor for adult anxiety disorder which has been linked to depression, substance abuse, hospitalization, and suicide attempts.[10] In the literature, numerous studies have investigated prevalence of stress and anxiety among children and adolescents when challenged with factors such as academics, relationship, and sports and management.[3,4,7,8,11-13] However, to our knowledge studies that look specifically at highly specialized American soccer players ages 13 to 16 is lacking.

1.2 Statement of the Problem

Children who are classified as highly specialized athletes face additional hurdles compared to children who participate in youth sports for fun or general physical fitness. The biggest cause of early specialization is to enhance performance in order to achieve elite and/or professional status.[3,4,6] Pressure to perform consistently at the highest level is strenuous on an athlete, and for young athletes, can lead to injury, burnout, and isolation if not monitored and managed correctly.[3,4,6] Pressure can come from the athlete and others, such as their parents, coaches, and teammates. Additional factors like academics[14] and injury[4,5,7,15] can also impact an athlete's mental health. Understanding how stress and anxiety affect specialized athletes throughout a season is the first step in being able to provide efficient and successful management in reducing burnout and isolation among elite athletes. The purpose of this study is to track changes in stress and anxiety among highly specialized male youth soccer players throughout a season. The secondary purpose of this study is to determine what factors, if any, are more influential in stress and anxiety levels.

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1.3 Research Variables

1. *Group*

    a. *Full-Time Athlete (FT-A): who have a contract with the academy and are eligible to roster for all games.*

        i. *Injured Athlete (IA): Any of the FT athlete who get injured throughout the length of data collection. IA are defined as athletes whose injuries caused them to miss at least one game.*

        ii. *Healthy Athlete (HA): Non-injured FT-As. Each IA will be matched with a HP on their respective team at time of injury. Factors considered for matching athletes will be similar in 1) playing time and 2) position.*

    b. *Parents (P): One parent for each FT-A will be surveyed throughout the study and be paired with their child.*

    c. *Coaches*

        i. *Head Coach (HC): Each head coach for the respective teams will be surveyed throughout the study.*

        ii. *Supporting Staff (SS): The SS are coaches within the academy that have either direct or indirect influence on overall academy methodology and major influence on athletes.*

2. *Age: Age was evaluated as a continuous variable from 13 to 17 years of age.*

3. *Team: Team is determined by their respective age group. Some players may occasionally be asked to play for a team that is above their age group.*

    a. *FT-P U17: These athletes are 15 to 17 years old.*

    b. *FT-P U15: These athletes are 14 to 15 years old.*

    c. *FT-P U14: These athletes are 13 to 14 years old.*

4. *Measures*

    a. *Perceived Stress Scale 4 (PSS-4)[16]*

    b. *Generalized Anxiety Disorder 7-Item Scale (GAD-7)[17]*

    c. *Differentiated Transformational Leadership Inventory (DTLI)[18]*

    d. *Group Environment Questionnaire (GEQ)[18]*

    e. *Pressure Questionnaire*

    f. *Game Results*

    g. *School Questionnaire*

    h. *GPS data*

5. *Time*

    a. *Season was divided into 3 timepoints: Baseline, Midseason, and Postseason.*

    b. *Table 1.1 illustrates survey distribution during each timepoint.*

Table 1.1 Survey Distribution Timeline

Measure	Baseline	Midseason	Postseason
Consent/Assent	[a]All x1		
Demographics	All x1		
PSS-4	All x1	All x8	All x1
GAD-7	All x1	All x8	All x1
DTLI		Athletes x1 Coach x1	
GEQ		Athletes x 1	
School Questionnaire		Athletes x1	
Pressure Questionnaire	Athletes (Parents only)		Athletes (Parents and Coaches)

[a] "All" represents all participants were asked to complete the survey followed by how many times that it was collected during that part of the season.

1.4 Research Questions

Research Question 1: How do anxiety and stress levels change throughout an athletic semester in elite youth soccer players?

> Hypothesis 1: Stress and anxiety scores will fluctuate throughout the season as measured by the PSS-4 and GAD-7.

Research Question 2: What stressors are associated with alterations in stress and anxiety levels throughout a season in elite youth soccer players?

> Hypothesis 2a: Pressure from coaches and parents will be associated with athlete's PSS-4 scores.

> Hypothesis 2b: Performance outcomes (playing time and game results) will be associated with athlete's GAD-7 (anxiety).

> Hypothesis 2c: DTLI (perception of coach leadership) and GEQ (team cohesion) scores will be inversely related to GAD-7 (anxiety) and PSS-4 (stress) scores.

Research Question 3: What is the association between Rating of Perceived Exertion (RPE) and PSS-4 and GAD-7 scores?

> Hypothesis 3a: Athletes who report higher RPE scores will also score higher on the PSS-4.

Hypothesis 3b: Athletes who report higher RPE scores will also score higher on the GAD-7.

Research Question 4: What is the association between parent and their respective athlete GAD-7 and PSS-4 scores?

Hypothesis 4a: Athlete PSS-4 scores will be similar in magnitude and direction to their matched parent.

Hypothesis 4b: Athlete GAD-7 scores will be similar in magnitude and direction to their matched parent.

1.5 Exploratory Research Questions

Exploratory Research Question 1: What is the association between athlete's PSS-4 and GAD-7 scores and injury incidence throughout the season?

Exploratory Hypothesis 1a: Athletes will score higher on the PSS-4 while they are injured when compared to when they were healthy and their matched healthy teammate.

Exploratory Hypothesis 1b: Athletes will score higher on the GAD-7 while they are injured when compared to when they were healthy and their matched healthy teammate.

1.6 Assumptions

1. All athletes are attending school full time.

2. All athletes have at least 1 parent/guardian who is involved in their extracurricular activities and will participate in the study.

3. All recruited coaches will actively participate in the study.

4. All participants will have access to electronic devices.

5. All participants will honestly answer the survey questions.

1.7 Delimitations

1. Only the Austin FC Academy athletes were included in this study because of accessibility to these teams.

2. Only one parent/guardian was surveyed for each athlete to reduce participant burden and not all athletes may have two parents/guardians.

3. Part time athletes were not included because we could not track their soccer activities outside of the academy.

1.8 Limitations

1. Only boys were included in this study because there are no girls' teams associated with Austin FC.

2. The U13 level was not included because our measures are not appropriate for children below 13-years-old.

3. Athletes were excluded from the study if they or their parents/guardians were not literate.

1.9 Significance of the Proposed Study

The current study is a prospective study investigating if and how much stress and anxiety levels change throughout a season among elite youth male soccer players. To the researcher's knowledge, there are only studies that investigated stress or anxiety among youth athletes retrospectively.[3,9,10,13,19] Prospective and retrospective studies involving sport specialization in youth athletes do exist, yet lack in investigation of behavior and mood. Other studies that are available on youth sports and stress or anxiety recruit participants within college or high school levels.[14,20,21] Currently, there is no literature

that investigates our specific population compromised of 13- to 17-year-old boys playing soccer at an elite level.

The need to investigate stress and anxiety among our youth concurrently with their season is the first step in helping these young athletes. With better understanding, adults can help children and adolescents better cope and manage their stress and anxiety. As healthcare professionals, parents, and coaches, it is important to create a safe environment, both physically and mentally, where children can play sports at any level. These findings will give healthcare professionals, players, parents, and coaches understanding stress and anxiety in highly specialized youth boys in soccer during a season leading to better management their stress and/or anxiety by providing appropriate resources.

2. LITERATURE REVIEW

2.1 Introduction

Youth sport participation is often introduced in early stages of children's lives to promote a healthy lifestyle, social interactions, motor and cognitive development, and fun.[2,7] In the United States (US), approximately 60 million children from 6 to 8 years old participate in organized sports.[7] More recently, a significant amount of emphasis on developing and exceling in skills to achieve an elite status has been placed on youth sport participation.[3] Pressure to specialize comes from not only the child but from parents and coaches as well who deem it necessary in order to achieve success in sports.[3,6,7] Sport specialization is characterized as the intense, year-round training of a single sport in exclusion of other sports.[2,3,6,7,12] It is also associated with high-volume training causing both burnout[2,4,5,22] and severe and overuse injuries[2,3,6,7] leading to an increase in concern among healthcare professionals.

Although the exact definition of sport specialization is still under debate, a three-point scale (low, moderate, and high) has been used to determine the severity of specialization[7] based on three factors: 1) if they have a main sport, 2) if they quit other sports to focus on their one main sport, and 3) if they train for eight or more months in a year.[4,7] Classification is determined by the total number of questions children answered "yes" to: 3 classifies them as highly specialized, 2 as moderately specialized, and ≤1 as low specialization. Being a highly specialized athlete has become a risk factor associated with orthopedic injuries in youth athletes.[7] This is because of the adherent training volume, intensity, and frequency young athletes are exposed to throughout the year.[3,4,6,7]

Despite concerns, the trend to specialize in a single sport has increased among adolescents. An increasing number of travel leagues have emerged starting at 7 or 8 years old.[3] The US Tennis Association reports 70% of their elite junior tennis players specialized at 10.4-years-old and 95% were specialized by 18-years-old.[3,6] Other highly technical and individual sports like gymnastics, swimming, diving, and dancing also have seen increasing rates of early specialization among young athletes.[6] Similarly, certain positions in team sports, such as a baseball pitcher, are trained to specialize in that sport and position specifically.[6] The push to specialize comes from the belief that the young athlete needs to focus on one sport to gain success. Despite increased sport specialization in our youth, only 4% of high school athletes playing boys' soccer, girls' soccer, football, and basketball will go on to play in Division I or Division II universities.[2] Additionally, less than 1% of young athletes 6 to 17 years old will obtain professional contracts in sports like basketball, soccer, baseball, softball, and football.[3]

Recently, the amount of research related to the risks associated with early sport specialization has increased. Evidence on how sport specialization affects mental health in young athletes is currently limited. However, research underlying training volume,[4,7] burnout rates, [3,6,12] and psychosocial behaviors[12] related to sport participation and specialization are available to offer insight into how factors related to sport specialization can affect a young athletes' mental health.

2.2 Risk Related to Sport Specialization

The most prevalent risk associated with sport specialization is the increasing amount of severe and overuse injuries.[4] Recent studies have shown that high training volumes is a risk for injury[3,4,6,7] and that increasing exposure is linearly related to injury

risk in high school athletes.[6] Studies have shown that age, sex, and child development need to be considered when determining training volume, intensity, and frequency of trainings.[2] Different organizing bodies have published recommendations discouraging sport specialization.[3] Youth sport leagues have also established guidelines to limit trainings and exposing children to highly repetitive motions to reduce the risk of injury.[4] However, adhering to the guidelines is difficult for young athletes like little league pitchers who play on multiple teams throughout the year.

Another factor to consider with sport specialization is the ratio between the hours spent participating in organized sport and free play: for every 2 hours of organized sport, it is expected for children to spend 1 hour playing unstructured, free play.[4] The criteria for youth sport training proposed by researchers is that training should not exceed 16 hours per week[6,7] and should be limited to the age of the athlete[7] (meaning a 13 year-old athlete should not be training for more than 13 hours during the week).

2.2.1 Orthopedic Injuries in Youth Sports

The risk of overuse serious injuries increases when young athletes focus on one sport, regardless of age and volume.[4] Similarly, there is an increase risk in injury, overuse injury, and serious overuse injury as degree of specialization increases.[4,6,7] Athletes who exceed both the age-recommended maximum and the overall maximum of 16 hours of training per week saw greater injury rates.[4] This trend was also noted in athletes that spent twice as much time in organized sport than free play.[4] In a study conducted by Post et al.,[7] athletes who were considered highly specialized (participating in one sport throughout the entire year and training for more than the recommended limitation) reported more previous or overuse injuries than their uninjured counterparts.

Specialized athletes sustained injury independent of their level of specialization.[4,7] Occurrence and severity of injuries were dependent of degree of specialization.[4] In a study conducted by Jayanthi et al.[4], 23.5% of the overuse injuries were classified as serious overuse injuries. Overall, serious overuse injuries accounted for 15.8% of all injuries.[4] Additionally, acute injuries accounted for 32.6% of all injuries. The majority of overuse injuries were reported to be in the shoulder and knee.[4,7]

2.2.2 Concussions in Youth Sports

Sport-related concussions (SRCs) have become a major concern among young athletes. Contact sports at a young age expose young athletes to repetitive head trauma.[23] Sport-related concussions are caused by direct blows to the head and or body that causes forces of acceleration, deceleration, and rotation of the head.[23,24] Approximately 3.8 million SRCs occur annually, however this figure only represents the reported cases. It is estimated that 50% of head injuries are unreported annually.[24] Contact sports have higher occurrences such as, football, hockey, rugby, and soccer.[24] Among individuals between the ages of 5-19, 30% of concussions are sport related and require emergency room visits.[24]

Children are more susceptible to a concussion accompanied by catastrophic injury and have a more prolonged recovery process.[24] Additionally, children who are pre-diagnosed with mood disorders, learning disorders, ADD/ADHD, and migraines alter the evaluation and management processes of concussions.[24] Other factors that suggest higher susceptibility of SRCs are prior history; greater number, severity, or duration of symptoms after concussion; female sex; and playing a certain position within the sport.[24]

Susceptibility to concussions and adverse effects in children can cause concern within youth sports.

Mood disorders, such as anxiety, both preexisting or as a result of injury, can impair the evaluation and management of SRCs.[24] Among high school and college students, 17-46% reported symptoms of anxiety, depression, or irritability.[24] There is no evidence that suggests that preexisting mood disorders increases the risk of sustaining SRCs. However, determining whether symptoms occurred before or after injury, and if the symptoms worsened due to injury, is difficult. Anxiety and depression can also affect baseline and/or repeating testing when reporting symptoms.[23,24]

Return from SRCs should be gradual and individualized for each athlete. In young athletes, management of concussions should incorporate both return-to-play and return-to-learn protocols. Young athletes need to be withheld from sport until they are fully reintegrated to their academic baseline following an SRC.[23,24] There is no standard guideline for returning athletes to school, however accommodations can be made to reduce symptoms of cognitive stress such as reducing workload, extending deadlines, taking short days and/or days off.[23,24] The return-to-play guideline then starts and is composed of a gradual and medically supervised increase in activity, physical demands, sport-specific activities, and physical contact.[23,24] The progression is stopped if the athlete experiences any symptoms during the progression and is returned to the previous phase when symptom free.[23,24] Final full-contact participation can then be cleared by a physician. The return-to-play progression time frame may vary in length depending on the athlete's response to the exercises. Studies have showed that children and adolescent athletes' cognitive recovery period for SRCs is approximately one to two days longer

when compared to college athletes.[23,25] Time away from sport can cause emotional distress in young athletes by feeling distant from teammates and unable to participate in activity, and more research needs to be done in light of the effects on concussion recovery and behavior in youth sports[12].

2.3 Mental Health within Youth Sports and Early Specialization

Youth sports have significant benefits in regard to physical and psychological health of children. In the US, physical activity and organized sport has helped combat current national health problems like diabetes and obesity.[2] Other benefits associated with organized sports include the overall social support and acceptance that being a part of a team can impose on a young child, thus reducing the risk of suicide among children and adolescents.[2] At the right dosage, physical activity and organized sport is associated with improvement in mental health among children and adolescents.[12]

Child readiness to participate in organized sport should be assessed prior to participation. An unready child introduced to a competitive environment can lead to anxiety and stress.[2] The focus is shifted towards winning rather than having fun, developing skills, and fairness.[2] As a child gets older, the pressure to succeed at a high level often becomes more important. Additionally, elite youth athletes can feel emotional or physical disconnect from their friends and family due to their commitment to sport.[13] Research around mental health overall among youth has become increasingly relevant, yet when specifically addressing elite youth athletes, it is limited.

2.3.1 Stress and Youth

Organized youth sports facilitate physical activity and enjoyment for children and is positive means of building friendships while learning developmental skills. Fostering a

positive environment surrounding youth sport can produce positive outcomes and help buffer anxiety[2] and stress[14] among children. An elite youth athlete daily routine is highly demanding juggling an academic load in addition to stresses and strains of high level and intensity trainings and competitions.[14] High levels of physical exhaustion paired with the psychological pressure of winning and losing and earning their spot on a team is believed to be one of the main differences between elite young athletes and non-athlete children.[14] Participating in an elite level of sport exposes children to more opportunities to fail and to succeed. How they navigate the failures can be harmful or harmless.

Competitive stress is considered acute anxiety in response to a competitive situation deemed threatening to one's self-esteem.[19] Stress in sport is triggered when the ability to meet a competitive demand is not achievable and therefore negative consequences is the only outcome. A Canadian study in 2014 followed 1492 teenagers for four years and found that enjoyment of the sport predicted an increase in self-esteem rather than sport participation.[11] Negative outcomes for a child are not only the failure associated with a lost but also negative feedback from someone the child looks up to, like a parent, coach, and/or peer.

In a study conducted by Scanlan and Passer,[19] pre and post-game predictors of stress were assessed in young boys and girls soccer players. They found that boys who had higher competitive anxiety stress, lower self-esteem, and lower personal and team performance experiences have more pregame stress than their peers with opposite attributes. In the same study, the greatest predictor of post-game stress was whether they had won or lost the game, and the amount of fun they had while playing. The children on teams that lost showed greater post-game stress than children that won. Despite results,

children who expressed to having more fun during the game had lower post-game stress than children reporting to have less fun. The study shows that result and performance can affect a child's mood and stress level but can also have no effect if the child participating is fundamentally having fun.

Scanlan et al.[19] surveyed 76 wrestlers 9-14 years old before and throughout a final tournament. Wrestlers were surveyed two weeks prior to tournament to determine a baseline, immediately after final weigh-ins day of the tournament focusing on significant adult influences and pre-match cognition, before the first and second round after being paired with their opponent to asses pre-match anxiety, stress, and personal performance expectancies, and again immediately after both the first and second rounds before interacting with parents and coaches to asses post-match anxiety, stresses, and discrepancy between expectation and result. The study showed that competitive trait anxiety and personal performance expectances were influential in predicting pre-match stress and that win-loss and the amount of fun were predictors of post-match stress. Although Scanlan et al. focused on an individual sport, similar data would be worth pursuing among soccer teams throughout a season rather than the course of a tournament.

2.3.2 Anxiety and Youth Sports

In the US, anxiety is the most common mental health issue among adolescents.[9] The lifetime prevalence of anxiety among adolescents is greater than 30%.[12] Anxiety prevalence rates vary with age of athlete: adult athletes' rate ranges from 7 to 26% whereas intercollegiate athletes have a higher rate of 37%.[13] In studies measuring anxiety rates in older athletes, the variability in the results could be due to when during the season or training week the questionnaire was administered.[13] And although the study

did note that it was not sufficient to conclude diagnostic evaluation, it did note that varying rates of stress could be linked to elevated risk of injury, performance deficits or plateaus, or approaching retirement of sport.[13]

Brand et al.[14] aimed to collect mental health data of young (12-15-year-old), elite athletes and compare it to deselected athletes (athletes who have failed to achieve desired performance) and nonathletes. The deselected athletes showed more symptoms of mental health disorders than their counterparts. More specifically, anxiety was one of the most prevalent mental health issues in both the elite and deselected athlete group compared to the nonathlete group among females.

During adolescents, athletes undergo multiple transitions within their personal and educational lives that can affect the young athlete emotionally. On a personal and psychosocial level, young athletes start to rely more so on their peer and coach relationships rather than their family relationships.[14] At the educational level, young athletes are transitioning into different levels of school with greater work load. Biologically, young athletes at this age are also undergoing physical changes to their bodies. Lastly, within their sport, more frequent and intense trainings and competitions are incorporated to their schedule along with more emphasis in skill and tactical development within the sport. All these transitions often occur simultaneously and compound on one another as young athletes get older. However, there is insufficient research to determine what extent each factor may affect the athlete's anxiety.

Weber et al.[13], conducted a study to provide an overview of symptoms for both anxiety and depression levels in young athletes (12-18 years old, average age 14.6) using the Hospital Anxiety and Depression Scale (HADS). The HADS diagnostic questionnaire

is used on 16 to 65 year old to help determine risk of anxiety and/or depression.[13] Of the 326 participants, 20% of the athletes reported clinically relevant scores associated to both anxiety and depression. To be clinically relevant, HAD scores above seven out of 21 were considered to be cases and varied by score and level. The average anxiety score among athletes was 7.2 on the HADS. Longitudinal and cross sectional study and found that anxiety often preceded depression and that athletes who reported higher anxiety scores were also more likely to report onset of depression independent of age.[13] This indicates that athletes who are more anxious are more at risk of developing depression.

In a different study conducted by McGuine et al., 13000 high school athletes in the US were surveyed to describe health among adolescent athletes during the Coronavirus Disease 2019 (COVID-19) sport cancellation and school closures. The study utilized the GAD-7 to report anxiety scores among the participants. They determined that of the athletes sampled, those who only participated in team sports reported worse symptoms of anxiety and depression, lower levels of physical activity, and worse health related quality of life than athletes who participated in individual sports or both team and individual sports.[21] As previously mentioned, sports are important to development and lifestyle in young athletes, therefore the cessation of sports indicated an additional stressor to athletes.

2.3.3 Motivation vs. Burnout in Youth Sports

Most parents and coaches believe that early specialization will maximize their athlete's skills which in turn will supply them future financial, social, and educational success.[2] Ericsson's study of deliberate practice emphasized that one needed 10,000 hours of dedicated practice in order to obtain mastery of the skill. Yet, 98% of athletes

who specialize early do not attain a professional contract.[2] That is because it is difficult to determine if a young child has elite potential and skill since they still are not physically, cognitively, or emotionally developed yet. [2,4,6,7] Ericsson also emphasizes that practice needs to also coincide with passion and love for what is being trained and that nobody is born a master.[2] Because of this focus on "practice makes perfect," children are often overly trained causing them to lose interest and quit early.

Burnout can be defined as the psychological syndrome consisting of emotional and physical exhaustion,[6,12] reduced sense of accomplishment, and sport devaluation,[12] resulting in the abandonment of the sport. Sport specialization can result in burnout due to overall parental and societal pressure and/or overtraining[12] without adequate recovery. Athletes can also decide to quit their sport if they feel that the physical demands being imposed on them or the performance expectations is impossible for them to physiologically and psychologically meet.[12] Most times, however, athletes will abandon their sport for other sports because of interest[12] or just because they are no longer having fun in their current situation.[2]

Direct factors of sport specialization related to risk of burnout come from various factors. Training load, frequency, and volume not only imposes physical demands leading to injury as noted previously, but also to psychological demands.[12] Additionally, training commitment, high expectation from others and self, negative performance evaluation, little to inconsistent coaching practices, and little control over sport decisions making are also risk of burnout in young athletes.[12]

2.4 Contributing Stressors Implied on Youth Sports

2.4.1 Parent and Coach Relationship

Parents can also inevitably stress out and cause anxiety in their children by adding environmental pressure. If a parent is unrealistic on their child's ability and level of skill, young athletes may feel an increase level of stress and anxiety to achieve an unrealistic level of performance.[2] Negative parental pressure and a negative parent-coach relationships can add more pressure and stress to young athletes as they progress in their sport.[2] However, studies have shown that due to the significant amount of time spent at practice a week, coaches quickly become models to their young athletes.[2,3,6,12]

Because of the assumption of skill, expertise, and increase amount of time spent with coaches, they quickly become models of behavior to young athletes.[2] Although the interaction between athlete and coach can be a positive influence, in one study, 30% of athletes reported that one reason they ended up quitting their sport was due to negative actions of coaches and parents.[2] Other negative coaching behaviors reported by athletes included being called names; favoritism among the teammates; pressure to win; decreased teaching skills; being shouted at or insulted; cheating and fighting with referees, parents, and/or other coaches; and being pressured to play while injured.[2] Consequently, these behaviors were part of the reason children ended up quitting because the focus was on winning and competing rather than to have fun. Justifiably, negative behavior conducted by adults in youth sport environment related to negative social behavior, like irritability and anger, among the children.

In a study conducted by Scanlan et al.[19] on stress and anxiety among wrestlers, they measured the contribution of parental pressure on young athletes and their pre- and

post-match behavior. It was found independently that wrestlers who felt greater parental pressure to wrestle (p < .059) and who worry more frequently about failing, experienced a greater state of anxiety than their peers with opposing responses. However, it was not a reliable stress predictor when other predictor variables were present. Nonetheless, more research needs to be conducted on parental pressure as a predictor for stress among elite young male soccer players.

2.4.2 Socioeconomic Pressure in Youth Sports

According to research, childhood obesity is a strong predictor for adulthood obesity[2]. It is predicted that one third of children born in 2000 and later will experience diabetes at some point in their lives.[2] Organized sports facilitate the incorporation of active and healthy lifestyle by maximizing caloric expenditure and avoiding sedentary lifestyle in children. The Center of Disease Control reported that there is a positive correlation between students who participated in physical activity and improved in academic achievement, decreased risk of diabetes and health related issues, and less psychologic dysfunction.[2] Participating in sports in suburban youth showed to be similar between boys and girls whereas urban and rural girls showed to participate less in activity than boys within their community.[2] Living in lower socioeconomic neighborhoods contributes to inactivity and have limited access to organized sport programs and facilities.[2] Lack of resources alone hinder a child's health.

Participating in youth sports and physical activity can be a financial hardship among families with low socioeconomic backgrounds. Basic costs include uniforms, equipment, league fees, travel expenses, and footwear.[2] Within some urban communities, there is a lack of fields and recreation centers, or little maintenance of these facilities.[2]

Both sport and safety equipment are often outdated or damaged.[2] Lack of government

funding for after-school programs also limit the accessibility of physical activity and

sport participation in these areas.[2]

Part of the reason behind increasing amount of pressure to specialize in a single

sport at an early age is to seek financial and academic reward. However, the decision to

commit to youth specialization impacts parents and family increasing their financial

burden. The cost of high level, elite youth sport clubs can take away from family savings

and normal family structures. However, many athletes will not receive sufficient amount

of aid or even scholarship to cover the cost of today's tuition. In 2003-2004, the average

scholarship awarded for a Division I or II university was $10,409, which covers about

half the tuition of a state school ad about 20% of a private university. Financial

investment in youth sport most often than not include private sessions, sport camps,

participation in high level clubs, college showcase tournaments, and travel expenses[2].

Extreme costs of elite level youth sports increase financial burden on families and little

research has been done to determine if the financial aspect interferes with the athlete's

motivation and performance.

<div align="center">

2.5 Conclusion

</div>

The purpose of this literary review is to highlight an increasing trend in early

sport specialization and how specializing in one sport can affect a child's behavior. More

specifically, elite young male soccer athletes and their response to stress and anxiety were

the key focus of the analysis yet very little research has been done within this specific

population. However, research has shown that both stress and anxiety have a dangerous

effect on youth alone, and that the added stressors in participating in youth sports both at

the recreational and elite level can be both helpful and harmful to a young athlete's physical and emotional growth. Variables that were determined to be significant stressors were injuries sustained and injury risk, parent and coach involvement in sport participation, and the socioeconomic elements surrounding youth sport. More research needs to be done in these areas to better understand the behavioral and cognitive toll early sport specialization can have on young athletes to both reduce the risk and also help young athletes cope with high training demands and pressure.

3. METHODOLOGY

The current analysis is a prospective-repeated measures study of elite youth soccer athletes, their parents, and their coaches. The participants included the athletes, parents, and coaches of Austin FC Academy within the MLS Next Youth Soccer League. The measure used to assess anxiety was the Generalized Anxiety Disorder 7-item Scale (GAD-7) and to assess stress was the Perceived Stress Scale 4 (PSS-4). The Differentiated Transformational Leadership Inventory (DTLI) was used to measure the coach and athlete relationship. The Group Environment Questionnaire (GEQ) was used to measure the relationship among the athletes within their respective team. Additional demographic information was collected for the athletes (age at the start of the season, grade level in school, years of experience playing soccer, additional extracurriculars, etc.), their parents (work/occupation, socioeconomic classification, etc.), and their coaches (coaching experience, certifications, etc.) Stress and anxiety baseline scores were also collected along with demographics. Data were collected through online surveys over one season in fall 2021. Season record and GPS data were collected through the team since they already collect that information for their own use. Consent forms were available to parents/guardians in English and Spanish. The Institutional Review Board at Texas State University in San Marcos approved this study prior to recruitment and data collection. Assent was collected from the athletes. Consent was collected for athlete participation by the parents/guardians, in addition to the parent's participation. Coaches consent to participate was also collected.

3.1 Recruitment

The researchers contacted the Head of Human Performance of Austin FC to gain permission to recruit the athletes of their youth development academy for this study. The researchers also met with the director, general manager, and coaches of all teams recruited for this study. Once given permission, the researchers held an online meeting with the athletes, parents, and coaches to present the study. The purpose and requirements of the study were described to everyone in the meeting. In addition, a 1-page explanation of the study and an assent/consent form was sent electronically to all the participants in both English and Spanish. The researchers were able to get the email addresses from the team's contact sheet through the academy's director. Participants were given time to review and discuss the assent/consent forms. Athletes, parents, and coaches were then given the opportunity to discuss participation within the study with the researcher. The potential participants were told that they could discuss any questions or concerns of the study with the researchers privately and could contact the researchers for more information at a later time via phone or email. Any potential participant that was unable to attend the meeting was contacted via a mass email that included a description of the study and the assent/consent forms attached. They were also encouraged to follow-up with the researchers if they had any questions or concerns.

3.2 Participants

3.2.1 Athletes

We invited 103 athletes, 13-17 years to participate in the study. These athletes participate in an MLS Next Academy team where they are recruited from to participate in. Some athletes move with or without their families from all over the country as well as

some athletes coming internationally. Families do not pay for their athlete to participate on this team like other local soccer clubs. This academy is linked to an MLS professional organization, with intention for these kids to be signed and play for that professional team, or elsewhere, including other professional teams or college. Twenty-three parents gave consent for them and their child to participate and 16 athletes assented to participate. Athletes were divided into their respective level, under 17 (U17; 15-17 years old), under 15 (U15; 14-15 years old), and under 13 (U13; 13-12 years old).

3.2.2 Parents and Coaches

One parent per participating athlete (n=16) was invited to complete the surveys within the study and only 15 of those parents consented to participate. From the coaching staff, 12 coaches (males = 12) were invited to participate in the study but only four coaches consented. These coaches were recruited because they had direct or indirect authority over athlete development and overall team decisions. The coaches were divided into two groups: head coaches (HC; n=3) and supporting staff (SS; n=2). The HC group were the head coaches assigned to one of the three teams and had the greatest influence and interaction with their respective team's athletes. The SS group included coaches who interacted with athletes from all three teams and were directly involved with athlete development or indirectly involved through each team's HC (strength and conditioning coach and general manager).

3.2.3 Exclusion

Participants were excluded from the study based on the following criteria if: 1) they were not literate, 2) they were not fluent in Spanish or English, 3) the player was not

a full-time roster athlete (meaning they are part-time or trialist for the academy), and 4)

parental consent or athlete assent were not granted.

3.3 Measures

3.3.1 Generalized Anxiety Disorder 7- item scale

The Generalized Anxiety Disorder 7-item scale (GAD-7)[17] has been validated in

multiple populations in its ability to detect generalized anxiety, panic, social anxiety, and

post-traumatic stress disorder (PTSD).[26] This behavioral measure assesses the person's

anxiety levels over the past 2 weeks using 7 questions. Answers range from "not at all" to

"nearly every day" with total scores ranging from 0-21. The accepted cut point for

generalized anxiety is a score of 10. Alternate cut points are 0-4 (minimal), 5-9 (mild),

10-14 (moderate), and 15-21 (severe). Normative mean scores for the GAD-7 in a

German sample of individuals 14-24 years old were 2.76±3.49.[27] The individual item

score means ranged from 0.30 to 0.54 across the sample.[27] The normative mean reported

by Löwe et al. for adults 35-44 years old was 2.82±3.34.[27] Due to the cessation of school

sports, McGuine et al. investigated anxiety scores among high school athletes during the

COVID-19 pandemic utilizing the GAD-7 and found that scores were elevated in males

(n=6117, X=6.3 95% Confidence Interval: 6.0-6.6).[21]

3.3.2 Perceived Stress Scale 4

The Perceived Stress Scale 4 (PSS-4) is a short version of a 14-item instrument

used to measure stress perception.[16] It is used to compare a person's perceived stress

related to current and objective events.[16] The PSS-4 is well-validated in the assessment of

one's perception of stressful events within the last month in both adults[16,28,29] (coefficient

alpha reliability: =.72; test-retest liability =.55) and adolescents (t= 3.23, p < .0002).[29]

The PSS-4 includes reverse scoring of questions 1 and 4 and positive scoring for questions 2 and 3. It uses a 5-point Likert Scale (0= never to 4= very often). A higher score indicates higher levels of stress. Warttig et al., reported the mean PSS-4 score for non-athletic participants 18 years old and less was 6.91±2.89[29] and from 30-44 years old was 6.05±3.16. In Cohen et al., a non-athletic adult sample scored an average of 4.5±2.9 on the PSS-4.[16] Despite of age, Warttig et al. found that men on average scored 5.56±3.04 on the PSS-4.[29] Jun Ming Benjamin et al., compared athletes to non-athletes (18-30 years old; mean = 23.2±2.1 years; 165 males; 155 females) in a college setting using the 10 item PSS and found that athletes scored less than non-athletes overall (athletes= 1.49±0.40; non-athletes= 2.02±0.44).[20]

3.3.3 Differentiated Transformational Leadership Inventory (DTLI)

The Differentiated Transformational Leadership Inventory (DTLI) is an adapted version of the Transformational Leadership Inventory and the MLQ5-X consisting of 31 items.[18] It examines the perception of leadership six transformational behaviors: individual consideration, inspirational consideration, inspirational motivation, intellectual stimulation, fostering acceptance of group goals, high performance expectations, appropriate role-modeling, and contingent reward.[18] Scores are summed up and averaged for each individual. The adapted version, DTLI showed reliability (alpha coefficient > .65) discriminant validity ($\chi 2(278) = 499.1$, RMSEA = 0.05, SRMR = 0.06, NNFI = 0.98 and CFI = 0.98) as a measure for perceiving transformational leadership.[18] In youth sports, the DTLI was a valid measure for youth sports when high performance was removed ($\chi 2 = 372.54$, $p = .000$; $\chi 2/df = 1.92$; CFI = .96; TLI = .95; RMSEA = .05; SRMR = .04).[30]

3.3.4 Group Environment Questionnaire (GEQ)

The Group Environment Questionnaire (GEQ) is used to assess a person's perception of team cohesion.[31,32] It contains 18 items that measure four dimensions: attraction to group-tasks, group integration-task, attraction to group-social, and group integration-social.[31,32] Items are scored on a 9-point scale (1=strongly disagree to 9=strongly agree). Validity of GEQ has been supported across variety of groups.[31] The GEQ has 12 items that are reverse scored. Finally, four sub scores are calculated, attraction to group-task (AT-G) and attraction to group-social (AT-S), group integration-task (GI-T), and group integration-social (GI-S). Attraction scores are added up and range from low scores of 4 to high scores of 46. Group scores are added up and range from a low score of 5 and a high score of 45. Higher scores indicate greater cohesion an individual feel towards a team.[32]

3.3.5 Pressure Questionnaire

The Pressure Questionnaire is a brief 2-question Pressure Questionnaire the researcher created to determine the level of pressure the athletes perceived from their parents and coaches independently. They were asked to rate their parent and coach based on how much pressure they felt by each to play soccer, win, and perform with a lot of intensity. Both questions were scored on a 4-point Likert scale (0=no pressure, 1=little pressure, 2= moderate pressure, and 3=severe pressure).

3.3.6 Game Results

Season record was collected by the team. The researcher assigned a 1 for every win, every loss a 0, and every tie a 0.5. These values were added up to determine each

athlete's game result score. This information was used to determine relationship between mood scores and results for each athlete.

3.3.7 School Questionnaire

Athletes were asked to complete a brief survey to give insight to academic load. Questions consisted of how many classes they were taking, what level of classes (AP, advance, honors, etc.) and/or if they had any extra classes to help with their school work (English as a Second Language), and diagnosed learning or attentional disorder. (dyslexia, ADHD, ADD, etc.)

3.3.7 GPS Data

GPS data was collected by the team and included distance covered in games and minutes played in games for each player. The team also collected rate of perceived exertion (RPE) for each player after every game. The GPS data would be used to determine what the relationship workload had on mood scores. RPE scores would be used to determine relationship between fatigue and mood scores for each player.

3.4 Procedure

Surveys were sent out and stored through Qualtrics (Seattle, WA). Table 3.1 illustrates the data collection timeline. Demographics and baseline scores for the PSS-4 and GAD-7 were collected at the beginning of the season in August 2021 for all participants. The players also completed a brief 2-question Pressure Questionnaire at baseline to determine the level of pressure the athletes perceived from their parents. Both questions were scored on a 4-point Likert scale (0=no pressure, 1=little pressure, 2= moderate pressure, and 3=severe pressure). Throughout the season, all participants completed a bi-monthly PSS-4 and GAD-7 survey until the end of postseason. Athletes

who missed more than one game during the season due to injury were matched with a teammate of similar position and/or playing time. Both players were asked to complete the survey weekly until the injured player returned to sport. Participants were sent two reminders on weeks with surveys.

At the end of midseason, players and coaches were asked to complete the DTLI surveys. Athletes were asked to also complete the GEQ and the School Questionnaire. The School Questionnaire was collected to establish any other stressors that athletes may endure. Athletes were asked to describe their academic load and in general how they are performing at school during the season. Additionally, athletes were asked if they participate in any gifted or supplementary courses to assist their schooling. Athletes were also asked to identify if they had a diagnosed learning or attentional disorder.

Finally, the GAD-7, and PPS4 were collected again at postseason from all participants. The athletes also completed the Pressure Questionnaire again for their parents and also for their coaches. The athletes were only asked to rate their perception of how much pressure they felt from their coaches at postseason because there were a lot of new athletes that joined the team at the start of the season, and thus would not have been able to accurately answer these questions at baseline. Season record and GPS data was turned over to the research from the teams at the end of the season for analyses. Season record was used to determine athlete game result scores. GPS data was collected by the team and included distance covered in games and minutes played in games for each player

Table 3.1. Survey Distribution Timeline

Measure	Baseline	Midseason	Postseason
Consent/Assent	[a]All x1		
Demographics	All x1		
PSS-4	All x1	All x8	All x1
GAD-7	All x1	All x8	All x1
DTLI		Athletes x1 Coach x1	
GEQ		Athletes x 1	
School Questionnaire		Athletes x1	
Pressure Questionnaire	Athletes (Parents only)		Athletes (Parents and Coaches)

[a] "All" represents all participants were asked to complete the survey followed by how many times that it was collected during that part of the season.

3.5 Statistical Analysis

Descriptive statistics were calculated for demographic variables and both mood scales. A repeated measures analysis of variance (RM-ANOVA) was performed to determine significant differences between timepoints (Baseline, Midseason and Postseason) of both the PSS-4 and GAD-7 for the athletes and parents. A paired t-test was performed to determine differences between parent and athlete mood scores at all three timepoints. Linear regressions were also conducted to assess correlations between parent and athlete mood scores at all three timepoints. A t-test was performed to determine differences between athlete perceived parent pressure score from baseline to postseason and between athlete postseason perceived parent pressure score to athlete postseason perceived coach pressure score. To determine the relationship between player stress and anxiety scores and game results, player mood change scores was first calculated by finding the difference between the mood score at baseline and midpoint (first half), midseason to postseason (second half), and baseline to postseason (total season). The game results score was then determined by assigning a 1 for every win, a 0 for a every lost, and 0.5 for a every tie, then all points were summed for each player. Lastly, Pearson's correlation was performed to determine the relationship between player mood change scores and

game results. No statistical analyses were performed for the DTLI and GEQ due to the

small sample size. These scores were only used as observation and discussion purposes.

Results were considered statistically significant when $P \leq 0.05$. All statistical analyses

were conducted using RStudio, version 3 (Boston, MA).

4. MANUSCRIPT

Prospective pilot study of mood in highly specialized youth male soccer athletes

4.1 Abstract

Context: Sport specialization rates have risen among athletes leading to an increase in injury rates at younger age; however, the research investigating the effects of sport specialization on mental health is lacking.

Objective: To examine the changes in mood scores among highly specialized youth soccer players throughout one season and explore potential factors contributing to their stress and anxiety levels.

Design: Prospective repeated-measures pilot study.

Setting: Major League Soccer (MLS) Next Academy.

Patients or Other Participants: From one MLS Next Academy team, 16 players and 15 parents participated.

Main Outcome Measures: Stress (Perceived Stress Scale 4, PSS-4) and anxiety (Generalized Anxiety Disorder 7-Item Scale, GAD-7) scores were collected from all participants at baseline, midseason, and postseason to determine change scores over time. Information about win-loss records, perceived pressure, leadership, and team cohesion metrics were also collected from the players to investigate additional factors that may have altered their mood states.

Results: Over the course of the season, PSS-4 and GAD-7 change scores for athletes ($F_{(2,22)}=2.26$, $P=0.13$) ($F_{(2,22)}=0.77$, $P=0.48$) and parents ($F_{(2,25)}=0.661$, $P=0.525$) ($F_{(2,25)}=0.98$, $P=0.39$) were not statistically different, respectively. All other comparisons were also not significant ($P > 0.05$).

Conclusion: Stress and anxiety scores remained consistently low throughout the season for both athletes and parents and were lower compared to previous studies. There was no significant change in anxiety or stress scores in either group over the course of the season. Nonetheless, some athletes did present with elevated scores at different timepoints. This indicates that further research needs to be done to elaborate on the current study's findings.

Word Count: 258

Key Words

PSS-4, stress, GAD-7, anxiety, mental health, youth sport

Take-Home Points

Highly specialized male youth soccer athletes have low stress and anxiety levels throughout a season.

Individual scores show need for a holistic approach when dealing with specialized youth athletes.

Sport participation benefits school-aged children by promoting healthy living, building social relationships, and improving self-image.[1] Consequently, children are starting to specialize in sports at a much younger age, as early as seven years old.[3,4] Sport specialization is defined as the participation of one sport at the exclusion of other sports for at least eight months during a year.[3,6,7] The assumption among coaches and parents is that the earlier a child specializes, the more guarantee their athlete will achieve elite status.[3] Injury rates among student athletes 5-22 years old has increased to approximately 22 million occurrences each year.[5] The physical toll on young athletes associated with sport specialization has been researched, however the mental toll associated with specializing early has not been investigated thoroughly, despite the increase in both pressure to perform and injury occurrence.

Very little research on the psychological impact of early sport specialization has been conducted despite the recent prevalence of stress and anxiety among youth and adolescents.[8,9] Highly specialized athletes face additional hurdles within their sport. Pressure to perform consistently at the highest level is strenuous on an athlete. This can lead to burnout, injury, and isolation in young athletes if not properly managed.[3,4,6] Stressors can be intrinsic, pressure from the players themselves to perform at a certain level, as well as extrinsic, coming from parents, coaches, and teammates. To our knowledge, previous studies that have investigated mental health among specialized youth athletes have been retrospective or before and after a single event. Scanlan et al.[19] examined pre- and post-game stress on youth male soccer players immediately before and after their games. They found players who had higher competitive anxiety stress, lower self-esteem, and lower personal and team performance experiences have more pregame

stress than their peers with opposite attributes. Players who also had fun presented with less post-game stress despite game result. While this information is helpful, it is not longitudinal or improve understanding about how and when interventions may be necessary. Previous studies have investigated athletes participating in high school sports where athletes have various skill levels and/or are outside of the US.[14,19,21] These studies emphasized the importance of sport enjoyment and how it predicted athletes' mood. To our knowledge, no study has prospectively investigated the correlation between parents and their highly specialized athlete's mood states. This information would give insight to the influence from home on athletes' mood.

Understanding how stress and anxiety affect specialized youth and adolescent athletes throughout a season is the first step for parents, coaches, and healthcare professionals to provide efficient and successful management in psychological distress among youth and elite athletes. The purpose of this pilot study is multifold: 1) to track changes in stress and anxiety among highly specialized male youth soccer players throughout a season, and 2) to determine if the following are associated with the athlete's mood levels (PSS-4 and GAD-7 scores) a) parent stress and anxiety levels, b) game results (win-loss records), c) coaching style, and d) team cohesion. We hypothesize that the athletes' mood scores will increase (worse outcome) as the season progresses and that the athlete and parent scores will be correlated. Additionally, game results, team cohesion, and coaching style scores will have an inverse relationship with mood scores.

4.2 Methods

Study Design and Recruitment

This is a prospective repeated-measures pilot study of highly specialized youth soccer players and their parents. The research team recruited from a group of 60 players and parents within an MLS Next Academy from the under 14 (U14), under 15 (U15), and under 17 (U17) teams. The university Institutional Review Board approved this study prior to recruitment and data collection. Consent was collected for player participation from the parents/guardians, in addition to the parent's participation. Assent was collected from the players. After recruitment and consent, 16 players (male, 13.64 ± 0.8 years old) and 15 parents (male n=3, female n=12, 44 ± 4.77 years old) were enrolled in the study.

Measures

The Perceived Stress Scale 4 (PSS-4) is used to compare a person's perceived stress related to current and objective events within the last month.[16] The PSS-4 is a well-validated measure in both adults (coefficient alpha reliability: =.72; test-retest liability =.55) and adolescents (t= 3.23, P < .0002).[29] The PSS-4 includes reverse scoring of questions 1 and 4 and positive scoring for questions 2 and 3. It uses a 5-point Likert Scale (0= never to 4= very often); a higher score indicates higher levels of stress. Warttig et al.,[29] reported normative PSS-4 scores (mean scores) for non-athletic participants 18 years old and less was 6.91±2.89and from 30-44 years old was 6.05±3.16. In Cohen et al.,[16] a non-athletic adult sample scored an average 4.5±2.9 on the PSS-4. Despite age, Warttig et al.[29] found that men on average scored 5.56±3.04 on the PSS-4. Jun Ming Benjamin et al.,[20] compared athletes to non-athletes (18-30 years old; mean = 23.2±2.1 years old; 165 males; 155 females) in a college setting using the 10 item PSS

and found that athletes scored less than non-athletes overall (athletes= 1.49±0.40; non-athletes= 2.02±0.44).

The Generalized Anxiety Disorder 7-item scale (GAD-7)[17] has been validated in multiple populations in its ability to detect generalized anxiety, panic, social anxiety, and post-traumatic stress disorder.[26] This behavioral measure assesses the person's anxiety levels over the past two weeks using seven questions. Answers range from "not at all" to "nearly every day" with total scores ranging from 0-21. The GAD-7 is an indicator tool not a diagnostical measure. The accepted cut point for generalized anxiety is a score of 10. Scores of 10 or more should be referred for additional testing and diagnosed by a trained professional. Alternate cut points are 0-4 (minimal), 5-9 (mild), 10-14 (moderate), and 15-21 (severe). In a German sample of individuals 14-24 years old, the normative mean scores for the GAD-7 were 2.76 ±3.49.[27] The individual item score means ranged from 0.30 to 0.54 across the sample. Löwe et al. reported normative mean scores for adults 35-44 years old were 2.82±3.34.[27] Due to the cessation of school sports, McGuine et al.[21] investigated anxiety scores among high school athletes during the COVID-19 pandemic utilizing the GAD-7 and found that scores were elevated (n=1300, X=6.3, Confidence Interval: 6.0-6.6).

The Differentiated Transformational Leadership Inventory (DTLI) examines the perception of the leadership six transformational behaviors: individual consideration, inspirational consideration, inspirational motivation, intellectual stimulation, fostering acceptance of group goals, high performance expectations, appropriate role-modeling, and contingent reward.[18] The DTLI showed reliability (alpha coefficient > .65) and discriminant validity ($\chi 2(278) = 499.1$, RMSEA = 0.05, SRMR = 0.06, NNFI = 0.98

and CFI = 0.98) as a measure for perceiving transformational leadership in adults.[18] In

youth sports, the DTLI was a valid measure for youth sports when high performance

was removed ($\chi2$ = 372.54, p = .000; $\chi2/df$ = 1.92; CFI = .96; TLI = .95; RMSEA = .05;

SRMR = .04).[30] The removal of the subscale was because the sample surveyed were

youth athletes from a sample of athletes 11-18 years old and where training load and

frequency was less than the athletes from the teams within this study.[30]

The Group Environment Questionnaire (GEQ) is used to assess a person's

perception of team cohesion.[18] It contains 18 items that measure four dimensions:

attraction to group-tasks, group integration-task, attraction to group-social, and group

integration-social.[18] Items are scored on a 9-point scale (1=strongly disagree to

9=strongly agree). Validity of GEQ has been supported across variety of groups.[31] The

GEQ has 12 items that are reverse scored. Four sub scores are calculated across the 18

items, attraction to group-task (AT-G), attraction to group-social (AT-S), group

integration-task (GI-T), and group integration-social (GI-S). Scores in subgroup AT-G

and AT-S are summed and range from 4-46. Scores in subgroup GI-S and GI-T are

summed up and range from 5-45. Higher scores indicate an individual feels greater

cohesion towards their team.[32]

Procedures

All athletes and one of their parents were recruited during pre-season to

participate in this pilot study. Those who consented completed a demographic online

survey that also contained the PSS4 and GAD-7 during preseason and then bimonthly

PSS4 and GAD-7 surveys for the duration of the fall season (5 months). Surveys were

sent directly to each participants' email address through Qualtrics (Seattle, WA). See Table 1 for the survey distribution timeline.

Additional information was collected to help the research team better understand additional pressures/stresses that may affect the athletes throughout the season. A short, two question survey was provided to determine the level of pressure the athletes perceived from their parents and coaches. The questions were scored on a 4-point Likert scale (0=no pressure, 1=little pressure, 2= moderate pressure, and 3=severe pressure). The athletes were only asked to rate their perception of how much pressure they felt from their coaches at postseason because there were a lot of new athletes that joined the team at the start of the season, and thus would not have been able to accurately answer these questions at baseline. Season record was obtained at the end of the season to determine individual athlete's game results. All game wins, losses, and ties were recorded.

Statistical Analysis

Descriptive statistics were calculated for demographic variables and mood scales. A repeated measures analysis of variance (RM-ANOVA) was performed to determine significant differences between timepoints (Baseline, Midpoint and Postseason) of both the PSS-4 and GAD-7 for the athletes and parents. Player mood change scores were calculated by finding the difference between the mood score at baseline and midpoint (first half), midpoint to postseason (second half), and baseline to postseason (total season). The game results score was determined by assigning a 1 for every win, a 0 for a every lost, and 0.5 for a every tie, then all points were summed for each player. A Pearson's Correlation was performed to determine the relationship between player mood

change scores and game results. A paired *t*-test was performed to determine differences between parent and athlete mood scores at all three timepoints. No statistical analysis was performed for the DTLI and GEQ due to the small of sample size. These scores were only used as observations and for discussion purposes. Results were considered statistically significant when $P \leq 0.05$. All statistical analyses were conducted using RStudio, version 3 (Boston, MA).

4.3 Results

All athlete scores were merged into a single group since there were not enough athletes from each individual team to analyze them separately. Three timepoints were used for analyses out of the 10 timepoints collected because there was inconsistency with the number of participants that would fill out the surveys across the timepoints. The PSS-4 scores were not statistically different among the timepoints for both athlete $(F_{(2,22)}=2.257, p=0.128)$ and parents $(F_{(2,25)}=0.661, p=0.525)$, nor were the GAD-7 scores for the athletes $(F_{(2,22)}=0.766, p=0.477)$ and parents $(F_{(2,25)}=0.982, p=0.389)$ (Table 4.2). The PSS-4 scores were not statistically different between parents and athletes for all three timepoints (Baseline: t=0.848, *P*=0.413; Midpoint: t=1.610, p=0.152; Postseason: t=1.658, *P*=0.123), nor were the GAD-7 scores (Baseline: t=0.554, p=0.590; Midseason: t=0.991, *P*=0.355; Postseason: t=-0.050, *P*=0.961) listed in Table 2. The athlete and parent PSS-4 scores at midseason (r=-0.85, *P>0.05*) had a very strong negative correlation, while GAD-7 midseason scores (r=0.89, *P>0.05*) had a very strong positive correlation (Figure 4.2). All other timepoints had a weak or negligible parent-athlete correlation for both PSS-4 (Baseline: r=-0.31, *P*=0.31; Postseason: r=0.20,

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P=0.54) and GAD-7 (Baseline: r=-0.01, P=0.98; Postseason: r=-0.02, P=0.96) (Table 4.2, and Figures 4.1 and 4.3).

The athletes' perception of pressure from parents and coaches are listed in Table 4.3. Pressure from parents slightly decreased at the end of season. Athlete perception of pressure from their coach was higher than from their parent at the end of the season but not statistically significant (t=2.1926, p=0.0531). The DTLI scores on average were higher in regard to head coaches than to the support staff (Table 4). GEQ scores were highest among the U14 team, followed by the U15, and then U17 team (Table 5). There was no correlation between game results and athletes' anxiety and stress scores at any of the timepoints ($P \geq 0.27$) (Table 6).

4.4 Discussion

The purpose of this pilot study was multifold. We first hypothesized that mood scores would increase over the course of the season. Athlete PSS-4 scores increased from baseline to postseason, peaking at midpoint whereas parent scores decreased from baseline to postseason (Table 4.2, and Figures 4.1-4.3); however, these differences were not statistically significant. The overall increase for the athletes could be related to the added travel and larger scale tournaments that they participate with their team towards the end of the season along with any possible final exams and projects they may have in school. Meanwhile, parents may experience the slight decrease due to the break of coordinating their family's lives with their child's soccer practice and game schedule. In comparison to previous studies, the athletes in the current study scored lower than their non-athlete peers in the same age group in previous studies[16,29]. As previously mentioned, sports can have a positive impact on how a child develops physically and emotionally by

allowing for physical activity and providing an outlet for them mentally.[2] This could

indicate why the current study's sample of athletes scored lower than other children their

age.

Athlete average GAD-7 scores decreased from baseline to postseason (Table 4.2,

and Figures 4.1-4.3); however, these findings were not statistically significant. The

decrease in anxiety scores could be because of the sense of normality that this season had

for the athletes. However, towards midpoint and postseason, athlete GAD-7 score ranges

increased but the means decreased (Table 4.2, and Figures 4.2 and 4.3). Most of these

teams were formed during the COVID-19 pandemic. Traveling to compete against teams

in different states is a component of this league. Many of the COVID-19 travel and

competition restrictions were lifted at the start of this season, thus being able to

participate with a normal travel-competition schedule for the first time within the league

could have contributed to the decrease in anxiety scores. The average GAD-7 score for

the current sample (2.7±3.58) was nearly identical to Löwe et al. (2.76±3.49).[27] In

comparison to high school athletes surveyed during the COVID-19 pandemic, the athletes

in the current study scored lower than the athletes surveyed in May of 2020 (n=6117,

X=6.3, 95% Confidence Interval: 6.0-6.6).[21] This could be indicative of how resuming

participation in sports had a positive effect on anxiety among youth athletes.

The academy selected for the study recruits their athletes to play on these teams

because they are skilled athletes. Athletes have moved from other states and countries

some with or without their families. None of the families pay any fees for their child to

play on the team, unlike other soccer clubs. To be invited to play on this team can be a

boost to athlete's self-esteem and as they are made to feel special, which can lower stress

and anxiety. When athletes do something that they enjoy and are really good at, sports can become an outlet for them to let go of stressors.

Parent PSS-4 scores decreased over the course of the season while GAD-7 scores fluctuated, however, neither of the differences for either measures were statistically significant (Table 4.2, and Figures 4.1-4.3). This could be a result of decreasing extrinsic factors within parents' daily lives that contribute to stress over the course of the season. For instance, children starting school often results in a more structured family routine and fewer workday childcare concerns. The average parent GAD-7 scores (2.22±2.64) within the current study are similar to the those reported in Löwe et al.[27] (2.82±3.34). PSS-4 scores for parents in the current study (2.71±1.94) were lower than those reported by Warttig et al[29] (6.05±3.16). Our findings support previous research in utilizing both scales for measuring stress and anxiety respectively in parents of highly specialized youth male soccer players.

Previous research found that as age increased, perceived stress scores decreased.[29] Our data supported this, with parent average scores for both stress and anxiety remaining lower than the athlete's average scores at every timepoint (Table 4.2, and Figures 4.1-4.3). It is suggested that individuals report fewer stressors as they get older than their younger counterparts due to many reasons, for instance, change of perspective in satisfying goals and regulating emotions to promote positive experiences.[29] Health-related problems can increase individual stress and/or anxiety. However health limitations can also reduce the amount of stressors by limiting the amount of injury-causing activities in older adults.[29]

The correlation between athlete and parent mood scores at midseason for both mood scores were very strong (Table 4.2). The PSS-4 scales had an inverse relationship, meaning that as athlete's stress score increased, parent's stress score decreased. Contrarily, GAD-7 scores had a positive relationship, meaning that as athlete's anxiety score increased, so did their parent's score. School could be a reason as to why an inverse relationship between stress scores are noted; athletes have the additional academic load that they did not have at baseline, while for parents, school acts as a form of childcare while they are at work, which they might have needed at baseline. All other timepoints had a weak or negligible parent-athlete correlation for both PSS-4 and GAD-7 (Table 4.2, and Figures 4.1 and 4.3).

In regard to the relationship between athlete-parent pairings, neither mood scores were statistically significant between at any of the three timepoints. Figures 4.1-4.3 depict athlete and parent PSS-4 and GAD-7 scores at all three timepoints. The figures illustrate each participants' stress (x-axis) and anxiety (y-axis) scores. In each figure, athletes are denoted by a lowercase letters and their parent by the same letter in uppercase, respectively. This allows for visual representation between athlete and their parent's scores.

At baseline (Figure 4.1), one athlete-parent pair had the same GAD-7 score and four pairs had the same PSS-4 scores. At midseason (Figure 4.2), four pairs had the same GAD-7 scores. And at postseason, (Figure 4.3) three pairs had the same GAD-7 scores and 3 pairs had the same PSS-4 scores. The differences between parent and athlete pair scores at baseline and postseason could have been too far from each other overall, which lead to weaker correlation at those timepoints, despite having at least one pair score the

same for either measures. This could explain why these timepoints had weaker or negligible correlations.

The average pressure perceived by athletes from their parents did not change from baseline to postseason (Table 4.3). Average pressure perceived by the athletes from their coaches was slightly higher than what they perceived from their parents, but the difference was not statistically significant, indicating that pressure on the athlete to perform could be coming from their parent and/or coach. Pressure from both parents and coaches was perceived as "a little pressure" which could also indicate why athlete stress and anxiety scores remained low throughout the season. Although athletes were asked to complete the survey honestly, previous research has concluded that one cause of burnout among highly specialized youth athletes is pressure from their parents and coaches to perform.[3] That study was conducted retrospectively, after the athletes were no longer participating in sports.[3] Conversely, the athletes in our study completed the Pressure Questionnaire about the coaches following the season but all athletes had intentions to return to the team in the spring, This could suggest two things, the athletes in the current study may have answered the questions with an element of dishonesty or our participants felt less pressure from their parents and coaches compared to Jayanthi et al.'s participants. Future research should consider also asking athletes how much pressure they put on themselves to perform at a high level to describe the better understand how this factor may affect their play and mood states.

The DTLI scores for Support Staff 2 were higher (better) than the head coaches and Support Staff 1 scores (Table 4.4). This is most likely due to the supportive role that Support Staff 2 plays within the academy as a health and fitness professional. Although

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head coaches are the most direct point of contact for the athletes within a youth team, the relationship between a head coach and an athlete is different because game results are their main focus. Alternatively, the relationship athletes have with their strength and conditioning coaches or athletic trainers are more open and trusting because of the nature of those professions to oversee athletes' health and well-being. This is important for clinicians and coaches to know who within an organization the athletes are influenced by most and also the least. Having staff members who are positive role models to athletes that athletes can also trust, creates a positive and healthy environment for athletes.

A small and uneven sample size between each team made it impossible to determine the team cohesion (GEQ) within and between teams (Table 4.5). Team cohesion was greatest among the U14 team compared to the U15 and U17 team. Interestingly, Attention to Group-Task (ATG-T) scores were higher in both the U14s and U17s. The ATG-T subcategory coincides with player's perspective of team unity towards team results. The U15 team in the previous year had poor results due to poor performance individually, which is what led to major changes in their roster. Potentially, the team's goals were more directed in improving their performance for the better of the team, not exactly winning. Despite that, the U15 team still had an above average season with a season record of 10 wins, 3 ties, and 1 loss. The older two teams had the biggest changes to their rosters this season than the U14 team. Additionally, several players on the U17 team were playing a year up, which increases the competitiveness for those younger players. This happens because they are trying to stay on the upper-level roster and/or earn a starting position on the higher-level team. New athletes joining teams and trying to fight for a spot on the team can cause discord between teammates and increase the

competition within the team itself. However, competitiveness can also be a factor that brings teammates together, making practices and games more fun for the athletes. Winning games can also have a positive implication on team cohesiveness.

There was no correlation between either stress or anxiety scores and game results at any timepoint (Table 4.6). However, it is important to note the clinical significance of our findings. First half GAD-7 and PSS-4 scores were lower than second half scores, when teams had more ties and losses. In a study by Scanlan et al.,[19] the greatest predictor of immediate post-game stress was whether they had won or lost the game, and the amount of fun they had while playing. Despite their game results, children who had more fun during the game had lower post-game stress than children reported having less fun. They also surveyed wrestlers and found that competitive trait anxiety and personal performance expectances were influential in predicting pre-match stress and that win-loss and the amount of fun were predictors of post-match stress.[19] Alternatively, the current study measured overall stress and anxiety scores over the course of two weeks not acute scores prior to competition, which could be a point of interest for future research. Another explanation for why game results were not associated with mood scores is because game results don't always represent how the game went for the individual athlete or the team as a whole. A team could have played a great game but still tied or lost. A team could also win a game that they feel they did not play hard enough to deserve a win. A tie could also be positive for a team if they started the game as the underdogs, or negative if they were highly favored. All these reasons give support as to why game results and mood scores were not significantly associated.

4.5 Limitations

This pilot study was not without limitations. This study involved male youth soccer athletes and their parents, which reduces the generalizability to other groups; however, this group was chosen because female teams at this level are less common. Researchers should consider including females to improve the overall knowledge about these associations. In addition, it would be helpful to also include coaches and teachers to improve the overall knowledge about how these individuals may affect athlete mood states. The participants were asked to complete bimonthly surveys; however, many of the participants did not complete all timepoints and we lost a few participants to attrition. Due to this we were only able to report baseline, midseason, and postseason scores. Reducing the amount of timepoints could encourage improved participant compliance. GPS data was not collected in this pilot study. This information could give insight into how player workload is related to their mood states. Lastly, research shows that injury is associated with altered mood states, but these associations have not been investigated in this population. Future work should consider including injury to determine if time-loss and non-time-loss injuries affect mood states over the course of a season in this population.

4.6 Clinical Significance

Understanding the mental health component of early sport specialization is the next preventative step that clinicians should consider when working with youth athletes. Although there were no significant changes in stress and anxiety throughout the season, our findings do not mean that mental health should be discounted in this population.

Some athletes individually scored higher than their teammates. Clinicians, coaches, and parents need to approach their athletes in an individual and multi-disciplinary fashion. Performance, perceived expectations, and injury can affect mental health and should be taken into consideration moving forward.

4.7 Conclusion

In conclusion, the current prospective pilot study analyzed how stress and anxiety changed over the course of a season among highly specialized youth soccer players in the US and if extrinsic factors were associated with these changes. There were no significant changes in either of the mood scores in either group independently of each other over the course of the season. Overall, both athlete and parent average scores for the PSS-4 and GAD-7 were low respectively and were lower in the current study than reported in previous studies. Although significant differences were not found, some athletes did present with elevated scores. As the discussion around mental health in sports continues to increase, the current pilot study stands as a point of reference for future studies to expand on the effects of sport specialization on mental health among youth soccer athletes.

Table 4.1. Survey Distribution Timeline

Measure	Baseline	Midseason	Postseason
Consent/Assent	[a]All x1		
Demographics	All x1		
PSS-4	All x1	All x8	All x1
GAD-7	All x1	All x8	All x1
DTLI		Athletes x1 Coach x1	
GEQ		Athletes x 1	
School Questionnaire		Athletes x1	
Pressure Questionnaire	Athletes (Parents only)		Athletes (Parents and Coaches)

[a] "All" represents all participants were asked to complete the survey followed by how many times that it was collected during that part of the season.

Table 4.2. Athlete and Parent Mood Demographics and Scores

Mood Survey	Timepoints	Group (n)	Mean ± SD	Range	Confidence Interval (95%)	t-value	Pearson r (p-value)	p-value
PSS-4	Baseline	Athlete (n=14)	3.71±1.98	1-8	-1.21 - 2.75	0.85	-0.31 (0.31)	0.41
		Parent (n=14)	3.43±2.50	0-9				
	Midpoint	Athlete (n=11)	4.36±2.58	1-9	-1.11-5.86	1.61	-0.85 (0.01)*	0.15
		Parent (n=14)	2.43±1.74	0-6				
	Postseason	Athlete (n=16)	4.25±2.84	0-9	-0.46-3.38	1.66	0.20 (0.54)	0.12
		Parent (n=13)	2.69±2.25	0-7				
	Average	Athlete	4.1±2.49	0-9				
		Parent	2.71±1.94	0-9				
GAD-7	Baseline	Athlete (n=14)	2.79±2.67	0-9	-1.58-2.66	0.55	-0.01 (0.98)	0.59
		Parent (n=14)	2.57±2.21	0-6				
	Midpoint	Athlete (n=11)	2.64±4.32	0-15	-1.91-4.66	0.99	0.89 (0.00)*	0.36
		Parent (n=14)	1.5±1.70	0-5				
	Postseason	Athlete (n=16)	2.69±3.84	0-14	-3.42-3.26	-0.05	0.10 (0.96)	0.96
		Parent (n=13)	2.46±3.57	0-12				
	Average	Athlete	2.7±3.58	0-15				
		Parent	2.22±2.64	0-12				

*significant p-value at 0.05

Table 4.3. Athlete Perceived Pressure Score

	Baseline range	Baseline average score	Final range	Final average score	CI (95%)	T-value	P-value
Parent (n=11)	0-2	1.18 ± 0.87	0-3	1.36 ± 0.81	-0.59-0.22	-1	0.34
Coach (n=11)			1-3	1.82 ± 0.60			
Final parent vs. final coach					-0.01-0.92	2.19	0.05

*significant p-value at 0.05

Table 4.4. Differentiated Transformational Leadership Inventory Scores

	Head Coach (n=16)			Support Staff 1 (n=8)			Support Staff 2 (n=8)		
	Range	X±SD	Sum	Range	X±SD	Sum	Range	X±SD	Sum
IC	4-20	16.13±3.83	258	12-20	17±2.78	136	13-20	18±2.45	144
IM	11-20	15.69±2.96	251	10-20	15.63±3.89	125	16-20	18.63±1.41	149
AGG	7-15	12.75±2.52	204	9-15	12.25±2.66	98	11-15	13.13±1.64	105
HPE	13-20	17.5±2.251	280	1-20	18.38±2.00	147	14-20	22.25±2.31	138
ARM	10-25	20.06±3.97	321	14-25	20.63±4.50	165	19-25	22.25±2.31	178
CR	0-29	21.06±7.75	337	17-30	25.13±5.44	201	22-30	27±3.07	216
Total Score Mean±SD	275.17±48.77			145.33±63.68			155±37.94		
Average Score per Athlete	103.19			109.00			116.5		

IC = Individual Consideration; IM = Inspirational Motivation; AGG = Fostering Acceptance of Group Goals and Promoting Team Work; HPE = High Performance Expectations; ARM = Appropriate Role Model; CR = Contingent Reward

Total score mean (X) and standard deviation (SD) were calculated using the sum column; Average score per athlete was calculated by dividing the sum column by the sample size (n) for that group.

Table 4.5. Group Environment Questionnaire

Team		ATG-S	ATG-T	GI-S	GI-T	Total
All	Range	12-45	14-36	11-26	10-45	
	Sum	450	477	281	297	1475
	Average	28.13±9.37	29.81±6.05	17.56±4.44	18.56±9.31	
U14 n=7	Range	23-45	14-36	11-26	10-45	
	Sum	230	204	129	142	705
	Average	32.86±6.52	29.14±7.84	18.43±5.62	20.29±12.85	
U15 n=5	Range	16-22	29-34	15-21	10-23	
	Sum	158	106	90	85	439
	Average	31.60±2.83	21.20±2.30	18.00±2.83	17.00±6.67	
U17 n=4	Range	12-44	19-34	11-21	10-23	
	Sum	114	115	62	70	229
	Average	28.50±13.96	28.75±6.70	15.50±4.12	17.50±5.57	

ATGS = Individual Attraction to Group-Social; ATGT = Individual Attraction to Group-Task; GIS = Group Integration-Social; GIT = Group Integration-Task

Table 4.6. Game Results^a and Mood Scores

	% Win	% Loss	% Tie	Game result (X ± SD)	PSS4 change score (X ± SD)	R² PSS-4	P-value	GAD-7 change score (X ± SD)	R² GAD-7	P-value
First half of season	85%	15%	0%	5.75 ± 1.13	-0.5 ± 3.20	0.13	0.63	-0.82 ± 3.29	-0.29	0.27
Second half of season	43%	19%	38%	4 ± 1.10	1.5 ± 4	0.46	0.07	1.06 ± 4.63	0.16	0.54
Total season	63%	17%	20%	9.75 ± 1.06	1 ± 2.68	0.01	0.97	0.25 ± 3.09	-0.02	0.94

^aTotal games: 41, season record: 26-7-8
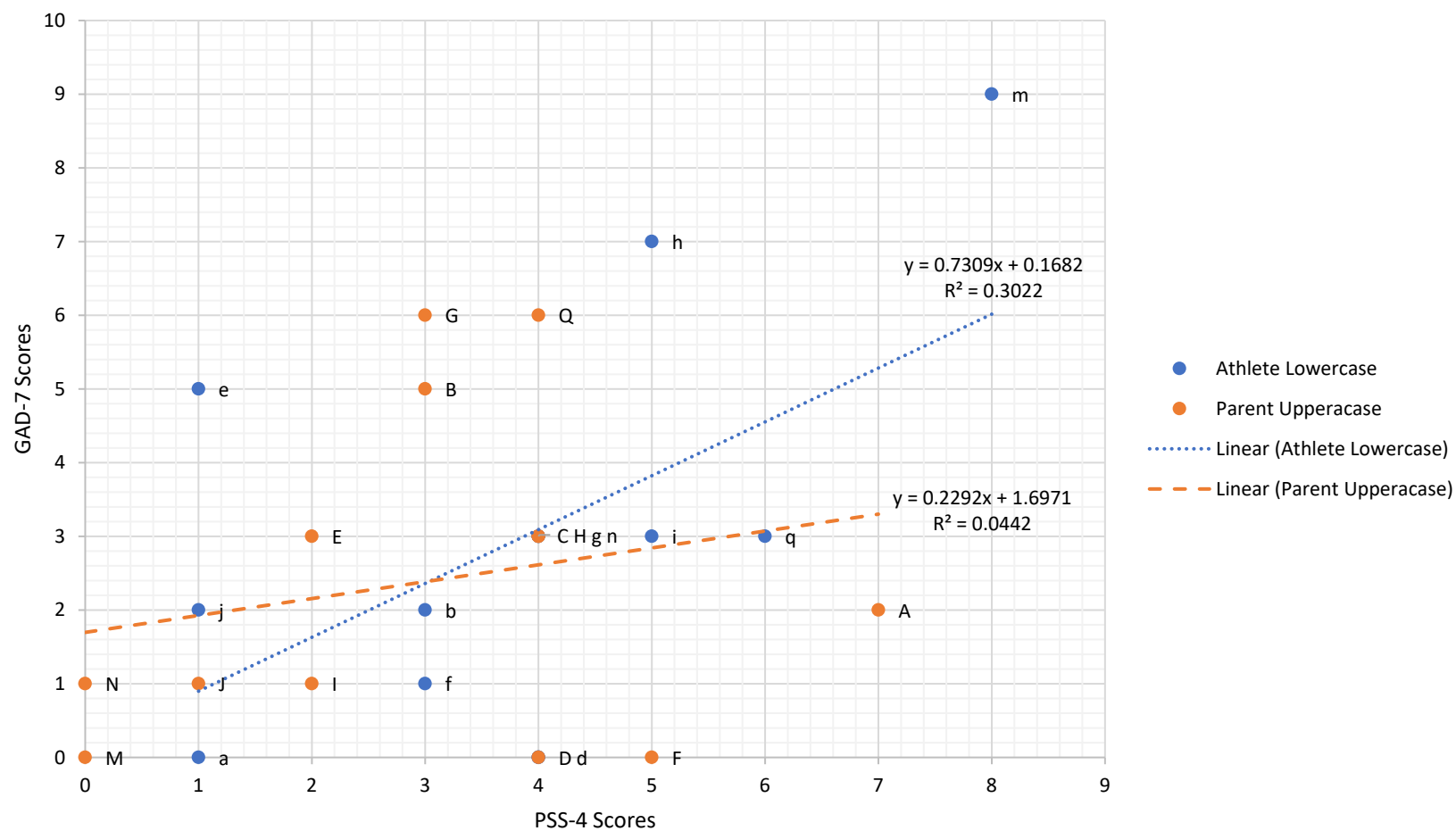*significant p-value at 0.05

Figure 4.1. Athlete and Parent Baseline Mood Scores*
* athletes and parents are paired and denoted by lowercase and uppercase letters, respectively
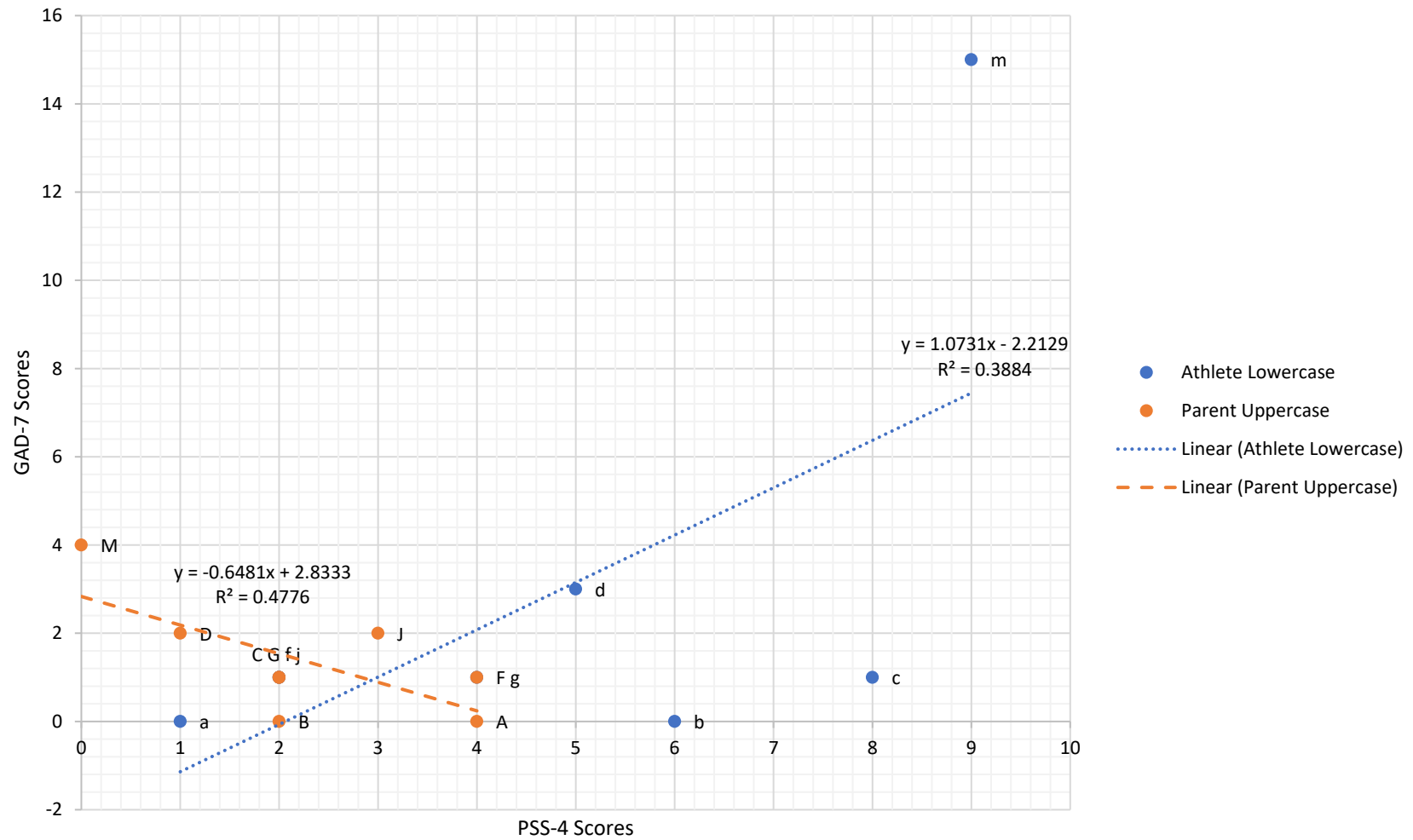
Figure 4.2. Athlete and Parent Midseason Mood Scores*
* athletes and parents are paired and denoted by lowercase and uppercase letters, respectively
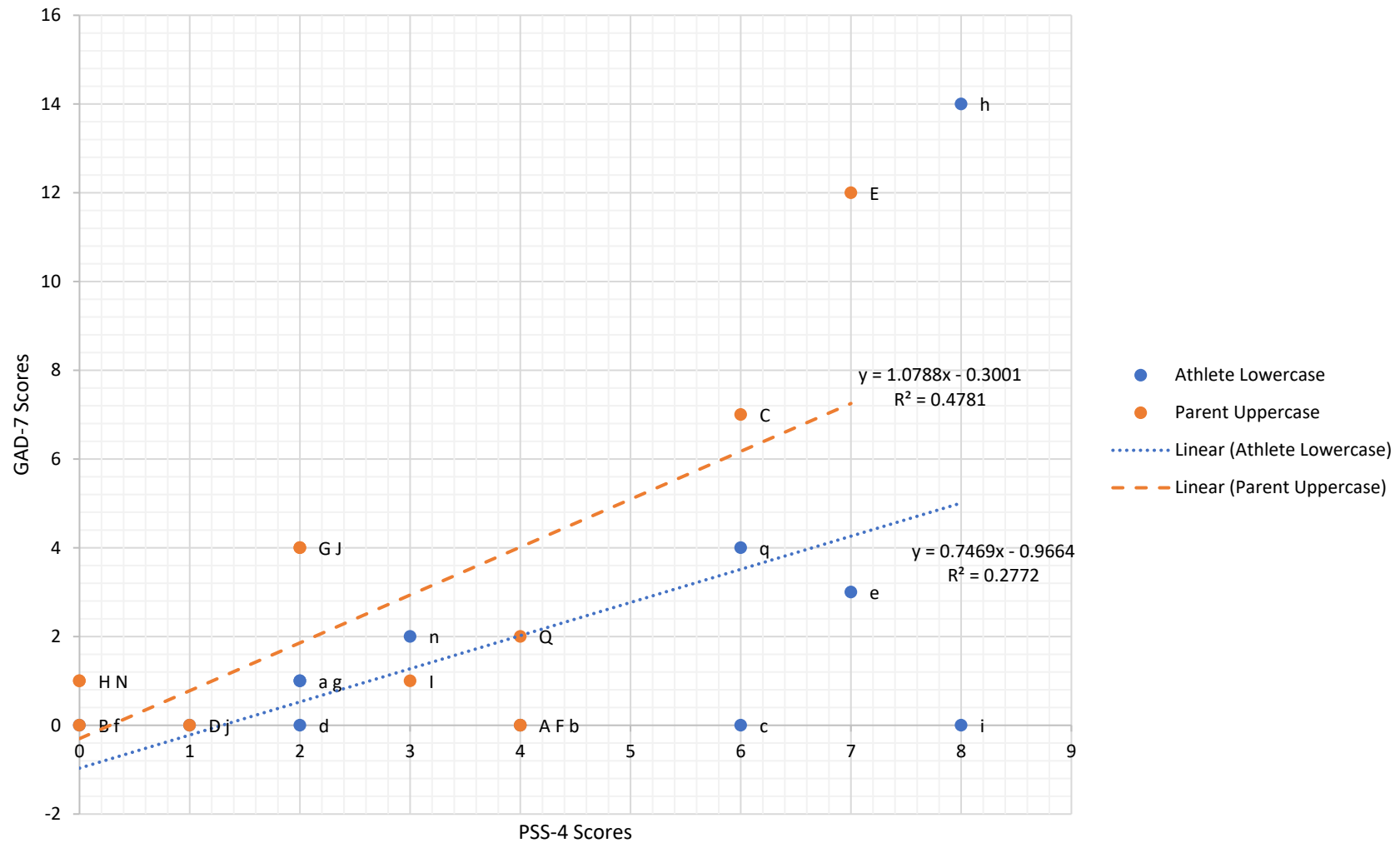
Figure 4.3. Athlete and Parent Postseason Mood Score*
* athletes and parents are paired and denoted by lowercase and uppercase letters, respectively

5. FUTURE CONSIDERATIONS

The current pilot study presented with unexpected limitations during the data collection process that the researcher will address. Sample size overall was overestimated and consistent reporting of stress and anxiety for each individual across all timepoints was limited. Collection of supplementary surveys were not completed at the timepoint that the researchers had originally planned.

5.1 Coaches

Primarily, of the seven coaches that were invited to participate in the study. One coach was later excluded from the study because no goal keepers participated in the study. Of the remaining coaches, four coaches consented to participate. Additionally, only one coach of the four completed the surveys for all the timepoints. Coaches were also asked to complete the Differentiated Transformational Leadership Inventory (DTLI) on themselves, but only one coach filled it out. Due to sample size and lack of participation from the coaches, the research team decided to exclude the coach's scores from the results and discussion.

5.2 Performance Data

The performance data, running distance, minutes played, and rate of perceived exertion (RPE), was intended to be collected by the Academy as done in previous years. However, there were some inconsistencies in the collection that rendered the amount of data insufficient to analyze. Not all players had GPS devices at the beginning of the season. Additionally, three players did not have any GPS data due to lack of devices, injury, and playing time. Therefore, running distance and minutes played were not analyzed due to small sample size. RPE was not included because players did not fill out

the post-practice and post-game surveys that the team provides consistently enough to have sufficient data to analyze.

5.3 Future Research

After completing the data collection process, the research team has identified possible solutions to be considered for future studies. The primary consideration would be to reduce the number of surveys. Reducing the number of mood surveys to one per month may increase by-in and compliance, while also reducing participant burden. Focusing on fewer measures, like game results, or replacing game results with performance data measured by GPS (distance covered by athletes in games and minutes played by each athlete) and/or rate of perceived exertion should be considered. Additionally, the researchers being responsible to collect GPS data and RPE themselves rather than relying on the technical staff would be ideal in order to better manage what data is being collected and how it is stored.

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