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DISSERTATION

ATTENTION DEFICIT HYPERACTIVITY DISORDER AND SPORTS

Submitted by

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In partial fulfillment of the requirements

for the Degree of Doctor of Philosophy

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Summer 2001

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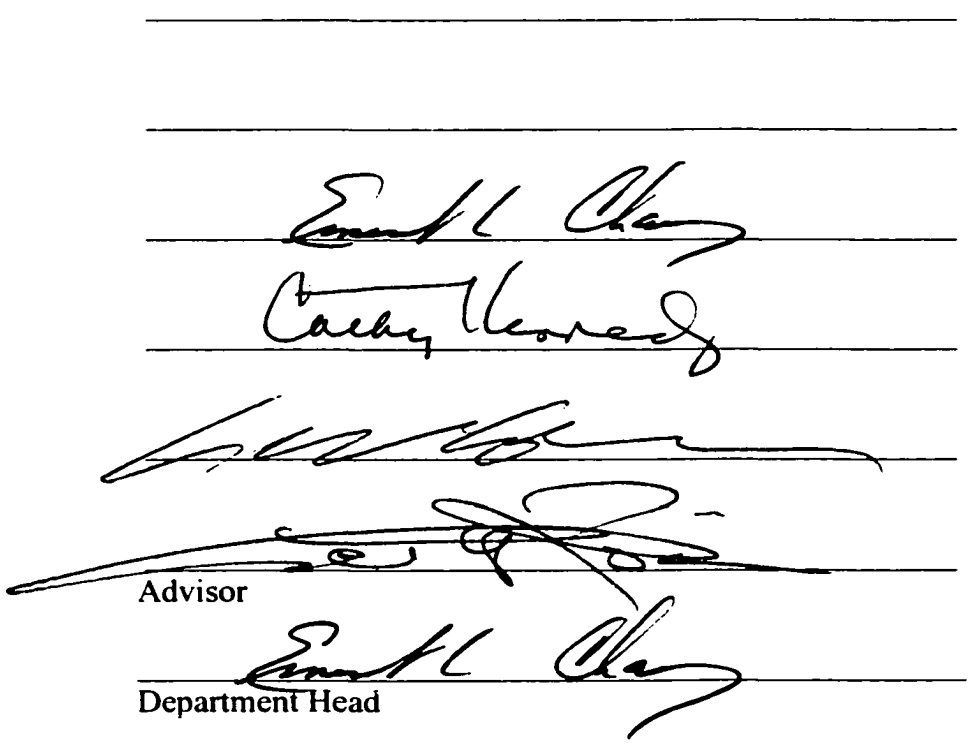

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ABSTRACT OF DISSERTATION

ATTENTION DEFICIT HYPERACTIVITY DISORDER AND SPORTS

This study examined differences in sport behavior between boys with and without Attention Deficit Hyperactivity Disorder (ADHD). Sport behavior was measured by parent-report on the Sports Behavior Checklist-Revised (SBC-R). Team affiliation was measured by parent-report on the Howe Sports Behavior Assessment Scale - Revised (Affiliation Subscale). Finally, attrition was measured through parent report on the Sports Attrition Scale. The current study demonstrates that ADHD boys exhibit higher levels of aggression, and emotional reactivity, coupled with decreased rule following behavior and affiliation with teammates and coaches, when compared to non-ADHD boys. Additionally, the ADHD cohort engaged in team sports for a significantly briefer duration when compared to the control group, with the ADHD cohort also being more likely to discontinue individual sports. Results are considered with respect to current theories of ADHD.

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To Amy, my wife and best friend

To Lee, the best teacher I have ever known

- RCJ

CHAPTER 1

INTRODUCTION

In spite of the vast amount of research regarding Attention Deficit Hyperactivity Disorder (ADHD), little empirical work has focused on the sport behavior of children with ADHD. This is an area which warrants attention, as sports are a salient component of the social status of children, with increased involvement and proficiency generally leading to increased acceptance among peers (Buchanen, Blakenbaker, & Cotten, 1976; Chase & Dummer, 1992; Gross, Johnson, Wojnilower, & Drabman, 1985; Thirer & Wright, 1985; Weiss & Duncan, 1992). It is particularly important to attend to factors that impact social status among children when studying ADHD children, as those with ADHD often experience high levels of social rejection (Barkley, 1998; Campbell & Paulaskas, 1979; Erhardt & Hinshaw, 1994; Johnston, Pelham, & Murphy, 1985; Milich, Landau, & Diener, 1998). Until relatively recently, however, the only information regarding the sport behavior of ADHD children was either anecdotal in nature (e.g., ADHD children tend to do better in individual rather than team sports), or rather limited in scope, such as the effect of methylphenidate on baseball proficiency in ADHD children (Pelham, McBurnett, Harper, Milich, Murphy, Clinton, & Thiele, 1990) or a case study showing the efficacy of sports skills tutoring in behaviorally disturbed boys (Armstrong & Drabman, 1994). A further understanding of the difficulties ADHD children may experience when participating in sports may lead to increased ability to predict and address these difficulties in advance, thus creating a more positive social experience for the ADHD child.

Johnson and Rosén (2000), in the only study looking at sport behavior in ADHD children across sports settings, including team sports (e.g., football, baseball, soccer, etc.) and individual sports (e.g., track and field, gymnastics, swimming), found that ADHD children are more likely than non-ADHD children to demonstrate difficulties while participating in sports. These difficulties, although particularly intense in the team sports setting, were present in both team and individual sports settings. Specifically, ADHD children showed increased levels of aggression, emotional reactivity, and disqualification relative to non-ADHD children (Johnson & Rosén, 2000). ADHD children also showed deceased length of involvement in team sports settings relative to non-ADHD children. This difference in length of involvement was not present in the individual sports setting.

Attention Deficit Hyperactivity Disorder

ADHD affects approximately 3-5% of school aged children in the United States, with males being approximately six times more likely than females to be diagnosed with the disorder (Barkley, 1998). Behaviors associated with this disorder fall primarily into three domains: attention, impulsivity, and hyperactivity. Those with ADHD often have diminished persistence on tasks with little intrinsic appeal, difficulty sustaining attention, difficulty withholding responses until instruction is given, high rates of risk-taking behavior, difficulty waiting one's turn, and excessive or developmentally inappropriate levels of activity (Barkley, 1998). Additionally, there are three subtypes of ADHD: primarily inattentive subtype, primarily hyperactive-impulsive subtype, and combined subtype (American Psychiatric Association, 1994). It appears, however, that the inattention manifested by those with the combined subtype is secondary to the impulsivity, and therefore is qualitatively different than the inattention manifested by those with inattentive subtype (Barkley, 1998). As such, some consider the inattentive subtype to be a separate disorder with a different etiology than ADHD hyperactive-impulsive and combined subtypes (Barkley, 1998).

Additionally, ADHD carries with it numerous potentially problematic behaviors, including increased potential for substance abuse (Barkley, 1998; Gittleman, Mannuzza, Shenker, & Bonagura, 1985), juvenile delinquency and aggression (Barkley, 1998; Farrington, Loeber, & Van Kammen, 1990), injury and accident-proneness (Gayton, Bailey, Wagner, & Hardesty, 1986; Hartsough & Lambert, 1985; Matheny & Fisher, 1984; Stewart, Pitts, Craig, & Dieruf, 1966), driving accidents (Weiss & Hechtman, 1986), and social rejection (Barkley, 1998; Campbell & Paulaskas, 1979; Johnston et al., 1985; Pelham & Bender, 1982; Rolf, 1976).

Theory

Barkley (1998) has advanced a theory of ADHD which incorporates a model originally proposed by Bronowski (1967). Bronowski identified four unique properties of human language that distinguish it from the language of other animals. Human beings, Bronowski argued, are capable of using language not only to communicate but also to reflect, that is, to plan, make predictions, and test consequences. This reflection can only occur when there is a temporal separation between a stimulus and a response. Because of this ability to delay or inhibit responding, Bronowski proposed that humans acquired skills he labeled prolongation, separation of affect, internalization, and reconstitution. Prolongation refers to our ability to reference past events and predict future events. Separation of affect is the ability to separate the emotional charge of a stimulus from that event, and thus, separate emotional content from our response to that event. Internalization refers to the turning of speech inward during behavioral inhibition. This allows humans to test various responses to a stimulus before overtly responding. Finally, reconstitution refers to a dual process involving analysis, which is the breaking down of a sequence of events or messages into their component parts, and synthesis, or the ability to use these parts to construct entirely new messages or responses.

Drawing largely from Bronowski's theory, Barkley (1998) proposed that ADHD is characterized by a deficit in behavioral inhibition which compromises the executive functions of working memory (similar to Bronowski's "prolongation"), self-regulation of affect and arousal (similar to Bronowski's separation of affect), internalization of speech (similar to Bronowski's "internalization), and reconstitution (behavioral analysis and synthesis). Thus, Barkley (1998) hypothesizes that the behavior of the ADHD individual is more often dictated by the contingencies of the immediate situation, rather than the contingencies of temporally distant goals. This decreased ability to inhibit responding to situational contingencies, rather than responding to distal contingencies, compromises the goal-directed behavior of the ADHD individual.

Barkley (1998) predicts that ADHD individuals demonstrate difficulties inhibiting prepotent responding, stopping ongoing responses given feedback on errors, and with interference control in contexts which supply minimal feedback or intrinsic appeal for the ADHD individual. Given the literature (Johnson and Rosén, 2000; Pelham, et al., 1990) and anecdotal reports regarding the sports behavior of children with ADHD, it is likely that the competitive sports setting may be such a situation for the ADHD individual, Thus, one would expect that ADHD children should have difficulty following the rule structure of the game, inhibiting socially inappropriate behavior (i.e., fighting) and emotional responding, as well as attending to salient events in the sports situations, when compared to non-ADHD children.

Peer Relations

There is extensive literature indicating that the impulsive and hyperactive behavior exhibited by ADHD children and adolescents has a negative impact upon their relationships with peers. ADHD children are more likely to find themselves barely tolerated in typical group activities (Barkley, 1998), and are significantly more often rated, by parents and teachers, as aggressive, annoying, uncooperative in a group, and

easily led by others (Campbell & Paulaskas, 1979). They are more likely to experience disturbed peer relationships, are less likely than non-ADHD children to have friends, and are considered "intrusive, boisterous, and annoying" by their peers (Milich et al., 1998). Sixty-six percent of the mothers of hyperactive children specifically mentioned their child's difficulty playing with other children, whereas only 19% of control mothers had similar complaints (Campbell & Paulaskas, 1979). Additionally, 43% of mothers of "hyperactive" children interviewed by Stewart and Pitts (1966) rated their child as unpopular, while none of the mothers of the non-hyperactive children rated their child as unpopular.

Among their classmates, ADHD children received more nominations on the Aggression factor and fewer on the Likability Factor of the Pupil Evaluation Inventory than did other children in the class (Johnston et al., 1985). Children with externalizing symptoms are also more likely to be rated negatively by peers than other groups of children "at risk" (Rolf, 1976). Similarly, Erhardt and Hinshaw (1994) found that when both ADHD and non-ADHD boys (previously unfamiliar to each other) were brought together to play, ADHD children were overwhelmingly rejected by their non-ADHD peers as early as the end of the first day. The degree of aggressiveness exhibited in childhood, in addition to the risks mentioned earlier, predicts poorer social relationships for Hyperactive-Impulsive and Combined subtypes (Barkley, 1998). As one would expect, research has shown that these social patterns are important indicators of childhood functioning (Hartup, 1983)

In turn, this pattern of social rejection that is so common in ADHD children is a significant predictor of later adult functioning in many areas. Riddle and Rappaport (1976), in a two year follow-up study of hyperactive boys, found that the clinically significant externalizing behaviors found among grade-school age populations predisposed the individuals to continued psychopathology, and that this relationship may be independent from socioeconomic status. Kohlberg, Lacrosse, and Ricks (1972) report

that social difficulties are predictors of later psychiatric adjustment difficulties. Cowen, Pederson, Babigion, Izzo, and Trost (1973a) found that peer rejection, demonstrated by peer ratings in the third grade, was a powerful predictor of later psychiatric problems as compared to the evaluations of mental health professionals, teachers, self-report and test data. In a similar study, the same authors found that peer nominations of negative roles and lack of, or minimal, peer nominations of positive roles was by far the best predictor of a subjects appearance in the county psychiatric records as an adult (Cowen, Pederson, Babigion, Izzo, & Trost, 1973b). Janes, Hesselbrock, Myers, and Penniman (1979) conducted a 12-15 year follow-up study of 149 males ages 4-15 initially referred to a clinic for behavioral problems, poor school achievement, fearfulness, and problems relating to peers. The authors found that among teacher reports of childhood social behaviors, "fails to get along with others" was the item with the most predictive power for later adjustment. In fact, this item was significantly correlated with educational attainment, job dismissals related to behavioral problems, trouble with the law, arrests, and psychiatric hospitalizations.

The social rejection experienced by ADHD children is congruent with both the anecdotal reports regarding their patterns of sports involvement and sports behavior, as well as the limited empirical literature regarding ADHD children in sports (Atkins & Stoff, 1993; Johnson & Rosén, 2000; Melnick & Hinshaw, 1996). Clinicians, parents, and teachers tend to note that ADHD children have greater difficulty getting along with teammates, following rules, and playing appropriately in team sports, as compared to individual sports. Researchers have also noted that ADHD children are more likely to demonstrate difficulty in team sports when compared to individual sports (e.g., increased aggression, emotional reactivity, and disqualification; Johnson & Rosén, 1999), more likely to show increased levels of hostile aggression in competitive situations (Atkins & Stoff, 1993), and are more likely to seek trouble (and fun) at the expense of rule following in a competitive setting, particularly if the ADHD boys demonstrate high-

levels of aggression (Melnick & Hinshaw, 1996). Taken together, the empirical literature and anecdotal evidence suggest that ADHD children and adolescents may find a better "match" in individual sports.

Sports

Numerous studies have demonstrated the significant, positive correlation between sports proficiency and social status in children and adolescents, particularly in males (Buchanen et al., 1976; Chase & Dummer, 1992; Gross et al., 1985; Thirer & Wright, 1985; Weiss & Duncan, 1992). Not only is proficiency correlated with social standing, increases in proficiency are followed by increases in popularity (Gross et al., 1985).

In a study of 802 fifth and sixth grade boys and girls, Buchanan et al. (1976) found that participants receiving high social status ratings by peers typically excelled either athletically or academically. When forced to decide the popularity of athletes (excelled athletically) versus student athletes (excelled both athletically and academically), boys endorsed the athletes as more popular and the girls endorsed the student athletes as slightly more popular. Finally, when asked to rate the contribution of four factors to popularity, boys most often endorsed sports, whereas girls endorsed grades.

Chase and Dummer (1992) found that for boys, sports were more important and academic achievement less important in determining personal popularity. Boys reported sports to be the most important determinant of male peer popularity, and that this relationship increased with grade level. Weiss and Duncan (1992), in a study of 126 children, revealed that children who are realistically confident of their sports ability, and are good at sports, tend to be popular among their peers and more socially confident than children who did not possess these characteristics.

Delaney and Lee (1995) examined differences in the level of self-esteem reported by high physically active and low physically active male and female high school students.

The authors found that high physically active participants were characterized by higher self-esteem scores, as well as higher tendencies to possess both positive masculine and feminine characteristics. While this certainly does not establish a causal relationship between physical activity and self-esteem, it supports the notion that physical activity may have a positive association with self-worth.

There is evidence, however, that suggests a causal relationship between sports proficiency and social status. Gross et al. (1985) found that improvements in sport proficiency are followed by improvements in peer sociometric ratings. In a study of 150 boys and girls, ages 7-13, involved in a sports fitness summer training camp, participants completed peer socioeconomic status ratings and a battery of physical fitness measures (used to indicate athletic ability) at the beginning and end of the eight week session. Five of the six physical fitness measures (pull-ups, sit-ups, broad jump, 50-yd. dash, and 600 yd. run) were significantly, positively correlated with the social status of the children at the start of the camp. Following training, the children exhibited significant improvements in physical fitness, as well as significant improvements in social status.

Costs of Sports Involvement

Aside from the benefits of sports involvement, however, there are also risks associated with continued sports involvement. These risks manifest themselves in three areas: emotional reactivity (Lewthwaite & Scanlan, 1989; Scanlan & Lewthwaite, 1984; Scanlan & Passer, 1979a; Scanlan & Passer 1978b; Simon & Martens, 1979), decreased prosocial behavior, (Bredemeier & Shields, 1986a; Bredemeier & Shields, 1986b; Bredemeier, Weiss, Shields, & Cooper, 1986; Caliber & Roberts, 1961; Rascal, Coulomb, & Pfister, 1998), as well as increased injury (NEISS Data Highlights, 1981). As ADHD individuals are at increased risk for emotional reactivity (Barkley, 1998; Braaten & Rosén, 2000, Kitchens, Rosén, & Braaten,1999), decreased prosocial behavior (Barkley, 1998; Farrington et al., 1990), and for injury (Gayton et al., 1986; Hartsough

& Lambert, 1985; Matheny & Fisher, 1984), a review of the literature regarding these risk factors in the sports setting is warranted.

The increased emotional reactivity experienced by sports participants does not appear to be unique to athletes. Research suggests that this emotional reactivity (e.g., anxiety) is not directly related to sports involvement, but rather to evaluation, the perception of the nature of the evaluation, and ability to meet demands of the situation, regardless of the context. Scanlan and Passer (1978b), in a study of stress experienced by 11 - 12 y.o. male soccer players secondary to competition, both prior to and following the event, found that the pre-game stress experienced by participants depended upon the participant's perception of their capabilities of meeting the demands of the competitive situation. Following the competition, stress was strongly influenced by the participants' perception of the adequacy of their performance in meeting the demands of competition. Of course, losing the event also significantly increased the participants' anxiety, as it is a direct indicator of the effectiveness of their actions. Scanlan and Passer (1979a) found similar results in a study of 10 - 12 y.o. female soccer players, with perceived team ability to perform, and perception of actual team performance strongly related to pre- and post-game stress, respectively.

Similarly, Simon and Martens (1979) compared pre-event state anxiety among 9-14 year old boys participating in required school activities (tests and gym class), non-required, non-sports activities (band solos/competition), and non-school sports (baseball, basketball, gymnastics, hockey, swimming, and wrestling). Interestingly, boys involved in band solos/competitions exhibited the highest anxiety levels, followed by boys involved in non-school sports, and lastly, boys participating in required activities. Looking more closely at the sports cohort, the highest anxiety was exhibited by those involved in individual contact sports (wrestling) and the lowest anxiety was exhibited by those involved in team contact sports (hockey, basketball). Thus, the salient factor affecting anxiety seems to be potential for evaluation, rather than physical competition.

Lewthwaite and Scanlan (1989) and Scanlan and Lewthwaite (1984), in a study of emotional reactivity among sports participants, found that the most influential and stable predictors of pre-match stress for 9 - 14 year old male wrestlers were competitive trait anxiety, as measured by the Competitive State Anxiety Inventory, and personal performance expectations, with pre-match worries about failure and perceived parental pressure predictive of both pre- and post-match stress. In turn, the wrestlers who exhibit more frequent somatic competitive trait anxiety (e.g. upset stomach) had lower self-esteem, reported greater upset as they performed poorly, expressed a preference for avoiding tournament matches, and worried about failure and parental evaluation more often.

In addition, it appears that prosocial behavior (e.g., altruism, cooperation, moral reasoning) may be negatively impacted by sports setting and length of involvement. In a study of 4-7 grade boys and girls, Bredemeier et al. (1986a) found that boy's participation and interest in high contact sports and girl's participation in medium contact sports (the highest contact sports that they had reported) were negatively correlated with maturity of moral reasoning and positively correlated with tendency to aggress. It is sports interest, rather than sports participation, however, that was the strongest predictor of reasoning maturity and aggression tendencies in the regression analyses. That is, those participants who showed highest interest in high and/or medium contact sports showed the least mature moral reasoning and highest tendency to aggress, regardless of actual participation in high and/or medium contact sports.

Rascle, Coulomb, and Pfister (1998), in a study of 240 boys and girls, aged 14 - 18, participating in handball across three settings (physical education classes, interscholastic, and league settings), found that instrumental aggression was significantly higher in the league context (the context with most emphasis on competition) than in the other two contexts. Thus, suggests that as perception of competition increases, so does the tendency to engage in instrumental aggression.

Bredemeier (1994) investigated the relationship between moral reasoning and tendency to aggress in both sports and non-sports contexts in 106 male and female 4th - 7th graders. Participants who were relatively unsophisticated in their moral reasoning rated themselves as more likely to behave aggressively across both contexts than those who rated themselves as morally sophisticated. Male were more likely to be aggressive across both situations. Additionally, older participants were more likely to behave aggressively than younger participants. These findings suggest that individuals who are male, older (i.e., junior high), and demonstrate less mature moral reasoning are more likely to behave aggressively in general. This has important implications for sport participation in ADHD individuals as they progress through their junior high school and high school years.

Kleiber and Roberts (1961) found decreased levels of altruism and cooperation among children who participated in competitive sports. Additionally, this effect increased with length of sport experience. That is, those children, particularly males, who had higher levels of sports experience demonstrated lower levels of both altruism and cooperation.

Evidence for a causal relationship between length of involvement in sports and increased levels of aggression and non-altruistic behaviors, however, has not been clearly established. This may be due to the fact that annually, 22 - 37% of children discontinue involvement in organized sports (McClements, Fry, & Sefton, 1982; Sapp & Haubenstricker, 1978). That is, those children who continue to participate in sports may demonstrate higher levels of competitive behavior (e.g., aggression) from the beginning of their sports careers. Thus, rather than sports exerting an influence on the aggressive behavior of the individual, those non-aggressive individuals may simply be self-selecting away from sports participation.

Finally, although injuries are an inherent risk of participation in sports, the rate and frequency of serious injuries experienced while participating in sports does not

appear to be greater than when engaging in non-sports activities. In tracking emergency room visits, the National Electronic Injury Surveillance System (NEISS, 1981) revealed that the estimated injury rate per 100,000 youth ages 5-14 to be 454 for football, 359 for baseball, 280 for basketball, 108 for soccer, 102 for wrestling, 101 for gymnastics, and 907 for bicycling. While these numbers are substantial, sports injuries only result in 2.3% of emergency room visits for children. While their prevalence among sports participants does contribute to sports attrition in children (Klint & Weiss, 1986), sports injuries do not seem to be a major threat to the vast majority of children. It is also interesting to note that, when the incidence of major-impact injuries is compared between organized sports and free play, there is no clear evidence that organized sports are more dangerous or safer than free play (NEISS, 1981).

Thus, the three major risk factors associated with sports participation (e.g., emotional reactivity, decreased prosocial behavior, and injury) do not appear to be negatively impacted by sports participation. Emotional reactivity, specifically anxiety, appears to be largely related to the participants' perception of evaluation, as well as their perception of their ability to meet the demands of a competitive situation (Lewthwaite & Scanlan, 1989; Scanlan & Lewthwaite, 1984; Scanlan & Passer, 1978a; Scanlan & Passer, 1978b; Simon & Martens, 1979). The research regarding sports behavior and decreased prosocial behavior has not supported a causal relationship. Rather, the best evidence available simply supports a correlation between the two variables (Bredemeier 1994; Bredemeier et al., 1986a; Kleiber & Roberts, 1961, McClements et al., 1982; Sapp & Haubenstricker, 1978). Finally, serious injuries are associated with sports participation, but serious injuries caused by sports are relatively infrequent, and no more frequent than those caused by free playing (NEISS, 1981).

Attrition or Continued Participation?

The current study focuses on the maintenance of involvement (e.g., continued involvement) or attrition (e.g., "quitting") experienced by the ADHD child in team and individual sports settings. Given the positive social outcomes associated with continued sports involvement (Buchanen, et al., 1976; Chase & Dummer, 1992; Gross et al., 1985; Thirer & Wright, 1985; Weiss & Duncan, 1992), a review of the literature pertaining to continued involvement in young athletes is warranted.

There is extensive literature on both maintenance of involvement (Alderman & Wood, 1976; Gill, Gross, & Huddleston, 1983; Gould, Feltz, & Weiss, 1985; Sapp & Haubenstricker, 1978; Wankel & Kriesel, 1985), as well as attrition (Klint & Weiss, 1986; McClements, Fry & Sefton, 1982; McGuire & Cook, 1983; Narciso et al., 1984; Orlick, 1973; Orlick, 1974; Sapp & Haubenstricker, 1978). In discussing the maintenance of involvement, an analysis of the benefits as well as costs of sports involvement will be discussed.

Ultimately, the vast majority of children will either quit a particular sport, or discontinue sports involvement altogether, either temporarily or permanently. The annual attrition rate from youth sports (ages 10-17) has been estimated to be between 22% and 37% (McClements et al., 1982; Sapp & Haubenstricker, 1978). Thus, between ¼ and 1/3 of child participants end the season, not to return the following year. Extensive literature has cited lack of enjoyment as a primary causal factor behind sports attrition cited by youth sport participants (Klint & Weiss, 1986; McClements, Fry & Sefton, 1982; McGuire & Cook, 1983; Narciso, Otto, &, 1984; Orlick, 1973; Orlick, 1974; Sapp & Haubenstricker, 1978).

Research shows that the presence of intrinsic rewards aspects (i.e. fun, fitness, affiliation, and skill improvement) in the sports setting function as the primary motivators of continued involvement. Alderman and Wood (1976) demonstrated that young Canadian athletes rated affiliation with teammates, being good at a sport, and having fun,

respectively, as the most salient factors positively impacting their continued involvement in ice hockey. Similarly, Gould et al. (1985), found that adolescent swimmers rated team atmosphere, skill improvement, fitness, challenge and fun as the most important motives for participation, with gender-equal emphasis on achievement/status, and with females placing greater emphasis on friendship and fun.

Wankel and Kreisel (1985) found that factors considered intrinsic to the sport activity, such as excitement, accomplishment, skill improvement, and skill testing against opponents were rated as most important factors pertaining to the sport enjoyment experienced by 822 youth sport participants (soccer, baseball, and hockey). Least important were extrinsic factors such as winning the game and pleasing others, with "being on a team" and "being with friends" being rated as intermediately important. Gill et al. (1983), however, note that boys tend to place greater emphasis on achievement/status in sports than females did. Similar to other studies, however, it was noted that the most important reasons for participation across all participants were to improve skills, have fun, learn new skills, be challenged, and to improve fitness.

Finally, Sapp and Haubenstricker (1978), in an extensive study on youth sports involvement in Michigan, found "having fun" to be the most frequently identified reason for participating in sports among children. Additionally, "learning new skills, becoming physically fit and interacting with friends" were also cited as important reasons for participation.

McGuire and Cook (1983) discovered that athletically proficient children who reported the decision to join sports as completely their own were the least likely to discontinue involvement. Perhaps the athleticism demonstrated by these children increased their perceived intrinsic rewards of sports (e.g., being good at the sport, testing their skills against others), thereby possibly confounding the salience of self-enrollment in predicting attrition.

Orlick (1974), in a study of 60 former multisports participants (ages 7-19), found that high-school aged participants were most likely to cite conflict of interest, both within and outside of sports, as a reason for quitting. Younger children (ages 10-13), on the other hand, cited little success or lack of playing time as their primary motivation for discontinuing involvement. The findings of McClements, Fry, and Sefton (1981), echo those of Orlick (1974). In a study of the attrition motivation of 200 youth hockey players, the authors found that players under age nine rated lack of fun and skill as the reasons for their quitting.

Similarly, Orlick (1973) conducted a study of 32 8-9 year old sports participants and non-participants and found that the majority of the dropout children indicated that they dropped out because "they never let me play". Additionally, many of these children indicated that they never wanted to go out for a sports team again. Thus, the literature suggests that there is a difference in attrition motivation between elementary aged and high school aged participants. That is, those who cease involvement early on do so for lack of playing time, or lack of perceived success, whereas the older dropouts do so because of diminished interest and/or increasingly busy schedules. Narciso et al. (1984) found that 69.1% of 12 -13 y.o. soccer dropouts cited a lack of intrinsic rewards (i.e., not having fun playing, coach not good, not playing enough, too much emphasis on winning) as contributing to their decision. Additionally, 55.8% reported having other things to do as motivators for attrition. As can be seen, the main reason that children participate in sports is the intrinsic rewards. In turn, lack of these intrinsic rewards is the major reason for attrition in elementary aged school children. Additionally, there seems to be a self-selection built into organized sports, with the more highly skilled players continuing participation.

Sports and the ADHD Child

It is particularly unfortunate that there is a lack of literature dealing specifically with sports and the ADHD child, as sports participation is an important, beneficial social activity with which ADHD children seem to struggle. Case studies have highlighted the benefits of sports skills tutoring in grade school boys referred to a psychiatric clinic due to behavioral problems (Armstrong & Drabman, 1994), as well as the comparative efficacy of exercise and methylphenidate on hyperactivity (Silverstein & Allison, 1994). Empirical studies have examined the effects of methylphenidate and the behavior of ADHD children on a baseball team (Pelham et al., 1990), behavior and goals exhibited by ADHD children in competitive situations (Atkins & Stoff, 1993; Melnick & Hinshaw, 1996), and differences in sports behavior between ADHD and non-ADHD children (Johnson & Rosén, 1999).

Armstrong and Drabman (1994) related the case studies of "inappropriately attention-seeking" children. The study utilized sports "tutors" who were responsible for increasing the referred child's competence in sports. The participants, as well as their parents and teachers, reported positive results from the tutoring, including increase positive peer interaction, and self-confidence, coupled with decreased in disruptive classroom behavior. Dozier, et al. (1978) note that the teenagers referred to a sports treatment group demonstrated increased confidence and expressiveness. While these studies do not refer specifically to ADHD participants, they do suggest that psychiatrically referred children and adolescents may show increases in adaptive behavior secondary to sport involvement.

In a study of the effect of methylphenidate on the sports behavior of ADHD male baseball players, Pelham et al. (1990) highlighted gains in the area of attention, ready position (in the field) and game awareness (i.e. how many outs/balls/strikes/runs). As lack of proficiency has been shown to negatively impact the child's social status, (Buchanen et al., 1976; Chase & Dummer, 1992; Gross et al., 1985; Thirer & Wright,

1985; Weiss & Duncan, 1992), it is possible that the medicated ADHD little league players may have experienced concomitant increases in their social status.

Difficulty attending to salient characteristics of the sports environment during competition is also correlated with rate of injury. Lavarda (1975) discovered that the characteristics of impulsivity, aggression, and guilt were related to the incidence of injury, independent of the sports activity, in Italian national athletes. Bergandi and Witting (1988) also found attentional style, as measured by the Test of Attention and Interpersonal Style (TAIS), to be a relatively good predictor of injury variance among college athletes.

ADHD children also report different goals and exhibit different behavior in competitive situations than comparison children. Melnick and Hinshaw (1996) studied differences in sports behavior between ADHD and control boys in a competitive game of foosball. High-aggressive ADHD boys were more likely to prioritize trouble seeking and fun at the expense of rules than low-aggressive ADHD and comparison boys. Atkins and Stoff (1993) conducted a study of competitive pinball playing behavior in children with disruptive behavior disorders (e.g., ADHD, conduct disorder, oppositional defiant disorder). Results indicated that only the ADHD group had higher rates of hostile aggression than controls. This has implications for the sport behavior of ADHD children, in that one might expect to see higher levels of both hostile and instrumental aggression, given the competitive nature of sports.

Johnson and Rosén (2000), in a study of ADHD and non-ADHD boys, ages 6 - 18, found several interesting results. First, ADHD boys were more likely than non-ADHD boys to demonstrate difficulty in sports (as assessed by rates of aggression, emotional reactivity, and disqualification), regardless of context (e.g., individual or team sports), than non-ADHD boys. Additionally, both groups of boys were more likely to display increased levels of aggression, emotional reactivity, and injury, regardless of ADHD status, in team sports, as compared to individual sports. Thus, the individuals that

demonstrated the greatest levels of difficulty were those ADHD boys participating in team sports. Additionally, ADHD boys participated in team sports for a significantly briefer period of time than their non-ADHD peers. It was unclear whether the ADHD group was selecting away from team sports, or simply initiating participation at a later age.

As noted, the literature on ADHD and sports is limited. The literature available suggests that ADHD males experience a benefit from medication in the team sport setting (Pelham et al., 1990), and that attentional style predicts injury in competitive sports settings (Bergandi & Witting, 1988; Lavarda, 1975). Additionally, ADHD males may be more likely to exhibit "fun" at the expense of rule following in competitive, non-sport settings (e.g., foosball, pinball), as well as increased rates of non-goal directed, "hostile" aggression than control males. Psychiatrically referred children demonstrating disruptive classroom behavior also appear to reap benefits from sports skills tutoring and sports involvement (Armstrong & Drabman, 1994; Dozier, Lewis, Kersey, & Charping, 1978). Recent studies (Johnson & Rosén, 2000) also highlight differences, indicating that ADHD males are more likely to demonstrate increased difficulty (e.g., more aggression, more emotional reactivity) and decreased participation when compared to controls, particularly in team sports settings. This literature strongly suggests that ADHD males have a different, more problematic experience in competitive sports settings, particularly team sports, when compared to their non-ADHD peers.

Present Study

The purpose of this study is three-fold. First, an attempt is being made to replicate the findings of Johnson and Rosén (2000) regarding difficulties ADHD children have in the team and individual sports settings (e.g., increased attrition, disqualification, aggression). Second, because ADHD children are ceasing participation in team sports much more frequently than their non-ADHD peers, it is important to determine whether

or not they are self-selecting away from or being "kicked-off" of team sports. This information may be useful to parents and coaches in preventing unnecessary negative sport experiences for the ADHD child. Finally, given that youth sports participants often cite team affiliation (e.g., "feeling part of a team") as a major reason for continued sports participation and that ADHD children often experience social rejection, it is essential to examine the ADHD child's team affiliation. Should there prove to be a difference in this perceived affiliation (e.g., ADHD children feeling less a "part of the team"), this difference may be associated with the role of ADHD status in the team sport attrition process.

According to Barkley (1998), ADHD children display an impairment in self-directed, temporally distant goal-seeking behavior. Specifically, the difficulties that ADHD individuals have with working memory, self-regulation of affect, internalization of speech, and reconstitution may result in deficits in the sports behavior of that population, particularly in the team sports setting due to the unique demands of that setting. Sports can be differentiated from simple physical activity in three distinct areas: goal directed behavior towards a particular outcome (i.e., winning), emphasis of a rigid rule structure, and reliance on other members in team sports to complete the task at hand. Ironically, these three areas are also prime areas of difficulty for ADHD children (Barkley, 1998). Additionally, these three areas tend to be more salient in the team sports setting than the individual sports setting.

There are typically more rules in team sports than in individual sports. For example, a soccer player has to be aware of his position and the boundaries it entails, appropriate ways to initiate physical contact with opponents, how many players can be on the field at one time, and appropriate ways to handle the ball, among others. The runner, or swimmer, or gymnast also has to attend to a rule structure, but this structure tends to be much simpler. These participants must stay in their lane, or on the equipment, and

avoid contact with opponents. Other than these rules, however, there is little structure to be violated. Thus, there is decreased opportunity for rule-violation.

Additionally, the team sports player may have to attend to a broader range of sports-salient stimuli than the individual participant. Schellenberger (1990) comments that all elements of attention are required in team sports, including distributive attention (attending to several objects at once), focused attention (limiting attention to one object or opponent), and the ability to alternate between, and maintain, these two types of attention efficiently and effectively. For example, the soccer players, baseball players, and football players must be aware of their positions and responsibilities, the position of their teammates relative to themselves, and the relationship between the two. In addition, the team sport participant must be able to bring there motor activity in line with the ball and goal (Schellenberger, 1990). Thus, there are high levels of demands on both focused and distributed attention for the team player, as well as maintaining that attention, or remaining vigilant. The individual sports participant, on the other hand, is typically concerned only with their position relative to the equipment, or relative to their opponent(s) (i.e., running in a straight line, successfully completing a putt). While there certainly are exceptions, such as fencing, these examples apply to the individual sports most commonly offered by schools and community organizations (e.g., golf, swimming, track and field, cross country, wrestling).

There may be a lack of frequent feedback (e.g., scoring) in team sports, such as hockey, baseball, or soccer, which serve to maintain goal directed behavior. Even when these contingencies do occur, the number that are completed by the ADHD individual, or in which the ADHD individual is directly involved, is small, thus further decreasing the frequency of feedback which bear directly on the behavior of the ADHD individual in the team sport setting. This lack of frequent feedback and significant opportunity for off-task behavior (e.g., playing right field) does not encourage restraint or attentiveness in ADHD children.

In the individual sport setting, on the other hand, feedback is frequent and salient. For example, in a foot race, the presence of the opponent, either in front of, or behind the individual, serves as feedback for the ADHD runner's behavior. If the opponent is in front, clearly the runner is not going fast enough, and must increase his or her pace. If the opponent is behind the individual, the runner is reinforced for his or her behavior, and persistence towards a goal is maintained. These differences should have several effects on the sport behavior of ADHD children.

ADHD children may show more difficulty following rules and suppressing aggression, given their increased likelihood of acting impulsively, particularly in the absence of frequent contingencies (Barkley, 1998). As such, one would expect to see, as found by Johnson and Rosén (2000), greater difficulties in the team sports settings, when compared to the individual sports settings.

ADHD children may also show increased levels of emotional reactivity. As inhibition plays a central role in the regulation of affect (Barkley, 1998), and ADHD individuals demonstrate difficulties with inhibition, it is reasonable to expect that ADHD individuals will have greater difficulty than non-ADHD individuals in separating affect from behavioral responding. It is also expected that these difficulties will be exaggerated in team sports settings, due to the increased attentional demands, and increased rule structure, coupled with decreased contingencies, found in team sports.

It is possible that ADHD individuals will also show increased levels of disqualification, when compared to non-ADHD participants. This is due to the fact that many of the impulsive behaviors that ADHD individuals demonstrate, such as aggression and emotional reactivity, violate the rules of the game. A common consequence of such behavioral excesses in the sport environment is disqualification. Again, these difficulties are expected to be greater in the team sport setting.

It is likely that ADHD children and adolescents will remain in individual sports longer than they remain in team sports, as behavioral excesses during team play may

result in negative feedback from peers. This may cause a decreased sense of mastery and team-affiliation for the ADHD child, which have been shown to be strong predictors of continued maintenance in the sports. Additionally, as the ADHD child experiences negative feedback from teammates, particularly in the team sports setting, their inappropriate sports behavior may intensify, given their difficulty with separating affect from response. This pattern, if accurate, creates a situation in which ADHD children are "set-up" for failure, given the multiple stressors in the team sports environment to which the ADHD child must respond. Someone involved with the ADHD child's sports participation, be it the parents, coaches, or children themselves, ultimately recognizes that there is an intense level of difficulty, and initiates the attrition process.

Finally, it is expected that the major proponents of attrition for the ADHD sport participant will be the parents and or coaches. The adults involved in the child's sport participation are in a better position to compare the individual's behavior to the normative behavior for a particular sport. When coaches and parents witness frequent, intense problematic behavior, they are often forced to deal with the negative consequences. While these difficulties may be apparent to the child, it is likely that they are painfully obvious to the adults, resulting in either suggestions to remove the child from a particular sport, or removal of the child from sports altogether.

In summary, the increased attention demands, increased rule structure, and decreased contingency schedule inherent in team sports, when compared to individual sports, may contribute to unique difficulties for the ADHD child. Specifically, as previous research suggests (Johnson & Rosén, 2000), ADHD children are at increased risk for behavioral difficulties in the team sport setting. These difficulties may contribute to both decreased feelings of affiliation, and selection away from team sports, either through parents, coaches, or through self-selection.

CHAPTER 2

METHOD

Subjects

Participants in the current study included ADHD children, as well as a comparison sample of non-ADHD children. Data were collected in two cities in the Rocky Mountain region of the United States, with populations of approximately 500,000, and 100,000, respectively. All data for the ADHD sample were collected either during ADHD parent support group meetings or regional parent conferences regarding ADHD. All data for the comparison sample were collected from Parent-Teacher Organization meetings at five elementary schools, two junior high schools, and one high school. All six of these schools were located in the city with a population of 100,000. Participation rate, or the participant to contact ratio, was 93% for the non-ADHD group and 87% for the ADHD group.

The original sample included 44 non-ADHD females, 56 non-ADHD males, 6 ADHD females, and 47 ADHD males. The decision was made to discard the data regarding the female participants, as the ADHD sample had insufficient female participants for valid statistical analysis. This distribution within the ADHD sample was not unexpected, as males have an increased likelihood of being ADHD (Barkley Dupaul, & McMurray, 1990). Additionally, the statistical tools utilized by the authors

necessitated inclusion of only that subset from each sample that had participated in both team sports as well as individual sports. These two criteria, only male participants who had participated in both team and individual sports, resulted in final sample sizes of 30 ADHD and 33 non-ADHD.

ADHD Sample

This sample was 30 boys, ages 6 to 17, who had been diagnosed with ADHD by either a physician or a psychologist. The mean age for this sample was 12.59 years (SD = 2.91). The mean Inattention Scale score on the ADHD Rating Scale - IV Home Version (see below) was 18 (SD = 5.51). The mean Hyperactivity-Impulsivity Scale score on the ADHD RS-IV was 12.9 (SD = 6.88). Twenty-three (77%) children were identified as Anglo-American, two (7%) children were identified as Latino, one (3%) child was identified as Native-American, and two (7%) parents declined to report the ethnicity of his/her child. Twenty-four mothers and five fathers completed the questionnaire packet, with one parent declining to report gender. The median income of this sample was $80.001+ annually. Twenty-two (73%) ADHD males were currently taking psychostimulant medication, four (13%) ADHD males were taking a serotonin specific reuptake inhibitor (SSRI), one (3%) ADHD male was taking clonidine, one (3%) was taking Depakote, one was taking herbal remedies (3%), and eight ADHD males (27%) were reported to not be on medication. Five ADHD males (17%) were also noted to be on two or more medications, typically a psychostimulant and an SSRI.

Comparison Sample

This sample included 33 boys, ages 7 - 18, who had not been diagnosed as having ADHD. The mean age for this sample was 13.06 years (SD = 3.56). The mean Inattention Scale score on the Attention Deficit/Hyperactivity Disorder Rating Scale - IV Home Version (ADHD RS-IV; see below) was 4.12 (SD = 3.5). The mean Hyperactivity-Impulsivity Scale score on the ADHD RS-IV was 2.93 (SD = 3.35). Twenty-seven (82%) children were identified as Anglo-American, two (6%) children were identified as Latino, four (12%) children were identified as bi-racial, and one (2%) parent declined to report the ethnicity of their child. Twenty-four mothers and nine fathers completed the questionnaire packet. The median income of this sample was $80,001+ annually.

Instruments

Demographics This form assessed demographics of each sample, including respondents' relation to the child, the child's age, gender, and ethnicity, the income of the family, presence of a diagnosis of ADHD, and, if so, who diagnosed the child, whether or not the child was taking medication for ADHD, and the type of medication. This form also assessed the age at which the participant began involvement in both team and individual sports, as well as the frequency of injuries in both team and individual sports over the course of the most recent year.

ADHD RS-IV Home Version The ADHD Rating Scale-IV is a questionnaire based on the DSM-IV criteria for Attention-Deficit/Hyperactivity Disorder (DuPaul, Anastopoulos, Power, Murphy, & Barley, 1994). The Home Version is completed by the parent concerning the child's home behavior over the past six months. This behavior is

rated on a Likert Scale numbering 0-3, with 0 being "never or rarely" and 3 "very often". The Hyperactivity-Impulsivity Scale score is computed by summing the even numbered items of the ADHD RS-IV. Examples of such items include "fidgets with hands or feet or squirms in seat", "is on the go, or acts as if driven by a motor", and "talks excessively". The Impulsivity Scale score is computed by summing the odd numbered items of the ADHD RS-IV. Examples of such items include "does not seem to listen when spoken to directly", "loses things necessary for tasks and activities", and "is easily distracted".

Both scales have adequate levels of test-retest reliability for four week intervals ($r > .75$), as well as adequate internal consistency, with coeffeicient alphas > .80. Additionally, scores on both scales are correlated with direct observations of classroom attention and productivity (DuPaul et al., 1994). For the current study, the ADHD RS-IV also demonstrated adequate reliability for both the Inattentive (alpha = .96) and the Hyperactive-Impulsive (alpha = .95) subscales. The 93rd percentile (1.5 standard deviations) cutoff scores varied across age range, ranging from 15 – 17 for the Hyperactivity/Impulsivity subscale and 15 - 18.5 for the Inattention subscale.

Sports Behavior Checklist-Revised The Sports Behavior Checklist - Revised (SBC-R) (see Appendix A, questions #1 – 16, and #22 - 33) is a 28 item, eight subscale questionnaire developed for this study. The SBC-R assesses a child's involvement in both individual and team sports settings, the length of that involvement, the types of sports in which the child participated, the quality of that involvement, as well as potential pathways for attrition (e.g. self, parent, or coach). With regards to the quality of the participants' sport involvement, the parents completed items regarding frequency of aggression, disqualification, emotional reactivity, rule adherence, and affiliation.

Respondents were asked to endorse each item regarding both their child's individual sport behavior as well as his team sport behavior. Parents responded to the items on a four point Likert scale, ranging from never (1) to very often (4). In answering the questionnaire, parents were directed to recall the sports behavior of their oldest child (with or without ADHD) in competitive team and individual sports settings. If their child had not participated in competitive individual or team sports, the parents were instructed to ignore the irrelevant questions. Generally, items were worded such that a higher score (indicating greater frequency) reflected an undesirable characteristic (i.e., increased injury, increased aggression, increased emotional reactivity). Six items (Q#1, Q#3, Q#7, Q#8, Q#10, and Q#13) were reversed, with higher scores reflecting desirable characteristics (i.e., rule following, and good emotional regulation). These items were then reversed coded by the researchers to ensure homogeneity in scoring. The original thirty-three item scale was reduced to twenty-seven items, and 7 subscales, following examination of the Chronbach's coefficient alpha (see results section). These subscales (aggression, rule following, emotional reactivity, affiliation, self-attrition, parent-attrition, and coach-attrition) were treated as repeated measures, as data was collected for both team and individual sports. The SBC-R also yielded an Individual Total Score and a Team Total Score. Both total scores were simply additive aggregates of the appropriate subscores (i.e., Individual score = individual aggression + individual rule following + individual emotional reactivity).

Howe Sports Behavior Assessment Scale-Revised The Howe Sports Behavior Assessment Scale - Revised (HSBAS-R; see Appendix A, questions #17 - 21) is a scale developed by Howe (1976) and further validated and revised by Zachary (1988). The HSBAS-R is composed of two different scales that assess affiliation and achievement

behavior of sports participants. The present study, however, is only interested in the affiliation behavior of ADHD and non-ADHD children, and will only include the affiliation subscale from the HSBAS-R. Parents respond to items on a five-point Likert scale, ranging from "rarely" to "often". Additionally, the wording of the subscale was altered so that parents would be able to report on the behavior of their children, rather than the children having to report on their own behavior.

Procedure

Questionnaire packets were distributed to parents at Parent-Teacher meetings, ADHD Parent support group meetings, and ADHD conferences. Following distribution of the packets, parents were read a paragraph describing the criteria for team and individual sports involvement (see Appendix B). Parents were then instructed to complete the questionnaires without indicating their or their child's name. Upon completion of the questionnaire packet, the investigators collected the packets.

CHAPTER 3

RESULTS

SBC-R Scale Development

Eight scales were originally included in the SBC-R: Aggression, Injury, Emotional Reactivity, Disqualification, Affiliation, Self-Attrition, Parent-Attrition, and Coach-Attrition. Following data collection, the researchers examined the reliability of the eight original subscales (see Table 1). All scales with a Chronbach's coefficient alpha > .60 for both team and individual subscales were retained for further analysis. The following were retained (with accompanying individual and team alpha coefficients): Aggression (.73, .82), Rule Following (.82,.86), Emotional Reactivity (.76, .82), Affiliation (.66, .68), Self-Attrition (.84, .84), Parent-Attrition (.63, .70), and Coach-Attrition (.70, .82). The Disqualification subscale (.27, .54) was not retained.

Analysis of Covariates

A one-way MANOVA was conducted to determine the association of Age and Income on group. The dependent variables used in the first analyses of group characteristics (ADHD vs. Non-ADHD) were the age of the child and annual income. A main effect of group on these variables was not significant [(F (1, 50) = 1.568, p = .218, Eta^2 = .059 (see Table 2)].

ADHD Symptoms

A one-way MANOVA was conducted to determine the relationship between group status (ADHD vs. non-ADHD) and Inattentive and Hyperactive subscales of the Attention Deficit/Hyperactivity Disorder Rating Scale - IV Home Version (ADHD RS-IV). Results indicated a statistically significant group effect [(F (2,60) =71.499, p<.001, Eta^2 = .704)]. An examination of the univariate analyses of the group effect on inattentive and hyperactivity-impulsivity demonstrated statistically significant group effects across both variables [inattentive (F (1,61) =145.213, p<.001, Eta^2 = .704), hyperactivity-impulsivity (F (1, 61) = 54.891, p<.001, Eta^2 = .474)]. The mean inattentive score for the non-ADHD group was 4.12 (SD = 3.50). The mean inattentive score for the ADHD group was 18 (SD = 5.51). The mean hyperactivity-impulsivity score for the non-ADHD group was 2.93 (SD = 3.35). The mean hyperactivity-impulsivity score for the ADHD group was 12.9 (SD = 6.88) (see Table 3).

Sports Involvement

A 2x2 ANOVA, with repeated measures on the second factor, was conducted to determine the effect of group status (ADHD vs. non-ADHD) and sports setting (individual vs. team) on Length of Involvement in sports. There was no statistically significant effect for group [F (1, 25) = 39.492, p = .359, Eta^2 = .034] (see Table 4). Results of this analysis indicated a significant effect for setting [F (1,25) = 6.312, p = .019, Eta^2 = .202] as well as a significant group by setting interaction (F (1,25) = 4.544, p=.043, Eta^2 = .154] (see Table 5).

A Tukey post-hoc test revealed several statistically significant differences between group means (see figure 1). ADHD males were involved with team sports for a

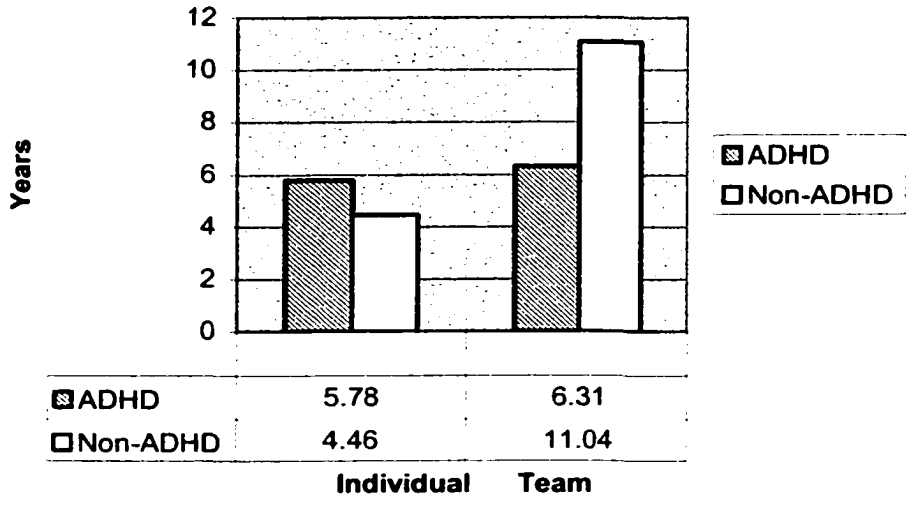

Figure 1: Length of Participation

significantly shorter period of time than were non-ADHD males. ADHD males were involved with individual sports for a significantly shorter time than non-ADHD males were involved with team sports. Also, non-ADHD males were involved with team sports for a longer period of time than with individual sports (see Table 6). This was not the case with ADHD males.

A 2x2 ANOVA (ADHD x Setting) with repeated measures on the second factor, was also performed to determine the effect of ADHD and sports setting on age of onset for sports involvement. Analyses indicated a significant setting effect [$\underline{F}$ (1,57) = 7.024, $\underline{p}$ = .010, Eta^2 = .110] (see Table 7), with participants joining team sports at a younger age (mean = 5.74 years) when compared to individual sports (mean = 6.82). There was no significant main effect of group [$\underline{F}$ (1,57) = .054, $\underline{p}$ = .818, Eta^2 = .001], nor a significant setting x group interaction [$\underline{F}$ (1,57) = 1.768, $\underline{p}$ = .189, Eta^2 = .030].

Sports Behavior

A 2x2 ANOVA (ADHD x Setting), with repeated measures on the second factor, was performed to determine the effect of ADHD and sports setting on the Total Sports score. Analyses indicated a significant setting effect [$\underline{F}$ (1, 61) = 13.461, $\underline{p}$ = .001, Eta^2 = .181] (see Table 8). Analyses also indicated a significant effect of group [$\underline{F}$ (1,61) = 55.750, $\underline{p}$<.001, Eta^2 = .478] (see Table 9), with ADHD males scoring higher than non-ADHD males. There was not a significant setting x group interaction [$\underline{F}$ (1, 61) = 2.153, $\underline{p}$ = .147, Eta^2=.034].

A 2x2 MANOVA (ADHD x Setting), with repeated measures on the second factor, was conducted to determine the effect of group status and sports setting on emotional reactivity, aggression, and rule following. A significant effect of group was

found [F (3,59) =21.237, p = .000, Eta^2 = .519]. A significant setting effect was also found [F (3,59) = 6.257, p = .001, Eta^2 = .241]. There was no significant setting by group interaction [F (3,59) = .928, p = .433, Eta^2 = .045].

An analysis of the univariate tests of the group effect revealed several statistically significant results. The effect of group on Emotional Reactivity was significant [F (1, 61) = 25.646, p = .000, Eta^2 = .29.6], with ADHD participants showing higher levels of aggression (mean = 2.33, SD = .098) when compared to non-ADHD participants (mean = 1.65, SD = .093) (see Table 10). The effect of group on Aggression was also significant [F (1, 61) =28.419, p = .000, Eta^2 = .318), with the ADHD participants showing higher levels of "aggression" (mean = 1.88, SD = .071) when compared to non-ADHD participants (mean = 1.36, SD = .068). The effect of group on Rule Following was also significant [F(1,61) = 59.204, p = .000, Eta^2 = .493], with ADHD participants showing poorer Rule Following (mean = 2.05, SD = .077) when compared to non-ADHD participants (mean = 1.23, SD = .074) (see Table 10).

An analysis of the univariate tests for the setting effect also revealed significant results. The effect of setting on Aggression was significant [F (1,61) = 19.147, p = .000, Eta^2 = .239], with participants demonstrating increased levels of Aggression in team sports (mean = 1.72, SD = .47) when compared to individual sports (mean = 1.49, SD = .44) (See Table 11). The effect of setting on Emotional Reactivity was not significant [F (1, 61) = .2.618, p = .111, Eta^2 = .041], nor was the effect of setting on Rule Following [F (1, 61) = 3.566, p = .064, Eta^2 = .055] (see Table 11).

A 2x2 ANOVA (ADHD x Setting) with repeated measures on the second factor was conducted to determine the effect of ADHD and sports setting on injury. A significant setting effect was found [F (1,610 = 9.475, p = .003, Eta^2 = .134] (see Table

12). There was not a significant main effect of group on injury [F (1,61) = .045, p = .832, Eta^2 = .001], nor was there a significant group by setting interaction [F (1,61) = .039, p = .845, Eta^2 = .001] (see Table 12).

Affiliation

A 2x2 ANOVA with repeated measures on the second factor was conducted to determine the effect of ADHD and sports setting on Affiliation. Results indicated a significant main effect of group on affiliation [F(1,61) = 40.306, p = .000, Eta^2 = .398] (see Table 13), with ADHD participants showing less Affiliation (mean = 11.42, SD = 2.34) than non-ADHD participants (mean = 15.5, SD = 2.73). There was not a significant effect of setting on Affiliation [F (1,61) = .003, p = .960, Eta^2 = .000], nor was there a significant group by setting interaction [F(1,61) = 1.368, p = .247, Eta^2 = .022].

Additionally, several linear regressions were conducted to determine if affiliation mediated the effect of ADHD status on length of participation in both team and individual sports. The effect of group status (ADHD vs. non-ADHD) was significantly predictive of length of team sports participation (F (1,28) = 4.81, p = .037, R^2 = .147) (see Table 14). Group status was not found to be significantly predictive of length of participation in individual sports (F (1,28) = .544, p = .47, R^2 = .021)(see Table 15). Continuing further with team sports, ADHD status was found to be significantly predictive of affiliation (F (1,61 = 43.51, p = .000, R^2 = .41) (See Table 16). Additionally, affiliation was found to be significantly predictive of length of participation in team sports (F (1,28) =5.213, p = .030, R^2 = .157)(see Table 17). Finally, addition of ADHD status as a predictor following team affiliation resulted in an insignificant model with ΔR^2 = .022 (F (1,28) = 2.94, p = .070, R^2 = .179) (See Table 18).

Attrition

A 2x2 MANOVA with repeated measures on the second factor was conducted to determine the effect of group and sports setting on Self-Attrition, Parent-Attrition, and Coach-Attrition. Significant main effects of group [F (3,42) = 1.487, p = .232., Eta^2 = .096] and setting [F (3,42) = .939, p = .430, Eta^2 = .063] were not discovered, though the group by setting interaction approached significance [F(3,42) = 2.266, p = .095, Eta^2 = .139] (see Table 19).

An analysis of the univariate effects of the group by setting interaction did not yield a significant group by setting effect on Self-Attrition [F(1,44) = .562, p = .457, Eta^2 = .013] nor a significant interaction effect on Coach-Attrition [F(1,44) = 1.332, p = .255, Eta^2 = .029], nor a significant interaction effect on Parent-Attrition was revealed [F(1,44) = 2.804, p = .101, Eta^2 = .06] (see Table 19).

CHAPTER 4

DISCUSSION

The results of the present study support the findings of Johnson and Rosén (2000). Specifically, the strong relationship between ADHD status and both quality and length of sports participation has been empirically supported. The current study demonstrates that ADHD boys exhibit higher levels of Aggression, and Emotional Reactivity, coupled with decreased Rule Following behavior and Affiliation with team-mates and coaches, when compared to non-ADHD boys. Also, while ADHD boys demonstrated statistically similar lengths of individual sports participation when compared to non-ADHD males, they engage in team sports for a significantly briefer duration when compared to the same group. Analyses also reveal that this discrepancy in duration of team sports involvement cannot be attributed to delayed onset of entry into team sports by ADHD boys. Rather, both groups of boys enter sports at the same time, with the ADHD group discontinuing earlier. Results also indicate that ADHD status is associated with discontinuing individual sports. Thus, while both groups of boys, ADHD and non-ADHD, are equally likely to discontinue team sports, ADHD boys are more likely to discontinue earlier, relative to their non-ADHD counterparts.

The Relationship between ADHD Status and Sports Behavior

The results indicated that ADHD status accounts for moderate to high levels of variance in length of involvement across sports settings, in Total Sports Score, in Affiliation, and in the variables that compose the SBC-R, namely Emotional Reactivity, Aggression, and Rule Following. Specifically, ADHD status accounted for 47.8% of the variance in Total Sports Score, for 31.8% of variance in levels of Aggression, 29.6% of variance in levels of Emotional Reactivity, and 49.3% of variance in rule following behavior. Additionally, ADHD status accounted for 39.8% of the variance in Affiliation. In each instance, ADHD males reported higher levels of difficulty across each variable (e.g. increased Aggression, decreased Rule Following, decreased Affiliation, etc.). These results indicate that ADHD boys are much more likely to demonstrate problematic behaviors, regardless of sports setting, when compared to their non-ADHD counterparts.

These increased levels of problematic behavior across sports settings appear to have implications not only for the quality of ADHD males' sports participation, but also for the quantity of that participation. Results indicated that there is a significant interaction between ADHD status and sports setting that accounts for 15% of the variance in the length of involvement. Specifically, while ADHD males (5.77 ± 5.27 seasons) and non-ADHD males (4.46 ± 3.86 seasons) report statistically similar lengths of involvement in individual sports, ADHD males reported significantly briefer teams sports involvement (6.31 ± 5.2 seasons) when compared to non-ADHD males (11.04 ± 8.57 seasons). Additionally, results indicated that this finding cannot be attributed to differences in age of onset for team sports involvement between the ADHD and non-ADHD samples. That is, there was no significant effect of ADHD on age of onset across either sport setting.

The current study also examined the likelihood for both ADHD and non-ADHD males to disengage from sports involvement, as well as potential reasons for that attrition. Findings indicate that both groups are equally likely to disengage from both team and individual sports. A central question of the study, however, was whether or not ADHD boys were at increased risk from being "kicked off" of their team sports. In order to determine the potential reasons for attrition, which included Self-Attrition (e.g., the child choosing to discontinue), Parent-Attrition (e.g., the parent deciding to remove the child), and Coach-Attrition (e.g., the coach "kicking" the child off the team), the univariate analyses were examined. As noted, no significant group effect was observed. Although the group by setting interaction was not significant, this interaction approached significance ($p = .095$) and accounted for 13.9% of the variance, indicating that it may be important in understanding the conditions under which ADHD children discontinued sport participation. That is, the trend suggests that parents of ADHD males are more likely to remove them from team sports when compared to parents of non-ADHD children. The failure to find a significant effect of group, or a group by setting interaction, for the Coach-Attrition variable indicates that ADHD males do not appear to be at increased risk for being "kicked off" of their sports team by their coaches. Rather, the trend suggests that parents of ADHD males are identifying the problematic behavior in team sports and removing their children from that setting.

These results are consistent with prior research (Barkley, 1998; Braaten & Rosén, 2000; Campbell & Paulaskas, 1979; Johnson & Rosén, 2000; Johnston, Pelham, & Murphy, 1985; Rolf, 1976) showing that people with ADHD are perceived by both peers and their parents as displaying higher levels of aggression and emotional reactivity than non-ADHD people in the classroom, at home, and in competitive sports. For example,

Johnson and Rosén (2000), found that ADHD males are much more likely than their non-ADHD counterparts to display increased levels of aggression, emotional reactivity, and disqualification when engaging in both individual and team sports settings. Additionally, problematic behavior in the ADHD males was most notable in the team sports setting, which corresponded to a significantly briefer duration in team sports involvement for the ADHD sample.

Barkley (1998) notes that ADHD children display impairments in self-directed, temporally distant goal-seeking behavior. This impairment, Barkley notes, may be due to the difficulties that ADHD individuals have with working memory, internalization of speech, regulation of affect, and reconstitution. It was predicted that these deficiencies would likely result in increased difficulties in team rather than individual sports for ADHD children, as measured by aggression, emotional reactivity, and rule following behavior, among others. As noted, the current study bears these hypotheses out, identifying ADHD children as having increased difficulties regardless of sports settings. While both groups demonstrated increased problematic behavior in the team sports environment, the ADHD males demonstrated the most difficulty in team sports, and were accompanied by a decreased length of team sports participation. It is likely that these difficulties are due to the increased rule structure of team sports, lack of frequent contingencies, increased opportunity for physical contact, and difficulty attending to a wider range of salient stimuli (Schellenberger, 1990). While both groups have difficulties with these aspects of organized sports, the level of difficulty for the ADHD male in the team sports setting appears to reach unacceptable levels, resulting in increased attrition.

Similarly, Braaten and Rosén (2000) in a study of boys with and without ADHD, found that ADHD boys were reported by their parents as more likely to exhibit behavioral manifestations of anger, sadness, and guilt than non-ADHD boys. Kitchens, Rosén, & Braaten (1999) found that ADHD children, when compared to non-ADHD peers, self-reported higher levels of anger and depressive feelings. These ratings were corroborated by their mothers, who indicated their children as demonstrating greater levels of aggression and depressive feelings. Additionally, Loney and Milich (1982), in a study of clinic referred ADHD individuals, found that 65% may show significant problems with temper tantrums, verbal hostility, stubbornness, and defiance. According to Barkley (1998), these differences in emotional response patterns between ADHD and non-ADHD children are likely due to an underlying deficit in behavioral inhibition. This underlying deficit, in turn, most likely contributes to the increased emotional reactivity, aggression, and decreased rule following behavior demonstrated by ADHD children in the competitive sports situation.

Impact of Affiliation

A second analysis of reasons for attrition was also conducted, investigating the possible mediating effect of affiliation on group status in predicting length of involvement in the team sports setting. Results did not support a significant mediating effect of affiliation on group status. None-the-less, this mediating relationship approached significance ($p = .07$), and accounted for the 17.9% of variance in length of team sports participation.

In order to establish this relationship, several assumptions were satisfied before hand. These assumptions included three significant predictive relationships between (1)

ADHD status and Length of team sports participation (14.7% of variance), (2) ADHD status and Affiliation in team sports (41.6% of variance), and (3) Affiliation and Length of participation in team sports (15.7% of variance). Additionally, in order to establish the mediating effect of Affiliation on ADHD status regarding Length of Participation in team sports, minimal or no unique variance can be accounted for by ADHD status, once Affiliation has been established as a predictor. Analyses indicated that this was the case, with ADHD status accounting for an additional 2.2% of the remaining variance, though the model only approached significance. While these results do not firmly establish Affiliation as a partial mediator of ADHD status in predicting Length of participation in team sports, the results do suggest that Affiliation may be important in understanding the factors which contribute to a "successful" team sports experience for ADHD children. A predictive relationship between ADHD status and Length of participation in individual sports was not established, thus no further analyses were conducted regarding Affiliation and Length of participation in individual sports.

These results are congruent with previous literature. Researchers have clearly demonstrated the increased likelihood of peer rejection experienced by ADHD individuals (Barkley, 1998; Campbell & Paulaskas, 1979; Erhardt and Hinshaw, 1994; Johnston, Pelham, & Murphy, 1985; Milich, Landau, & Diener, 1998). As such, it is reasonable to expect that ADHD children would experience decreased levels of affiliation with their teammates and coaches. The trend of the current study is consistent with this hypothesis. Additionally, literature regarding children and sports (Alderman & Wood, 1976; Gould et al., 1985; Sapp & Haubenstricker, 1978) has repeatedly highlighted the importance of intrinsic reward (e.g., affiliation, having fun) in maintaining prolonged sports involvement. The same relationship appears to hold true for ADHD children.

That is, the level of affiliation experienced by ADHD males in team sports is associated with their ultimate length of involvement in team sports. Once the affects of affiliation have been accounted for, ADHD status adds minimal unique variance.

The near significant mediating effect of affiliation on ADHD status may have important implications for maintaining team sports involvement for ADHD children. That is, it appears that ADHD children stand to increase their length of participation in team sports if there was an emphasis on participation and feeling "part of the team", rather than an emphasis on winning and competition, similar to the experience of youth sport participants in general. Further research into possible causal effects of Affiliation is warranted at this time.

Impact of Setting on Sports Behavior

The results indicated that sports setting (e.g., individual vs. team sports) accounted for moderate to high amounts of variance in Total Sports Score. Additionally, sports setting accounted for moderate to high variance in Aggression, Rule Following, frequency of Injury, Length of Participation, and age at onset of participation. Specifically, sports setting accounted for 18% of variance in Total Sports Score, 23.9% of variance in Aggression, 5.5% of variance in Rule Following behavior, 13% of variance in Injury, 20% of the variance in Length of Involvement, and 11% of variance in age at onset of participation. With regards to Aggression and Injury there was an increase (indicating greater difficulty) when moving from individual to team sports settings. Rule Following behavior decreased from individual to team sports. Additionally, participants, regardless of ADHD status, were more likely to initiate team sports at an earlier age, and continue participation in team sports for a longer duration, when compared to individual

sports. These results partially support the findings of Johnson and Rosén (2000), who indicated that sport setting accounted for moderate to high levels of variance in Aggression and Injury. Alternatively, the current study does not support Johnson and Rosén's finding that setting also accounted for significant variance in Emotional Reactivity. This is somewhat confusing, given the increased likelihood for emotionally provocative events (e.g., getting hurt, getting in a fight). The lack of significant finding with regards to setting effect on emotional reactivity may be due to small sample size, however, as the data do approach significance in a manner similar to the findings of Johnson and Rosén (2000). Alternatively, the data may suggest that emotional reactivity is most likely due to participants' intrinsic differences (e.g., ADHD vs. Non-ADHD), rather than environmental differences. Clearly, results are not conclusive in this regard.

Limitations of the Current Study

It is important to note that this study employed a quasi-experimental design with a relatively small sample size. As such, causality between ADHD status and sports behavior, as well as between sports setting and sports behavior, cannot be established. It is possible that boys who display higher levels of aggression and emotional lability naturally select team sports settings over individual sports settings. This is unlikely, however, as participation in both team and individual sports were necessary criteria for inclusion in the study. With reference to the small sample size, ability to generalize this study to all ADHD and non-ADHD male children may be limited. Additionally, parents of the ADHD individuals may have engaged in a response set that was biased towards negative evaluation. That is, the parent's of the ADHD children may be sensitized to the inappropriate, off-task behavior of their ADHD children, and may have over-reported

such behavior, as it is consistent with their expectations. Finally, ADHD individuals were not screened for comorbid disorders, such as anxiety, oppositional defiant disorder, conduct disorder, or depression. Given the likelihood that ADHD individuals will have a comorbid disorder, it is quite possible that several participants also had comorbid disorders.

Direction for Future Study

This study opens up several areas of inquiry into the nature of sports behavior of ADHD children. First, direct observation of the sports behavior of ADHD individuals would be helpful in determining the validity of the current findings. The current study relied solely on parental report of their child's sport behavior. Through direct observation, the effect of parental bias could be removed.

Second, qualitative data collection from both parents and ADHD children, as well as coaches of ADHD children, would also be useful in guiding future questions regarding ADHD and sports. Such data would ideally be composed of the children's reported levels of enjoyment, reasons for attrition, and impact of sports involvement on their friendships. Coaches would be interviewed regarding their experiences with ADHD athletes, as well as strategies that they have found to be useful in creating a successful sports experience for those athletes. Parents would be interviewed regarding their perceptions of their child's sports success, as well as difficulties they may have encountered across various sports settings.

The development and implementation of a curriculum for coaches regarding the deficits that ADHD children have and how these deficits will impact their sports behavior may also be a promising avenue for research. While coaches were not identified in the

current study as commonly "kicking" children off of their teams, coaches are responsible for the structure of behavior of the athletes. As such, increasing coach vigilance for problematic behavior in ADHD athletes may allow coaches to address this behavior more effectively, thereby creating a more successful sport experience for the ADHD child.

Finally, a reexamination of the affiliation experienced by ADHD athletes may also provide useful information. Specifically, affiliation was found to be a marginally significant mediating variable between ADHD status and length of involvement. While it is possible that affiliation is truly not a mediating variable, the trend found in this study is consistent with the literature on sports participation in children regardless of ADHD status. Additionally, the impact of negative peer evaluation (that ADHD children are likely experiencing in the team sports setting) upon affiliation would be a worthwhile examination. That is, are ADHD children predisposed to be less likely to experience affiliation, or is the possible negative evaluation they receive from teammates diminishing their perceived affiliation?

Implications and Conclusions

The results of the current study indicate that ADHD male children are more likely to experience increased levels of aggression, and emotional reactivity, coupled with decreased levels of rule following behavior. Additionally, ADHD participants demonstrated decreased length of team sport involvement, as well as an increased likelihood for discontinuing individual sports, when compared to non-ADHD individuals. Additionally, aggression and injury tend to increase significantly, while rule following behavior decreases significantly, regardless of ADHD status, when the participants are engaging in team sports settings. This data supports Barkley's (1998) theory that ADHD

individuals demonstrate decreased ability to inhibit behavior, and to show less emotional control. These results indicate that the need to attend to greater amounts of relevant stimuli in team sports, coupled with increased opportunity for physical contact opportunity for contact with opponents, greater potential for negative peer feedback, and more opportunity for off task behavior found in team sports settings may lead to less successful team sports experience for ADHD children. As noted in Johnson and Rosén (2000), this is clinically useful information, particularly for parents of ADHD males who are having difficulty within the team sports setting. Rather than quitting sports altogether, these parents and children could be encouraged to explore the individual sports setting as a possibility for continued involvement. Ultimately, this switch may create a more enjoyable sports experience, for both the parent and the child.

These results were consistent with the hypotheses that ADHD children would experience more difficulty in the team sports environment compared to the individual sports environment. The ADHD group exhibited greater levels of aggression, emotional reactivity, and disqualification than non-ADHD children in both sports contexts did. Additionally, ADHD children, as well as non-ADHD children, exhibited greater levels of these variables in the team sport setting.

Current results were not consistent with the hypothesis that parents and coaches would be more likely to identify the difficulties that ADHD athletes experience and, in turn, remove the children from that sport. Rather, self-attrition, parent-attrition, and coach-attrition all appeared to contribute equally to the attrition of ADHD athletes. The exception was that parents of ADHD children appeared to be slightly more likely to remove their children from team settings, although this finding was not significant.

Finally, while results supported the hypothesis that ADHD children would experience decreased affiliation, the hypothesis that affiliation is associated with length of participation was not supported.

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Table 1

SBC Subscale Reliability

Individual Subscale	alpha	Team Subscale	alpha
Aggression	.73*	Aggression	.82*
Emotional Reactivity	.76*	Emotional Reactivity	.82*
Rule Following	.82*	Rule Following	.86*
Disqualification	.27	Disqualification	.54
Self-Attrition	.84*	Self-Attrition	.84*
Parent-Attrition	.63*	Parent-Attrition	.70*
Coach-Attrition	.70*	Coach-Attrition	.82*
Affiliation	.66*	Affiliation	.68*

* indicates inclusion in study

Table 2

Group Effect on Age and Income

	Group		Univariate Group Effect F(1,66)	Effect Size Eta^2
	ADHD	Non-ADHD		
INCOME In thousands	62.19 (19.88)	66.67 (17.65)	.969	.014
AGE	12.22 (3.12)	10.31 (2.58)	7.66**	.104

**$p < .01$

Table 3

Inattentive and Hyperactive Scores by Group

	GROUP					
	Non-ADHD		ADHD		Univariate Effect	Size
	M	SD	M	SD	F(1,61)	Eta^2
Inattention	4.12	3.50	18	5.51	145.213**	.704
Hyperactivity-Impulsivity	2.93	3.35	12.90	6.88	54.891**	.474

**$p < .001$

Table 4

Length of Involvement: Main Effect for Setting

	Setting					
	Individual		Team		Univariate Group Effect	Effect Size
	M	SD	M	SD	F(1,53)	Eta^2
Involvement	5.12	.88	8.67	1.38	6.312	.202

*p<.05

Table 5

Length of Involvement: Setting by Group Interaction

	Group								Setting by Group Effect	Effect Size
	ADHD				Non-ADHD					
	Individual		Team		Individual		Team			
	M	SD	M	SD	M	SD	M	SD	F (1, 53)	Eta^2
Involvement	5.78	1.27	6.31	1.99	4.46	1.23	11.04	1.91	4.544	.154

**p<.01

Table 6

Differences in Involvement

	Group by Settings			
	ADHD		Non-ADHD	
	Team	Individual	Team	Individual
ADHD Team	-	.54	4.73*	1.85
ADHD Individual	.54	-	5.27**	1.31
Non-ADHD Team	4.73*	5.27**	-	6.58**
Non-ADHD Individual	1.85	1.31	6.58**	-

*p=.05
**p = .01

Table 7

Age of Onset: Main Effect for Setting

	Setting					
	Individual		Team		Univariate Group Effect	Effect Size
	M	SD	M	SD	F(1,57)	Eta^2
Age	6.82	2.96	5.74	1.35	7.024*	.110

*$p<.05$

Table 8

Total Sport Score: Main Effect for Setting

	Setting					
	Individual		Team		Univariate Setting Effect	Effect Size
	M	SD	M	SD	F(1,61)	Eta^2
Score	1.67	.49	1.80	.53	13.461**	.181

**p<.01

Table 9

Total Sport Score: Main Effect for Group

	Group					
	ADHD		Non-ADHD		Univariate Group Effect	Effect Size
	M	SD	M	SD	F(1,61)	Eta^2
Score	2.08	.065	1.41	.062	55.750***	.478

***p<.001

Table 10

Sport Score Variables: Main Effect for Group

	Group					
	ADHD		Non-ADHD		Univariate Group Effect	Effect Size
	M	SD	M	SD	F(1,61)	Eta^2
AGGRESSION	1.88	.071	1.36	.068	28.419**	.318
REACTIVITY	2.33	.098	1.65	.093	25.646**	.296
RULE FOLLOWING	2.05	.077	1.23	.074	59.204**	.493

**p<.001

Table 11

Sport Score Variables: Main Effect for Setting

	Setting					
	Team		Individual		Univariate Setting Effect	Effect Size
	M	SD	M	SD	F(1,61)	Eta^2
AGGRESSION	1.72	.47	1.49	.44	19.147**	.239
REACTIVITY	2.01	.69	1.94	.63	2.618	.041
RULE FOLLOWING	1.66	.65	1.58	.59	3.566	.055

*p<.05
**p<.001

Table 12

Injury: Main Effect for Setting

	Setting					
	Individual		Team		Univariate Group Effect	Effect Size
	M	SD	M	SD	F(1,61)	Eta^2
Score	.24	.67	.81	1.42	9.475**	.134

**p<.01

Table 13

Affiliation: Main Effect for Group

	Group					
	ADHD		Non-ADHD		Univariate Group Effect	Effect Size
	M	SD	M	SD	F(1,61)	Eta^2
Score	11.42	2.34	15.5	2.73	40.306**	.398

**p<.01

Table 14

ADHD Status and Length of Participation: Team Sports

Variable	B	SE B	β
Group status	-5.50	2.5	-.383*

Note $R^2 = .147$; * $p < .05$

Table 15

ADHD Status and Length of Participation: Individual Sports

Variable	B	SE B	β
Group status	1.305	1.768	.146

Note $R^2 = .021$; $p = .467$

Table 16

ADHD Status and Affiliation: Team Sports

Variable	B	SE B	β
Group status	-4.26	.645	-.645***

Note $R^2 = .416$; ***$p < .001$

Table 17

Affiliation and Length of Participation: Team Sports

Variable	B	SE B	β
Group status	.736	.322	.396*

Note R^2 = .157; *p <. 05

Table 18

Affiliation, ADHD Status, and Length of Participation: Team Sports

Variable	B	SE B	β
Affiliation	.467	.453	.251
Group status	-2.98	3.50	-.207

Note $R^2 = .179$; $\Delta R^2 = .022$; $p = .07$

Table 19

Attrition: Group by Setting Interaction

	Group								Univariate Group Effect	Effect Size
	ADHD				Non-ADHD					
	Individual		Team		Individual		Team			
	M	SD	M	SD	M	SD	M	SD	F(1,44)	Eta^2
SELF-ATTRITION	2.43	.15	2.47	.15	2.2	.17	2.31	.18	.562	.013
PARENT-ATTRITION	1.26	.07	1.35	.07	1.24	.08	1.2	.08	2.804	.060
COACH-ATTRITION	1.07	.03	1.14	.04	1.03	.04	1.01	.05	1.332	.029

Appendix A

Reminder: Please respond regarding your oldest child's organized sports involvement and behavior

Individual sports = sports that your child competes in alone (e.g., gymnastics, wrestling, etc.)

Team sports = sports that your child competes in as a member of a team (e.g., basketball, softball, etc.)

If your child is currently between the ages of 6 – 18 years old, please fill out the questionnaire regarding his/her sport involvement and behavior. When completing the form, recall your child's sport behavior across his/her life span.

Please list all sports your child has participated in and indicate length of involvement: (example: baseball, 4 years)

_____

_____

_____

	Individual sports				Team Sports			
	Never	Sometimes	Often	Very Often	Never	Sometimes	Often	Very Often
1 My child follows the rules:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
2 My child is involved in arguments:	1	2	3	4	1	2	3	4
3 My child is able to "keep it together" emotionally following a win or a loss:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
4 Referees have told my child to leave a game:	1	2	3	4	1	2	3	4
5 My child gets into "pushing matches":	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
6 My child is "benched":	1	2	3	4	1	2	3	4
7 My child keeps his/her "cool" during competitions:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
8 My child seems to understand the rules:	1	2	3	4	1	2	3	4
9 My child comes close to getting in fights:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
10 Rule following is easy for my child:	1	2	3	4	1	2	3	4
11 My child "overreacts" to wins or losses:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
12 My child is disqualified from competition:	1	2	3	4	1	2	3	4
13 My child remains calm following a win or loss:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**

14 My child "breaks" the rules:	1	2	3	4	1	2	3	4
15 My child is ejected from a game, meet, match, etc.:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
16 My child gets upset with others during games:	1	2	3	4	1	2	3	4
17 My child makes friends easily with others in his/her sport:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
18 My child considers friendships made through sports as a major reason for participation:	1	2	3	4	1	2	3	4
19 My child enjoys being a leader in his/her sport	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
20 My child loves the praise of the coach	1	2	3	4	1	2	3	4
21 My child is upset when his/her friends do not succeed	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**

It is common for a child to stop participating in a sport, whatever the reason. This can occur at the end of the season (e.g., deciding not to play next year) or in the middle of the season (e.g., "quitting", "getting kicked off"). If this has happened to your child, please answer the following questions

	Individual Sports				**Team Sports**			
	Never	Sometimes	Often	Very Often	Never	Sometimes	Often	Very Often
22 When my child stops participating in a sport, it is his/her decision:	1	2	3	4	1	2	3	4
23 I have suggested to my child that he/she discontinue a sport:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
24 Coaches have told me that my child can no longer participate in a team sport:	1	2	3	4	1	2	3	4
25 My child has made a decision not to continue a sport	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
26 When my child stops participating in a sport, it is my decision:	1	2	3	4	1	2	3	4
27 Due to difficulties playing sports, coaches have suggested that my child switch sports:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
28 My child's dissatisfaction with a sport has lead him/her to quit:	1	2	3	4	1	2	3	4
29 I have encouraged my child to discontinue a sport because it is too much of a hassle:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**

30 Coaches have suggested that my child discontinue a sport:	1	2	3	4	1	2	3	4
31 I have encouraged my child to change sports because of my dissatisfaction with his/her performance:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
32 My child has chosen to quit a sport:	1	2	3	4	1	2	3	4
33 Coaches have encouraged me or my child to discontinue a sport because it is too much of a hassle for the coach:	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**