A BIO-PSYCHOSOCIAL INVESTIGATION OF SELF-DETERMINED MOTIVATION IN RECREATIONAL AND TRAVEL YOUTH SOCCER PROGRAMS

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ABSTRACT

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Abstract

The purpose of this study was to conduct a biopsychosocial investigation of self-determined motivation in recreational and travel youth soccer. The investigation consisted of three distinct phases. A total of 128 youth soccer players (54 males and 74 females) aged between 8 and 17 years (*M* Age = 11.5 years, *SD* = 1.8) participated in the current investigation.

The first phase of the investigation used structural equation modeling to empirically test a motivational model of adult influence in youth soccer. The initial analysis failed to support the hypothesized model, $\chi^2(458) = 818.11$, $p < .05$. Modifications to the model based upon respecification criteria developed by Byrne (2001) produced an alternative model that demonstrated a moderate to good fit to the data. Perceptions of autonomy support from the mother positively and significantly predicted self-determined motivation in youth soccer players. Perceptions of autonomy support from the coach positively and significantly predicted perceptions of competence in soccer. Finally, perception of competence in soccer positively and significantly predicted self-determined motivation in youth soccer players.

The second phase of the study investigated gender and program related differences in self-determined motivation, perceptions of autonomy in soccer, perceptions of adult autonomy support, and perceptions of physical and soccer competence. Males reported significantly higher levels of identified regulation, $F(1,127) = 4.12$, $p < .05$, and perceived autonomy in soccer, $F(1,123) = 6.21$, $p < .05$. Participants in travel programs reported significantly higher perceptions of physical competence, $F(1,126) = 6.30$, $p < .05$.

The final phase of the study investigated gender and program differences in the biological maturational status of youth soccer players, and examined the relationships between biological maturity, body mass index and perceptions of physical and soccer competence. A significant interaction between gender and program was observed for biological maturity, $F(1,114) = 3.03$, $p < .10$. A closer inspection of the interaction revealed that, males participating in travel programs were maturationally advanced for their age than males participating in recreational programs.

Biological maturity was not significantly correlated to perceptions of physical or soccer competence in males or females. However, a significant and positive correlation was observed between biological maturity and perceptions of physical competence in males aged above the mean age of peak height velocity, $r(5) = .83$, $p < .05$. A closer inspection of the results relative to mean age of peak height velocity suggest that the direction and magnitude of the relationships between biological maturity and perceptions of physical and soccer competence vary with gender and the age relative to the mean age of peak height velocity. Body mass index was not significantly correlated with perceptions of physical or soccer competence in males or females.

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CHAPTER I

INTRODUCTION

Many parents in the U.S. are actively involved in competitive and recreational youth sports programs. Parents become involved in youth sports for a variety of reasons including coaching, officiating, the transportation of athletes to and from practices and competitions, fund raising, and the provision of financial and emotional support. Despite the many positive roles that parents perform in youth sports, there is a growing concern that certain aspects of parental involvement may be detrimental to the development and experiences of young athletes. An increase in the number of reported instances of parents engaging in violent, abusive, and controlling behavior toward athletes, coaches, officials and fellow spectators has led many organizations to reconsider the role of the parent in youth sports.

In response to concerns regarding negative parental involvement in youth sports many organizations have taken measures to control parental behavior. The National Alliance for Youth Sports, has developed 'The Parents Association for Youth Sports Program', to promote sportsmanship behavior and teach skills such as self-control. Similarly, the American Youth Soccer Organization has team officials educate all parents of participants below 8 years of age, on issues such as sportsmanship and behavioral conduct. In a response to 'loutish' behavior on the behalf of parents and coaches, officials of the 200 team Northern Ohio Girls Soccer League proclaimed a game day of silence in October, 1999 (Free Press News Service, 1999). On this day parents and coaches were banned from making any noises during competitive play. League officials

attributed the inappropriate behavior of the parents and coaches to an over fixation with winning and losing.

Another concern of coaches and physical educators is that parents of young athletes are exercising too much control over their children. Increasing tuition costs, the competition for collegiate scholarships, and the lure of professional sports has motivated many parents to commit their children to specialized training regimens at an early age (American Academy of Pediatrics, 2000). Parents are investing a greater amount of time and finance into the athletic development of their children. Further, parents' decisions to send or transfer children to and from academic institutions are increasingly based upon the athletic and not the academic reputation of the schools concerned (Frenette, 1999). Although such actions are supposedly taken in 'the child's best interests', there is a growing concern that the over-involvement of parents in youth sports may negatively affect the child's immediate and long-term experiences in sports.

The nature and extent of parental involvement in youth sports varies with the age and gender of the child and the culture in which he/she is raised. The influence of parental behavior upon physical activity in children occurs as early as infancy and continues through late childhood and adolescence (Brustad, 1996). Parents are more likely to encourage male infants to participate in physical activity than female infants (Lewko & Greendorfer, 1978, 1982, 1988). Through early and middle childhood, parents socialize children into gender specific sports. Boys are generally socialized into sports and activities that are traditionally perceived as masculine (e.g., rugby and wrestling) and girls are generally socialized into activities and sports that are traditionally perceived as feminine (e.g., gymnastics and dance).

During early and middle childhood many parents encourage their children to participate in adult organized youth sports programs (Rowland, 1992). These programs vary from recreational community sponsored programs (e.g., Kiwanis, Police Athletic League) to more competitive and specialized fee-based programs (e.g., professional gymnastics or figure skating clubs). More than half of US children will have participated in organized sport before the ages of 8 and 9 years (Institute for the Study of Youth Sports, 1978). However, for many children, participation in organized sports programs may begin as early as 4 years of age (Malina & Cumming, In press). Although few studies have examined the influence of parents during the period of adolescence, a number of theorists have suggested that parents and other significant adults may play an instrumental role in the socialization of females out of sports.

Young athletes' experiences in adult organized youth sports are related to their perceptions of parental behavior. Perceptions of parental encouragement and positive support are associated with greater athlete enjoyment and perceptions of competence, and may help foster a special bond between athletes and their parents (Wylleman, De Knop, Ewing, & Cumming, 2001). Competitive youth wrestlers, who perceive greater levels of parental and coach satisfaction with their season's performance, lower levels of maternal pressure and fewer negative maternal performance reactions, and more positive adult sport involvement and interactions, tend to report higher levels of enjoyment (Gould, Eklund, Petlichkoff, Peterson, & Bump, 1991; Gould, Horn, & Spreeman, 1983; Scanlan & Lethwaite, 1986). Similarly, male and female youth basketball players who perceive less parental pressure to participate and excel in youth sports report high levels of satisfaction (Brustad, 1988). In contrast, negative perceptions of parental involvement

are associated with less enjoyment and greater competitive anxiety. Elite level figure skaters who frequently experience pre-competitive lectures and perceive their parents and coaches as controlling, critical, and expectant, report higher levels of competitive stress (Scanlan, Stein, & Ravizza, 1991). Sports burnout is also much more likely to be experienced by talented young athletes who perceived their parents as controlling and making great commitments in terms of both finances and time (Coakley, 1992). In response to such evidence, the American Academy of Pediatrics (2000) identified unrealistic parental expectations, disruptions of family life, and/or exploitation of young athletes for extrinsic gain as major contributors to burnout in youth sports.

Enjoyment and competitive stress play central roles in shaping children's experiences in youth sports. In a survey of over 25,000 youth sports participants in the US, enjoyment was cited as the most popular reason for participating in youth sports (Ewing & Seefeldt, 1996). In contrast, competitive stress has been consistently identified as a motive for discontinuing participation in youth sports (Ewing & Seefeldt, 1996; Klint & Weiss, 1986; Scanlan, Stein, & Ravizza, 1991). As young athletes' perceptions of adult behavior are associated with both enjoyment and competitive stress, it is important that researchers examine the role of the parent in relation to participation motivation in youth sports. Further, it is of equal importance that researchers consider the role of the adults as it relates to current theories of participation motivation.

One of the most influential theories of motivation in the past two decades has been Deci and Ryan's (1985) theory of self-determined motivation. The theory of self-determined motivation assumes that the explanation of motivated behavior must incorporate the analysis of innate needs. Deci and Ryan (1985) propose that intrinsic

motivation is founded upon the need to feel competent, personally causative, and related to one's social environment. These needs are considered innate and are assumed to be distinct from physiological needs, such as hunger and thirst. These needs lead individuals to select activities that are optimally challenging, permit autonomy, self-expression and creativity, and are salient to their social milieu.

Although the needs upon which intrinsic motivation is founded are considered innate, they may be influenced by social factors. In an attempt to explain how social factors may facilitate or inhibit the development of intrinsic motivation, Deci and Ryan developed a 'mini theory' (Frederick & Ryan, 1995) entitled cognitive evaluation theory. The first tenet of cognitive evaluation theory posits that intrinsically motivated activities are by nature autonomous or self-determined. Any environmental stimulus that fosters or inhibits perceptions of self-determination will increase or decrease intrinsic motivation respectively. Cognitive evaluation theory also holds that intrinsic motivation is maintained through perceptions of personal-efficacy. Environmental events that raise or lower perceptions of personal efficacy will lead to positive or negative changes in intrinsic motivation, respectively.

Deci and Ryan's (1985) theory of self-determined motivation deals with both the determinants and consequences of intrinsic and extrinsic motivation. Therefore, it provides an appropriate conceptual framework from which to examine the relationship between parental behavior and participation motivation in youth sports. Accordingly, one would predict that children who perceived their parents as autonomy supportive would experience enhanced intrinsic motivation and would be more likely to continue participating in youth sports. In contrast, children who perceive their parents as

controlling, critical, and non-autonomy supportive would be expected to experience reduced intrinsic motivation and be more likely to withdraw from youth sports participation.

Research in the domain of education has consistently identified a positive relationship between children and adolescents' perceptions of parental autonomy support and self-determined motivation (Vallerand, Fortier, & Guay, 1997). Few studies, however, have examined the motivational influence of adults in youth sports. Further, only a small number of studies have examined the motivational influence of mothers and fathers independently. A study of parental involvement in youth sports in the United Kingdom suggests that although it is the father who generally initiates the child's involvement in sports, it is the mother who supports the child's continued participation in sport (Rowley, 1986). In order to develop a more comprehensive understanding of the relationship between perceptions of parental autonomy and self-determined motivation in youth, it is essential that researchers examine more closely the nature of the relationships between mothers, fathers, sons and daughters

Another environmental factor that has been linked to changes in self-determined motivation is competition. Cognitive evaluation theory (Deci & Ryan, 1985) posits that the presence of competition can either increase or decrease self-determined motivation, through changes in the competitor's perceptions of self-determination or self-competence. The evaluative feedback related to the competitive event (e.g., outcomes, medals, praise, criticism) mediates feelings of self-determination and intrinsic/extrinsic motivation through changes in competitors' perceptions of their own competence. The nature of this relationship, however, is moderated by the competitor's perception of

competitive environment as controlling or not. If the competitor perceives the competitive situation as informational and not controlling, then increased perceptions of competence should promote feelings of self-determination and intrinsic motivation. However, if the competitive environment is perceived as controlling, then increased perceptions of competence will not foster feelings of self-determination or intrinsic motivation. Decreased perceptions of competence, regardless of whether the competitive environment is perceived as informational or controlling are associated with reduced feelings of self-determination and intrinsic motivation.

Deci and Ryan (1985) contend that competition may positively or negatively influence self-determined motivation. The majority of experimental and quasi-experimental research in education and sport, however, has identified a negative relationship between competition and intrinsic motivation. In accordance with the theory of self-determined motivation, one would argue that participants in these studies perceived the competitive environments as controlling and not informational. It is not clear, however, what factors predispose an individual to perceive a competition environment as informational or controlling. To better understand the process through which competition influences self-determined motivation it is imperative that future research seeks to identify and examine many of the personal and environmental factors that may mediate the relationship between competition and self-determined motivation.

A potential mediator of the relationship between competition and self-determined motivation is the child's perceptions of adult autonomy support. Providing young athletes with autonomy support entails allowing them to make choices and decisions with regards to their participation in sport (Vallerand, Fortier, & Guay, 1997). Autonomy

support serves to increase young athletes' self-determined motivation through gains in perceived autonomy and perceptions of self-competence. As such, autonomy support serves to empower the young athlete and provides the opportunity for creativity and self-expression. Individuals who adopt non-autonomy supportive styles control the behavior of others by telling them what to do and how to do it. This approach serves to undermine the self-determined motivation of young athletes by inhibiting perceptions of autonomy and self-competence.

The situation or social context in which an individual acts may influence whether or not they adopt an autonomous style of interaction (Vallerand, Deci, & Ryan, 1987). To the extent that individuals feel that they are being placed under pressure or some forms of external control they are more likely to adopt non-autonomous styles of interaction. It is predicted that individuals who are evaluated, placed under surveillance, or asked to achieve specific deadlines, goals, or rewards will be less likely to adopt autonomy supportive styles of interaction. Research in the context of education (Deci, Spiegel, Ryan, Koestner, & Kaufmann, 1982) has provided some evidence to suggest that an individual's perceptions of the environment as controlling or non-controlling can influence the manner in which he or she interacts with others. In a study of the effects of evaluation on teaching styles, Deci and his associates found that educators who were being evaluated were less likely to adopt autonomy supportive teaching styles than educators who were not being evaluated.

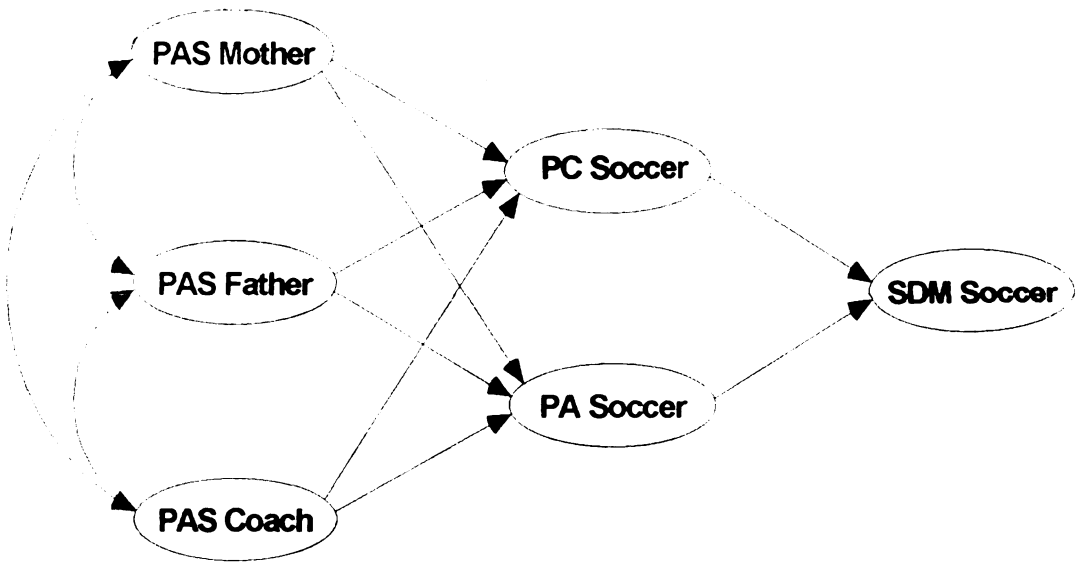
An individual's perception of the motives that others hold can also influence whether or not they adopt an autonomy supportive style of interaction. Individuals who perceive others as being intrinsically motivated are more likely to adopt supportive styles

of interaction. In contrast, individuals who perceive others to be extrinsically motivated are more likely to adopt controlling styles of behavior. In a study of coaching behavior in swimming, Pelletier, Vallerand, and Blais (1985) found that coaches who perceived athletes as being more intrinsically motivated indicated that they would be more likely to adopt an autonomy supportive style of coaching. In contrast, coaches who perceived athletes to be more extrinsically motivated were more likely to adopt non-autonomy supportive styles of coaching.

The parents and coaches of youth participating in elitist or more competitive youth sports programs might be expected to be less autonomy supportive in their behavior than the parents and coaches of youth participating in more recreational sports programs. Parents and coaches of youth participating in more competitive sport programs generally invest a greater amount of time and finances in the development of their children, place a greater emphasis upon the importance of winning and losing, and hold higher expectations of success. Such expectations may also lead the coaches of youth participating in more competitive youth sports programs to perceive higher levels of pressure to succeed and a greater level of public scrutiny. The parents and coaches of youth participating in competitive, in comparison to recreational, sports programs may also perceive their children/athletes to be more extrinsically motivated. All of these factors combined may lead parents and coaches of youth participating in more competitive sport programs to exert a greater degree of control over their children and athletes.

The primary purpose of the current investigation is to empirically test a motivational model of adult influence in youth sports that is founded upon Deci and

Ryan's (1985) theory of cognitive evaluation (See Figure 1). This model is based upon a motivational model of adult influence that was been developed and tested within the context of high school education (Vallerand, Fortier, & Guay, 1997). In accordance with the theory of self-determined motivation, it is predicted that youth soccer players' perceptions of adult (i.e., coach, mother, father) autonomy support will positively predict their perceptions of self-competence and personal autonomy in the domain of soccer. In addition, the hypothesized model predicts that the young soccer players' perceptions of competence and autonomy in soccer will positively predict their self-determined motivation in soccer.



Note. PAS = Perceived autonomy support; PC Soccer = Perceived Competence in soccer; PA Soccer = Perceived autonomy in soccer; SDM Soccer = Self-determined motivation in soccer.

Figure 1.
The hypothesized motivational model of adult influence in youth soccer.

The second objective of this study is to examine gender and the program related differences in self-determined motivation, perceptions of physical and soccer competence, perceived autonomy in soccer, and perceptions of parental autonomy supportive behavior. In accordance with prior research examining gender and program related differences in self-determined motivation in college sports (Fortier, Vallerand, Briere, & Provencher, 1995), it is predicted that girls, and youth participating in recreational soccer programs will report higher levels of self-determined motivation than males, and youth participating in travel programs, respectively. Specifically, it is predicted that the girls and the participants in the recreational programs will report higher levels of intrinsic motivation, identified regulation, and lower levels of introjected regulation, external regulation, and amotivation.

In accordance with the predicted gender and program related differences in self-determined motivation, it is predicted that girls and participants in recreational program will report higher perceptions of personal autonomy, and autonomy support from their mothers, fathers, and coaches. It is also predicted that boys and youth participating in travel programs will report higher perceptions of soccer competence. Although these predictions are not consistent with the hypotheses regarding gender and league differences in self-determined motivation, they are consistent with the observations of prior research investigating gender differences in perceived physical competence. The majority of studies that have examined gender differences in perceptions of physical competence have revealed that boys typically report significantly higher perceptions of physical competence than girls do (Horn, & Harris, 1996).

The third phase of the current investigation attempts to bridge the gap between biological and psychological research examining the relationships between biological maturity status, perceptions of athletic competence and motivated behavior in youth sports. As previously noted perceptions of competence are believed to play an instrumental role in the regulation of self-determined behavior. High perceptions of physical competence are predicted to be positively associated with self-determined behavior in youth sports. Research in the context of youth sports and growth and motor development suggests that the biological maturity status of young athletes, and youth in general, acts as a predictor of performance in a number of tests of physical aptitude.

In addition this phase of the investigation will examine gender and program related differences in biological maturity, and examines the relationships between biological maturity and body mass index. Indices of biological maturation, such as skeletal age, age at peak height velocity, and sexual maturity have consistently demonstrated strong relationships with physical size, body composition, and motor performance (Beunen, Malina, Van't Hof, Simons, Ostyn, Renson, & Van Gerven, 1988; Malina & Bouchard, 1991). Males who are successful in youth sports tend to be advanced or average in their maturational status. The success of the early maturing male is primarily attributable to their greater physical size and a greater proportion of fat free mass, which leads them to outperform their peers in tasks that involve strength, speed, or explosive power (Malina & Bouchard, 1991).

Females who are successful in youth sports tend to be average or delayed in their maturational status. Although late maturation in females is associated with shorter stature and lower body weight, it is also associated with a more linear physique and a

higher proportion of fat free mass (Malina & Bouchard, 1991; Weiss & Glenn, 1995). Maturity related differences in physique and body composition afford an athletic advantage to average and late maturing females, particularly in weight bearing activities, and sports that involve a high degree of aesthetic performance (e.g., figure skating & gymnastics) or muscular endurance.

In accordance with prior research investigating the relationship between athletic competence and biological maturity, it is predicted that male youth soccer players will be biologically more mature for their age than female youth soccer players. Further, it is predicted that the boys participating in travel programs and girls participating in the recreational programs will be more biologically mature for their age than the boys participating in the recreational programs and the girls participating in the travel programs, respectively.

Malina (1988) argues that researchers studying the socialization process in sport must adopt a bio-psychosocial perspective. In support of this position, Malina (1988, p. 94) stated that "Sport may be a social phenomenon, but the biological organism performs within a particular cultural context." Hence, if one is to truly understand participation behavior and performance in sports, it is important to recognize the contribution and interaction of biological, psychological and cultural factors. Few psychologists or sociologists, however, have examined the contribution of biological and maturational factors upon the socialization process in youth sports (Weiss & Glenn, 1995). As maturational status is strongly related to physical and motor competence, it is likely that maturational status might also influence children and adolescent's perceptions and beliefs about their own physical competence.

In accordance with the assumption that biological maturity is related to athletic competence, it is predicted that a relationship will exist between biological maturation and perceptions of competence in soccer and physical activity. Specifically, it is predicted that males who are advanced in their maturational status will hold higher perceptions of their own competence in soccer and physical activity than males who are less advanced in their maturational status. In contrast, it is predicted that a negative relationship will exist between biological maturity perceptions of physical and soccer competence in females. That is, females who are advanced in their maturational status will report lower perceptions of their competence in soccer and physical activity than females who are less advanced in their maturational status.

Changes in physique, body composition and physical ability, associated with the time period following peak height velocity, may alter the magnitude and/or direction of the relationship between biological maturity and perceptions of physical and soccer competence. Rapid gains in body size, fat-free mass, strength, explosive strength, and muscular endurance may accentuate the magnitude of the relationship between biological maturity and perceptions of physical and soccer competence in males. Accordingly, one would predict that the magnitude of the correlations between biological maturity and perceptions of physical and soccer competence would be greater in boys aged above the mean age of peak height velocity.

Rapid gains in body fat free mass and a marked decline in relative strength and muscular endurance may also accentuate the magnitude of the predicted relationship between biological maturity and perceptions of physical and soccer competence in females. In accordance one would predict that the magnitude of correlations between

biological maturity and perceptions of physical and soccer competence would be greater in girls that were aged above the mean age of peak height velocity. In an attempt to address these questions, this study will examine the relationship between biological maturation and perceptions of physical and soccer competence in boys and girls aged above and below the mean ages of peak height velocity.

Finally, in an attempt to examine the relationship between body composition and participation motivation in youth sports, the current study will examine the relationships between relative body composition, as determined by the body mass index (BMI), and perceptions of competence in soccer and physical activity. High proportions of fat mass in males and females is associated with poorer performances on a number of measures of physical activity (Malina & Bouchard, 1991). In accordance, it is predicted that a series of negative correlations will be observed between BMI and perceptions of competence in soccer and physical activity in males and females.

CHAPTER II

LITERATURE REVIEW

Most children and adolescents participate in a wide variety of achievement-related activities including education, sport, music, art, hobbies, and work. Their reasons for participating in these activities, however, may vary. Engagement may occur out of free choice, mandatory legal requirements, and/or the influence of significant others. The explanation as to why individuals participate in achievement-related activities has been characterized by two forms of motivation, namely, intrinsic and extrinsic (Vallerand, & Fortier, 1998).

Individuals are considered intrinsically motivated when they participate in an activity for the pleasures or satisfaction inherent to the activity itself (Deci, 1975). An example of intrinsic motivation in education would be the student who reads the history book because he or she finds it interesting, exciting, or pleasurable. Similarly, the dancer who participates in ballet for the experiences inherent to the activity itself (e.g., movement, physical exertion, and creativity) would be considered intrinsically motivated. This form of motivation is most likely to occur when the activity is perceived as interesting, challenging, providing clear feedback, and permitting autonomy and creativity (Deci, 1975; Deci & Ryan, 1985).

Extrinsic motivation is experienced when an individual engages in an activity for reasons that are not inherently associated with the task (Deci, 1975). In a manner of speaking the extrinsically motivated individual participates in the activity as a 'means to an end'. Such 'ends' might include financial or material rewards, social affiliation or

recognition, or the avoidance of social sanctions and punishments. An example of extrinsic motivation in education would be the student who reads the history book in order to gain favor from his or her parents or teacher or avoid the social repercussions associated with a poor performance (e.g., negative evaluation and punishment). Similarly, the dancer who engages in dance for the purpose of winning trophies or fraternizing with peers would be considered extrinsically motivated. Extrinsic motivation is most likely to occur when the individual perceives the achievement climate to be evaluative, controlling, and when a greater emphasis is placed upon outcome rather than performance (Vallerand, Deci, & Ryan, 1987).

The concepts of intrinsic and extrinsic motivation have received a great deal of attention in the social sciences, particularly in relation to behavioral and psychological functioning in achievement domains. Two distinct approaches have characterized the study of intrinsic and extrinsic motivation. Whereas the first approach has sought to identify contextual, situational, and dispositional factors that predict the development of intrinsic and extrinsic motivation, the second approach has investigated the behavioral and psychological consequences associated with intrinsic and extrinsic motivation. Research adopting the latter approach has focussed upon a diverse range of psychological and behavioral correlates including state anxiety (Baumeister, 1984: Baumeister, Hamilton, & Tice, 1984), cognitive flexibility (McGraw & McCullers, 1979; McGraw & Fiala, 1982) effort (Kruganski, Stein, & Ritter, 1977; Pittman, Emery, & Boggiano, 1982), activity preference (Vallerand & Briere, 1990), and persistence (Olson, Reeve, & Cole 1986).

The Theory of Self-Determined Motivation

Over the last two decades Deci and Ryan's (1985) theory of self-determined motivation has been one of the most influential theories in the study of intrinsic and extrinsic motivation in achievement contexts. This theory deals with both the determinants and consequences of intrinsic and extrinsic motivation and provides a clear conceptual framework from which to integrate theory and research regarding related constructs such as enjoyment, attribution theory and achievement motivation.

The theory of self determined motivation assumes that the explanation of motivated behavior must incorporate the analysis of human needs. Intrinsic motivation is founded upon the need to feel competent (Harter, 1981; White, 1959), personally causative (DeCharms, 1968), and related in their social environment (Deci & Ryan, 1985). As Deci and Ryan (1994, p.7) posited 'people are inherently motivated to feel connected to others within a social milieu, to function effectively in that milieu, and to feel a sense of personal initiative in doing so'. These needs are considered innate and are assumed to be distinct from physiological needs such as hunger and thirst, and lead individual's to select activities that are optimally challenging, permit autonomy, self-expression and creativity, and salient to their social milieu.

Deci and Ryan (1985) propose that an individual's perceptions of competence, causality and relatedness are critical in determining how the social context influences intrinsic and extrinsic motivation. Variations in intrinsic and extrinsic motivation are assumed to be a function of changes in perceptions of self-determination and self-competence. Inputs that are relevant to the initiation and regulation of behavior can serve to either promote or inhibit the perceptions of self-determination and self-competence,

and hence, influence intrinsic and extrinsic motivation. However, the effect that a specific input will have upon intrinsic or extrinsic motivations will be ultimately determined by the individual's perception of that input as controlling or non-controlling. Inputs may be external events such as the offer of a reward or the imposition of a deadline. They can also be internal events such as intrinsic or extrinsic orientations, achievement orientations, causal attributions, thoughts, feelings or memories. Finally, inputs can also be experiential events such as the context or ambience of a situation.

Deci and Ryan (1985) assume that it is the controlling and informational aspects of inputs that determine changes in intrinsic and extrinsic motivation. Inputs that are perceived by the individual as controlling (e.g., competition, scholarships, time deadlines, ego orientation, and material rewards) tend to pressure individuals toward engaging in specific behaviors, and thus, reduce perceptions of self-determination and intrinsic motivation. In contrast, inputs that are perceived as non-controlling (e.g., autonomy support, free choice) foster perceptions of self-determination and promote the development of intrinsic motivation.

The informational component of inputs may also foster intrinsic motivation through perceptions of high self-competence. However, the nature of this relationship is moderated by the individual's perceptions of input as controlling or not. When an individual feels self-determined, the informational or competence related component of an input becomes salient. In such situations positive perceptions of competence are associated with enhanced intrinsic motivation. However, if the individual does not feel self-determined, the informational component of the input is not salient and competence related changes in intrinsic motivation do not occur.

Self-determined motivation theory also posits that multiple dimensions of intrinsic and extrinsic motivation exist (Vallerand et al., 1987). These dimensions are hypothesized to vary in terms of their inherent levels of self-determination and can be ordered along a self-determination continuum from amotivation to intrinsic motivation. Intrinsic motivation operates at three distinct levels, namely, the intrinsic motivation to know, the intrinsic motivation to accomplish, and the intrinsic motivation to experience. The intrinsic motivation to know occurs when one engages in activity for the pleasure and satisfaction associated with the experience of learning, exploring or trying to understand something new. Intrinsic motivation to accomplish is considered the desire to participate in an activity for the pleasure or experience of surpassing one's self or creating something. Finally, intrinsic motivation to experience stimulation is defined as engaging in an activity in order to experience the pleasant sensations associated with participation in the activity.

It was originally believed that extrinsic motivation pertained only to behaviors that were under the control of others and in the absence of self-determination. However, Deci and Ryan (1985) propose that some extrinsically motivated behaviors might be engaged in out of choice. Although an individual may participate in an activity for reasons not inherent to the activity itself, their decision to participate may be self-determined. Deci and Ryan (1985, 1991) identified four different levels of extrinsic motivation that varied in terms of their inherent levels of self-determination. The order of the four types of extrinsic motivation vary across the self-determination continuum, from the lowest to highest, is external regulation, introjected regulation, identified regulation, and integrated regulation.

When a behavior is externally regulated, it is controlled exclusively through external means such as rewards or rules. Children who complete their homework assignment out of fear of punishment from their teacher or parents would be considered, externally regulated. Introjected regulation occurs when individuals begin to internalize their reasons for engaging in a specific behavior. However, the internalization is not truly self-determined as it is still related to external contingencies. This leads to feelings of anxiety and guilt if the individual fails to engage in the activity. An example of introjected regulation would be children who complete their homework out of feelings of duty or guilt. Identified regulation occurs when individuals engage in an activity out of choice and perceives their involvement in the activity as valuable and important. However, the reasons for participating in the activity are still externally oriented. An example of identified regulation would be children who complete their homework because they know that it will help them perform well in their college entrance examinations. Finally, integrated regulation like identified regulation, refers to engaging in an activity out of choice and value. However, the choice is now a harmonious part of the organization of the self. An example of integrated regulation would be children who pass up the chance to play with their friends after school in order to go home and study for college entrance examinations.

Deci and Ryan (1985) identified that a third motivational construct, amotivation, which is crucial to acknowledge if one was to fully understand human behavior. An individual is amotivated when they perceive a lack of contingency between their behavior and outcomes. Hence, these behaviors are neither intrinsically nor extrinsically

motivated. As amotivated individuals perceive no sense of self-determination or competence related to the behavior, they eventually cease conducting the behavior.

Research examining Deci and Ryan's multidimensional conceptualization of intrinsic and extrinsic motivation has provided consistent evidence towards the existence of amotivation, and the multiple dimensions of intrinsic and extrinsic motivation (Vallerand & Fortier, 1998). Furthermore, it appears that amotivation and the multiple dimensions of intrinsic and extrinsic motivation are associated with distinct behavioral and psychological consequences.

Adult Influence upon Self-Determined Motivation in Youth

Adults play instrumental roles in the psychological and behavioral development of children and adolescents, and may be considered salient 'inputs' in the motivational process. As children and adolescents spend a significant amount of time interacting with, and under the tutelage of, adults, it is not surprising that much research investigating the nature and development of self-determined motivation has focused upon the influence of significant adults (e.g., youth sport coaches and music tutors) upon youth.

The theory of self-determined motivation predicts that the intrinsic motivation of children and adolescents in achievement domains may vary as a function of their perceptions of significant adults informational (e.g., parents and educators) as controlling or informational. Youth who perceive the behavior or interactional style of adults as controlling are predicted to perceive a shift in locus of causality from internal to external. This shift is accompanied by a perceived decline in self-determination that leads to the development of extrinsic motivation. In contrast, youth who perceive the behavior of adults as informational and not controlling are predicted to employ an internal locus of

causality, and experience increases in self-determination and intrinsic motivation. The following sections provide a general review of research examining the influence of parents and educators upon children and adolescents' self-determined motivation in academia and sports.

Parental Influence upon Self-Determined Motivation in Education

The majority of research examining parental influences upon motivation in youth has focused on the context of academia. In one of the earliest series of studies to investigate the relationship between parenting style and motivated behavior, Baumrind (1967, 1971) examined the influence of two dimensions of parenting style, firm versus lax control and autonomy versus psychological control, upon the behavior of preschoolers. Parents who were categorized as being high in terms of psychological control and firm control were labeled authoritarian and parents who were categorized as being high in terms of autonomy and firm control were labeled as authoritative. In accordance with the theory of self-determined motivation, the children of authoritarian, in comparison to authoritative, parents were observed as being more withdrawn and more discontented.

In one of the most comprehensive investigations of parental influence upon self-determined motivation in children, Grolnick and Ryan (1989) examined the relationship between three dimensions of parenting style, autonomy support, involvement, and provision of structure, upon aspects of elementary school children's self-regulation and competence. As predicted, parental autonomy support, as rated by the investigators through a one-hour interview with the parent, was found to be positively correlated to the children's self-reports of autonomous self-regulation. Parental autonomy support was

also positively correlated with teacher ratings of the children's levels of classroom adjustment, academic competence, academic achievement, and grades. Maternal involvement, in terms of time spent with the child, was also found to be positively correlated with academic achievement, the teacher's ratings of academic competence, and some aspects of behavioral adjustment. Surprisingly, the father's involvement with the child failed to predict any of the variation in these variables. These results suggest that during the period of elementary education, mothers in comparison to fathers may play a more influential role in the development of academic competence and perceptions of self-determination.

Adopting an alternative approach, Dornbusch, Ritter, Leiderman, Roberts and Fraleigh (1987) investigated the relationship between adolescents' perceptions of parenting styles and academic achievement. As it is the individual's perception of reality, and not reality itself, that influences self-determined motivation, it was predicted that the adolescents' perceptions of the parenting styles would prove to be an equal if not stronger predictor of self-determined motivation than the observer's, or the parents' own perception of their parenting styles. Accordingly, the authors observed that those children with poor academic grades were more likely to report more authoritarian, less permissive, and less authoritative parenting styles.

A more recent investigation conducted by Vallerand, Fortier, and Guay (1997) tested a self-determined motivational model of high school dropout behavior. In line with the reasoning of Deci and Ryan (1985), the model predicted that students' perceptions of autonomy support from parents, teachers and the school authority would influence their perceptions of personal autonomy and academic competence, and their

intrinsic and extrinsic motivation. As predicted, the students' perceptions of autonomy support from parents, teachers and the school authorities were positively correlated with their perceptions of autonomy and competence, and intrinsic motives, and negatively correlated with extrinsic motives. Dropouts, in comparison to the remaining students, reported lower perceptions of autonomy support from parents, teachers and school authorities, and lower perceptions of autonomy and academic competence. Dropouts also reported higher levels of amotivation and external regulation and lower levels of intrinsic motivation and identified regulation. Similar differences were also exhibited in boys when compared to girls.

In an attempt to differentiate between continuing students and dropouts in Danish High Schools, Dohn (1992) examined group differences in the degree to which the students perceived their decisions to enter into high school education was influenced by themselves, their parents, their teachers, and their peers. High school education in Denmark begins at the ages of 15 to 16 and is comparable to junior and senior years in US high schools or junior college in the United Kingdom. In accordance with Deci and Ryan's (1985) theory of self-determined motivation, dropouts, in comparison to the remaining students, reported that their decision to apply for high school was more likely to have been influenced by parental pressure. Surprisingly, dropouts were less likely to identify pressure from teachers as influential toward their decision to apply to high school. However, this may be attributed to lower expectations on behalf of the teachers.

A more recent investigation, conducted by Ryan, Stiller and Lynch (1994), examined the influence of parents, teachers and peers upon students' self-esteem and academic functioning. The authors predicted that the students' perceptions of parental

and teacher relationships, but not peer relationships, would be related to their perceptions of control over academic outcomes, autonomy, engagement, and positive coping. In support of their predictions, the authors observed that students who felt more secure with and more able to utilize parents and teachers reported more positive attitudes toward school and higher levels of self-determined motivation. Students who reported higher levels of parental and teacher emulation also demonstrated more positive school adjustment and higher levels of self-determined motivation. The authors suggested that perceptions of emotional security in adult relationships, and ability to utilize adults for emotional support, were associated with greater autonomy and engagement in high school. These results suggest that adult support, as much as instruction, is critical in determining positive engagement in high school education.

Adopting a novel approach to the investigation of parental influence upon motivated behavior in youth, Grolnick, Frodi, and Bridges (1994) and Frodi, Bridges and Grolnick (1985) examined the longitudinal effects of maternal controlling styles upon the mastery motivation of children aged 12 to 20 months. The mother's degree of control was assessed via a global rating procedure which involved observers making subjective judgments based upon the mothers' responses to interview questions. The results of their studies demonstrated that a negative correlation existed between maternal control and mastery motivation, particularly in terms of task competence and persistence (Frodi et al., 1995). Employing the same design, Grolnick and Ryan (1989) tested the influence of maternal controlling style upon intrinsic motivation and self-regulation in children aged 8 to 12 years. Again maternal controlling style was negatively correlated with intrinsic motivation and self-regulation. These results corroborate Deci and Ryan's (1985) theory

of self-determined motivation and suggest that perceptions of maternal control and parenting style in general may influence self-determined motivation in the early stages of childhood. These results also suggest that parenting styles may influence motivated behavior at early age and emphasize the need to provide autonomy supportive learning environments for infants and pre-schoolers.

Deci, Driver, Hotchkiss, Robbins, and McDougall-Wilson (1993) employed a similar research design to examine the relationship between mothers' vocalizations and the intrinsic motivation of their six and seven year old children to complete a puzzle task involving lego bricks or Lincoln logs. The vocalizations of the mothers were categorized as being controlling, autonomy-supportive or neutral. Intrinsic motivation was assessed behaviorally in terms of time spent on the task during free choice play and as a self-reported measure of how much the child liked the task, and how much fun they had completing the task was rated on a four point likert scale. In line with Deci and Ryan's (1985) theorizing, maternal control was negatively correlated with both the behavioral and self-reported measures of intrinsic motivation. These results again provide compelling evidence to suggest that parenting styles may influence self-determined motivation in childhood.

Grolnick, Ryan and Deci (1991) employed structural equation modeling to test a theoretically based model of children's perceptions of parental style upon self-determined motivation and performance in academia. The children in this study attended grades three, four, five or six. In accordance with the theory of self-determined motivation, the authors hypothesized that three motivational variables (i.e., control, understanding and competence) would mediate the relationship between children's perceptions of parenting

styles and academic performance. The results of their analyses demonstrated that maternal autonomy support and involvement positively predicted the children's perceptions of control, understanding and academic competence. Surprisingly, the children's perceptions of their fathers' parenting styles were not significantly associated with their perceptions of control, understanding, and academic competence. This may be due to the fact that maternal parenting styles are more influential during the period of early childhood. Indeed, descriptive data indicated that children perceived their mothers, in comparison to fathers, as more involved and providing more autonomy support. However, perceived parental autonomy support and involvement were positively related to perceptions of control and academic competence.

Teacher Influence upon Self-Determined Motivation in Education

As indicated in the previous section a number of researchers have identified a relationship between students' perceptions of teaching styles and self-determined motivation. Given their position of authority, it is no surprise that teachers play an instrumental role in the development of self-determined motivation in academia. Deci, Nezlek, and Sheinman (1981) and Deci, Schwartz, Sheinman, and Ryan, (1981) reasoned that students' self-determined motivation in academia was partly a function of the teaching style that was present in the classroom. Specifically, the authors suggested that differences in teaching styles lead to the creation of 'informational' or 'controlling climates' (Deci, Spiegel, Ryan, Koestner, & Kaufmann, 1982, p.852). A controlling teaching style attempts to direct learning through the use of external factors such as grades, evaluations, or other performance related contingencies. In contrast, an informational teaching style attempts to foster learning through the emphasis of choice,

exploration, self-expression and creativity. In accordance with Deci and Ryan's (1985) theorizing it is predicted that a controlling, in comparison to an informational style, will be more likely to undermine self-determined motivation.

A series of studies investigating the relationship between teaching styles and self-determined motivation in academia has provided consistent empirical evidence to suggest that controlling, in comparison to informational, teaching styles are negatively associated with self-determined motivation (Deci, Nezlek, et al., 1981, Deci, Schwartz, et al., 1981; Deci et al., 1982; Noels, Clement, & Pelletier, 1999; Ryan & Grolnick, 1986). Students in autonomy, in comparison to control, oriented classrooms demonstrated greater increases in self-determined motivation. Teachers in the control oriented conditions talked more, were more critical of the students, gave more commands, and allowed less opportunity for choice (Deci et al., 1982). Furthermore, students of autonomy oriented and low-aggression teachers demonstrated greater creativity, effort and standards of performance in their schoolwork (Ryan & Grolnick, 1986). Finally, children who perceived the classroom climate as autonomy oriented reported greater internal control over outcomes, and less control by powerful others (i.e., teachers, administrative staff).

Employing an experimental design, Grolnick and Ryan (1987) compared the effects of two directed (controlling or non-controlling) and one non-directed teaching style upon learning and self-determined motivation and performance in reading tasks. The children (5^{th} graders) in the controlling and non-controlling directed, in comparison to non-directed learning conditions, demonstrated greater interest and greater conceptual understanding of the task. However, the children in the controlling condition experienced more pressure and demonstrated a greater decline in rote learning over an eight-day

period. These results suggest that although both controlling and non-controlling teaching styles may foster learning, the non-controlling style may promote a more stable conceptual understanding.

Employing Deci and Ryan's (1985) theoretical framework, Norwich (1999) explored adolescents' reasons for learning and behaving appropriately, and not learning and not behaving appropriately, in English, math, and other subjects. The students frequently identified introjected reasons for learning and behaving appropriately. These reasons were associated with parental involvement. In contrast, intrinsic and teacher-related introjected reasons for learning and behaving appropriately were less frequently identified. These results suggest that although teaching styles may lead to extrinsic reasons for learning, a primary source of control may be a sense of obligation to one's parents.

Finally, Sheldon and Biddle (1998) employed Deci and Ryan's (1985) theory of self-determined motivation as a theoretical framework from which to discuss and examine a number of current issues in education (e.g., educational standards, accountability and school reform). In their review the authors suggested that many present reforms in education were likely to promote the adoption of controlling rather than informational styles of teaching. Teachers faced with constant evaluations, and performance standards would be more likely to experience pressure and control and resort to teaching styles that were superficial, performance oriented, less flexible and less sensitive to the needs of individual students. The authors continued to predict that such methods would lead to reductions in self-determined motivation, and creativity and flexibility in learning. As a recommendation the authors posited that educators needed to

develop alternative strategies which placed a greater emphasis upon 'trust, teacher professionalism, and responsive education for students' (Sheldon & Biddle, 1998, p.164).

Adult Related Determinants of Self-Determined Motivation in Young Athletes

More recently a number of researchers have attempted to extend Deci and Ryan's (1985) theory of self-determined motivation to the context of youth sports. A primary focus in much of this research has been the influence of adult behavior (i.e., parents and coaches) upon self-determined motivation in youth. Vallerand et al. (1987) identified two primary sources of influence upon self-determined motivation in youth sports. The first source deals with the nature of the coach or parent's interpersonal style (controlling vs. informational). The second source deals with the factors that influence the coach or parent's interpersonal style. To the extent that coaches or parents feel pressured, they are predicted to adopt a controlling style. Sources of pressure that may influence the interpersonal style of youth sport coaches include competition, social expectations, job security, and even personal pride.

In an attempt to test the theory of self-determined motivation in the context of sport, Vallerand and Pelletier (1985) examined the relationship between intrinsic motivation, self-esteem and perceptions of coaching styles in competitive youth swimming. Analyses revealed that athletes' perceptions of their coaches' interpersonal styles were related to their intrinsic motivation and self-esteem. Specifically, athletes that perceived their coach as having an informational, in comparison to controlling style, reported higher levels of intrinsic motivation and self-esteem. However, the coaches' perceptions of their own interpersonal styles did not relate significantly to the athletes' reported levels of intrinsic motivation. This result supports Deci and Ryan's (1985)

contention that it is the individual's perception of reality, and perhaps not reality itself, that is instrumental in determining motivated behavior.

In a related study Pelletier and Vallerand (1985) presented male and female teenage swimmers with descriptions of three hypothetical swimming coaches. The swimmers were then asked to rate their predicted levels of self-determined motivation if they had each coach. Accordingly, the swimmers predicted that they would have the highest levels of intrinsic and self-determined motivation if they had the informational and not the controlling coach.

Adopting an alternative approach Pelletier, Vallerand, and Blais (1985) examined the effect of athletes' motivational orientations upon the behavior of coaches. In their study, 29 youth swim coaches were asked to read five hypothetical scenarios, each of which depicted an athlete displaying a different type of motivational orientation toward swimming. Motivational orientations varied in terms of the degree of self-determination involved. For each situation the coaches were asked to rate how they would solve an interpersonal conflict involving themselves and the athlete. The results of the study indicated that the motivational orientation of the athlete influenced the coaches' behavior. Specifically, coaches adopted an informational approach with athletes they perceived to be self-determined. In contrast, coaches employed controlling strategies with athletes that they perceived as low in self-determination. These results suggest that the nature of the relationship between the coach and the athlete is dynamic. Just as the coach may influence the motivated behavior of the athlete, the athlete may influence the interpersonal style adopted by the coach.

Although only a limited number of studies have directly tested Deci and Ryan's (1985) theory of self-determined motivation in the context of youth sports, there is a growing body of evidence to support the contention that controlling parental and coaching styles may influence motivated behavior and affect in this domain.

In a review of the parenting process in youth sport, Lee (1993, p. 44) described the nature and consequences of parental 'over-involvement' in youth sports. Lee described two types of parents that were characteristically over-involved in youth sport, namely, excitable and fanatical parents. Excitable parents were typically supportive but tended to get 'caught up in the heat of the moment' leading to embarrassment on behalf of the child (Lee, 1993, p.44). In contrast fanatical parents tended to be controlling, imposing, outcome-oriented, never satisfied, and had a desire for their child to be a 'sporting hero or heroine' (Lee, 1993, p.45). Although both types of parents could adversely effect the youth sport experience, fanatical parents posed the greatest risk in terms of continued participation in sports. This approach served to undermine the intrinsic motivation of the children, turning 'play into work' (Lee, 1993, p.44). Children of fanatical parents experience greater parental pressure, argue more frequently with coaches and officials, experience problems with eating and sleeping, show less effort and enjoyment during training sessions, and are more likely to withdraw from participating in youth sports.

Babkes and Weiss (1999) investigated the relationship between intrinsic motivation, enjoyment and perceptions of parental behavior in youth soccer. Players that perceived their mothers as positive role models, as having more positive beliefs about their soccer competency, and as responding positively to successful sport performances,

reported greater enjoyment, a greater preference for internal sources of competence information, preferred optimal challenges, and had higher perceptions of their own competence in soccer. Children's perceptions of their father's influence resulted in similar findings. However, children who perceived greater involvement from their fathers in terms of game attendance and instruction, and perceived less pressure to perform, reported greater perceptions of perceived soccer competence and enjoyment.

Investigating factors that contribute toward burnout in youth sport, Coakley (1992) conducted a series of fifteen informal interviews with adolescent athletes that had been identified as cases of burnout. From these interviews, Coakley (1992, p.271) developed a model that conceptualized burnout as "a social problem grounded in forms of social organization that constrain identity development during adolescence and prevent young athletes from having meaningful control of their lives". Lack of control in the lives of the athletes was grounded in a combination of factors including the actions of parents, coaches, and the athletes themselves. Through the decision to pursue a career as an elite athlete, the athletes had subverted the control of their lives to their parents and coaches. The author was unable to discern whether or not the parents and coaches had "subtly coerced the athletes to maintain their commitment to sport" or had simply responded to what the athletes wanted. However, six of the fifteen athletes reported instances of parents using guilt to motivate them. Athletes whose parents and coaches had made considerable commitments of time and resources most frequently expressed a loss of autonomy. These athletes typically came from middle and upper income families. Ten of the fifteen athletes interviewed identified how their parents had positively influenced their experiences in sport. However, seven of those ten athletes also expressed

concerns about the future of their relationships with parents now that they were no longer involved in youth sports.

Amorose and Horn (2000) examined the relationship between intrinsic motivation and perceptions of coaching behaviors in collegiate sport. In accordance with Deci and Ryan's (1985) theory of self-determined motivation, the authors observed that those athletes reporting the highest levels of intrinsic motivation perceived their coaches to exhibit a 'leadership style' that emphasized training and instruction and was high in democratic behavior and low in autocratic behavior. In addition, the athletes reporting high levels of intrinsic motivation also perceived that their coaches provided high frequencies of positive and informational feedback and low frequencies of punishment-oriented and ignoring behavior.

A study investigating the relationship between preferred teaching styles and levels of satisfaction with leadership and personal outcomes in Japanese and Canadian college level athletes suggested that the influence of teaching styles upon motivated behaviors may vary across different cultures (Chelladurai, Imamura, Yamaguchi, Oinuma, & Miyauchi, 1988). Specifically, the Japanese, in comparison to the Canadian athletes demonstrated a greater preference for autocratic leadership behavior and social support. In contrast, the Canadian athletes reported a greater preference for more training and instruction and greater satisfaction with both personal outcomes and leadership. In a series of related studies, Anshel and associates (Anshel, 1990; Anshel & Sailes, 1990) reported that black in comparison to white athletes participating in US collegiate athletics believed that their coaches were more controlling prior to competition, less sensitive to their needs, and less supportive and fair. These results suggest that it may be important to

account for cultural, racial and individual differences when assessing the influence of teaching or parenting styles upon behavioral constructs such as self-determined motivation.

A number of studies have examined the influence of parenting styles upon participation in physical activity. Anderssen and Wold (1992) examined the influence of parental and peer support upon Norwegian adolescents' self-reported levels of physical activity during their leisure time. Perceived parental and peer influence were assessed in terms of direct support and direct help to participate in physical activity and perceived value of participating in physical activity. Perceptions of parental and peer direct support were positively correlated with the students' self-reports of time spent doing moderately vigorous physical activity. However, the authors observed that perceived parental direct support and direct help served as stronger predictors of activity related behavior in males. In contrast, perceived peer direct help served as the strongest predictor of self-reported physical activity for females.

Goudas and Biddle (1996) observed that adult (i.e., parents, physical educators, and coaches) encouragement to participate in physical activity was positively related to secondary school children's (ages 13-14 years) intentions to participate in physical activity and actual physical activity rates. In line with the reasoning of Deci and Ryan (1985), the researchers reported that perceptions of physical competence acted as a mediator of adult encouragement upon both intentions and actual activity.

Kimiciek, Horn, and Shurin (1996) observed that US children's (11 to 15 years of age) perceptions of their parents' beliefs regarding their physical competence were unrelated to their self-reported measures of moderate to vigorous physical activity.

However, Sallis, Alcaraz, McKenzie, and Hovell (1999) indicated that parental involvement, in terms of frequency of transportation to activity locations, explained a significant proportion of variance in the physical activity of US elementary school students. In contrast, measures of parental encouragement, financial support, and participation with the child did not significantly predict any of the variance in US children's levels of physical activity. This may be due to the fact that the authors assessed the parent's and not the child's perceptions of these factors.

Researchers have also examined the role of parental influence in regard to participation and withdrawal from youth sports. Brown (1985) observed that social, and in particular, parental support was positively related to continued participation in competitive female youth swimming. Perceived parental and peer support, in terms of encouragement and involvement, were positively associated with continued involvement in competitive swimming.

Hellstedt (1987) developed a model for understanding the nature of the relationships between the young athlete, their parents, and their coach. In this model the author drew a distinction between three types of parents, namely, those that were overinvolved, underinvolved, and moderately involved. Hellstedt described the overinvolved parents as 'a problem for coaches' and 'meddling, overprotective, and getting in the way of the coach's relationship with the athlete (Hellstedt, 1987, p.151). Further, over-involved parents focused primarily upon competitive outcomes and tended to spend large amounts of time, money, and emotional energy in order to insure that their children become competent in their sport. Behaviorally, the author characterized the overinvolved parents as more controlling, more confrontational, more likely to attend

practices and competition, more likely to coach their children from the sidelines, and having unrealistic expectations of their child. Hellstedt continued to suggest that the children of overinvolved parents were more likely to experience athletic burnout, withdraw from sport or develop the trait of high anxiety.

In a subsequent study Hellstedt (1990) investigated the relationship between perceptions of parental performance appraisal, pressure to compete and continue participation, and affective responses in competitive youth skiers. The author observed that the majority of male and female youth skiers perceived moderate to excessive parental pressure to compete and continue their participation in skiing. However, most of these athletes perceived the pressure as positive and supportive, not negative. The author did identify a small sub-group that reported experiencing excessive pressure from their parents and perceived this pressure as negative.

In response to concerns regarding negative parental influence in competitive youth tennis, DeFrancesco and Johnson (1997) compared athletes' and parents' perceptions regarding the importance of winning and losing, sustaining effort during competition and related sport behaviors. The results of the study indicated that athletes in comparison to parents were significantly more upset following losses in which they had not tried their hardest. Further, in the same context the athletes perceived their parents as being significantly more upset than their parents reported. After winning a tough match, athletes rated themselves as being happier about the outcome than their parents perceived them to be. Finally, approximately a third of the athletes reported that their parents had caused them embarrassment during tennis matches. These results suggest that parental

behavior can negatively influence children's experiences in youth sports. However, children's perceptions of their parents, and vice versa, may not always correspond.

Power and Woolger (1994) examined the relationship between parenting behavior and motivated behavior in competitive youth (aged, 6-14 years) swimming. Mothers and fathers of the swimmers completed questionnaires regarding their child-rearing practices and parents, coaches, and the children completed questionnaires regarding the child's enjoyment, effort, competitiveness, commitment, and ability. The authors observed that the parental support provided by the mothers and fathers was positively and significantly correlated with the parents' perceptions of the child's enthusiasm and ability, but not the child's or coach's perceptions. Enthusiasm for participating in swimming, as reported by the children, demonstrated a curvilinear relationship with parental directive behavior and performance outcome goals. Specifically, the children of parents reporting moderate levels of directive behavior and performance outcome goals reported the most enthusiasm for participating in swimming. This observation suggests that the relationship between directive or controlling behavior upon self-determined motivation may not be as simple or linear as predicted in Deci and Ryan's (1985) theory of self-determined motivation. Indeed, some degree of directive behavior may be essential in communicating a sense of parental interest and involvement to the child. A difference between mothers and fathers was observed in regard to the effects of modeling behavior (i.e., participating in swimming related activities with the child) on enthusiasm. Whereas mother modeling was positively associated with enthusiasm for boys and girls, father modeling was negatively associated with the boys reported enthusiasm for swimming. This observation

suggests that gender of the child and the parent may significantly influence the nature of the relationship between parental behavior and children's experiences in youth sports.

In an attempt to further identify aspects of parental behavior that contribute to experiences in youth swimming, Lee and MacLean (1997) observed that the discrepancy between the athletes' perceived and desired levels of parental control predicted the amount of pressure they experienced. Specifically, excessive pressure, as measured by the discrepancy between the amount of pressure experienced and the amount of pressure desired, was positively associated with the discrepancy between the amount of parental control the swimmers perceived and the amount of parental control they desired. These results suggest that the pressure an athlete experiences is as much determined by their own tolerance for pressure and directed behavior as it is by the behavior of their parents. Further, these results identify the need to account for both individual and environmental factors when investigating individual differences in motivated behavior. In support of this contention, Hellstedt (1995, p.122) stated that what one athlete may perceive as positive encouragement another athlete may perceive as 'negative, disabling and damaging'.

As part of the 'Training of Young Athletes Study', Rowley (1986) conducted a series of over 40 interviews with competitive young athletes and their parents. Rowley (1986, p.93) concluded that parents of young athletes performed two primary roles, namely, 'socialization and support'. Most parents played an instrumental role in socializing their children into sports. However, their reasons for encouraging their children to begin participating in sports varied. Some parents encouraged their children to participate in sports because they or a significant other felt their child demonstrated

natural talent for a given sport. In contrast, some parents did not see their children as athletically gifted but wanted them to become 'good' (Rowley, 1986, p.95).

When a child begins participating in a sport or activity, parents generally assume a supportive role. Rowley (1986) defined three specific forms of support that parents provided, namely, emotional, financial and provisionary. Emotional support was described in terms of discussing tactics, analyzing victories and defeats and 'watching out for cheats' (Rowley, 1986, p.96). A number of athletes reported that the failure of themselves and their parents to separate themselves emotionally during training and performance situations lead to an emotional over-involvement. Such involvement resulted in many athletes feeling guilty and stressed, particularly following poor performances or losses. Parents of children who initiated their own involvement in sport felt it was their responsibility to 'evaluate the scale of future sports involvement, and decide how much they should push, persuade, or support the young athletes' fantasies or sporting objectives' (Rowley, 1986, p.96). This lead many young athletes to report that their parents only viewed them as athletes and not individuals.

Parental support also consisted of financial and provisionary support. Despite the considerable financial demands many parents experienced supporting their children, none complained about the costs. In contrast, a number of parents and athletes complained about the consequences (e.g., marital disharmony, disruption to family life, guilt, loss of free time) associated with providing provisionary support (e.g., travel to and from competition and training) to the athletes. The degree to which the provisionary support disrupted family life was dependent upon the nature of the sport activity and the degree

of training commitment. Although fathers were most instrumental in initiating involvement in sport, mothers were most instrumental in providing provisionary support.

Scanlan and Lethwaite (1986) reported that competitive youth wrestlers' (aged 9-14 years) perceptions of parental influence were related to enjoyment. Specifically, wrestlers who perceived greater levels of parental and coach satisfaction with their season's performance, lower levels of maternal pressure and fewer negative maternal performance reactions, and more positive adult sport involvement and interactions, reported higher levels of enjoyment. Similarly, Scanlan, Stein, and Ravizza (1991) reported that parental and coach behavior was related to perceptions of competitive stress in elite level youth figure skating. Specifically, controlling behaviors, pre-competitive lectures, criticism, and high expectations were positively associated with perceptions of competitive stress.

Finally, in a series of retrospective interviews with world class athletes, Hemery (1986) noted that the majority of the athletes stated that their parents provided them with a supportive, stable, secure, and encouraging environment and did not pressure them. Although the athletes interviewed represented a very select sample of the general population, the interviews provided some evidence to support the contention that perceptions of parental autonomy supportive behavior are associated with positive experiences in sport (Lee & MacLean, 1997).

Influence of Competition upon Self-Determined Motivation in Sport

Cognitive Evaluation Theory (Deci & Ryan, 1985) posits that competition can either increase or decrease self-determined motivation, depending upon the perception of the competitor. Vallerand, Gauvin, and Halliwell (1986, p. 367) define competition as "a

social event that can provide the individual with competence/incompetence information because social comparison processes are very prominent". The competitive situation may influence self-determined motivation through changes in the competitor's perceptions of their competence and/or locus of causality. An individual who perceives the competitive environment as controlling will develop an external locus of causality, will feel less self-determined and will experience reduced intrinsic motivation. In contrast, an individual who perceives the competitive environment as autonomy oriented should develop an internal locus of causality, increased feelings of self-determination and an increase in intrinsic motivation. Evaluative feedback related to the competitive event (e.g., outcomes, medals, praise, criticism) may also mediate feelings of self-determination and intrinsic/extrinsic motivation through changes in the individual's perceptions of self-competence. Specifically, increased perceptions of competence should promote feelings of self-determination and intrinsic motivation. Likewise, decreased perceptions of competence should inhibit feelings of self-determination and intrinsic motivation.

The first experimental study to investigate the effect of competition upon intrinsic motivation was conducted by Deci, Betley, Kahle, Abrahams and Porac (1981). In this study college students performed puzzle tasks in the presence of a same-sex confederate. The participants were randomly assigned to either a competitive or control condition. Participants in the competitive competition were instructed to compete against the confederate on the same puzzle task. Participants in the control condition were simply told to perform the task as quickly as they could. Following completion of the task, the participants in the competitive condition demonstrated less intrinsic motivation to participate in the task as measured by time spent on the task during free play.

The observed effect of competition upon intrinsic motivation has been replicated in a number of subsequent studies and with distinct populations. Vallerand, Gauvin, and Halliwell (1996) assessed the effect of zero sum competition (i.e., competition in which the rewards are not equally distributed) upon self-determined motivation to participate in a stabilometer task. Children between the ages of 10 and 12 years were informed that they would receive a one-dollar reward if they surpassed a pre-determined best performance standard. Failing to surpass this standard did not mean that they had performed poorly, only that they had not set the best performance. Irrespective of performance, participants were randomly allocated to winning or losing conditions. Following completion of the task the participants in the winning condition demonstrated marginally greater intrinsic motivation for the task, as measured by time spent on the task during free play.

Comparing self-determined motivation in competitive and recreational athletes from two Canadian Junior colleges, Fortier, Vallerand, Briere and Provencher (1995) noted that competitive athletes reported less intrinsic motivation to experience stimulation and less intrinsic motivation to accomplish things than recreational athletes. In contrast, competitive athletes reported more identified regulation and amotivation than recreational athletes. Although the authors observed that female athletes reported lower levels of external regulation and amotivation than male athletes, no significant gender by sport structure (i.e., competition, recreation) interaction was observed.

In a position statement regarding intensive training and specialization in young athletes, the American Academy of Pediatrics (2000) identified the demands of high level competitive sports as a potential source of physical and psychological stress in young

athletes. The requirements associated with competing at the highest level create a constant pressure for athletes to "train longer, harder, more intelligently and, in some cases, at an earlier age" (American Academy of Pediatrics, 2000, p.154). To meet these demands, the young athlete may have to seek social and financial support from significant adults (e.g., parents and coaches). As previously indicated this decision may lead to disempowerment and a subsequent decline in feelings of self-determination and intrinsic motivation.

Biological Maturity and Perceptions of Physical Self-Competence

To gain a comprehensive understanding of why children and adolescents choose to participate in or withdraw from sports it is important to acknowledge the contribution and interaction of psychological, social and biological factors (Malina, 1988). Although a great number of studies have examined the influence of psychological and social factors upon participation behavior in youth sports, few have addressed the influence of biological factors or maturational status (Weiss & Glenn, 1995). This discrepancy is perhaps due to a number of factors. First, practitioners in the domains of exercise and sport psychology and sport sociology tend to receive the majority of their training in the social sciences and not the biological sciences. Secondly, traditional methods for assessing biological maturity (e.g., skeletal maturation, stages of sexual maturity) generally involve specialized knowledge, skills, tools, or the use of invasive procedures.

Research employing a variety of indices of biological maturation has consistently identified significant relationships between physical maturity and performance on a number of measures of physical aptitude including strength, aerobic power, speed, and explosive power (Malina & Bouchard, 1991). Similarly, research has consistently

reported a strong relationship between maturational status and measures of body composition, body size, and physique. Typically, males that are advanced in their maturational status are taller, heavier, and have a greater proportion of fat free mass and excel in tasks that involve strength, speed, or explosive power (Malina, 2000). Females that are advanced in their maturational status are also generally taller and heavier than females that are average or delayed in their maturational status. However, early maturing females tend to have a greater proportion of fat mass, a less linear physique and perform more poorly in tasks that involve cardiovascular endurance or weight bearing (Malina & Bouchard, 1991).

Maturity related variance in physical aptitude, body composition and physique might influence young athletes' perceptions and beliefs about their own physical aptitude and roles in society. Males that are advanced in their maturational status may perceive themselves as more competent in the physical domain. Males that are delayed in their maturation may perceive themselves as being less competent in the physical domain. In contrast, early maturing females may perceive themselves as being less competent in the physical domain and late maturing females may perceive themselves as being more competent. The maturational status of the young athlete may also influence the nature of their relationship with significant others (e.g., parents, coaches, and peers). Perceptions of competence may influence young athletes' decisions to participate in or withdraw from specific sports or physical activities. In addition, social expectations associated with maturational status may also influence young athletes participatory behavior in sport and physical activity. Malina (2000) suggests that early maturing females may be socialized away from sports participation. As average or late maturing females have not yet

reached an advanced maturational status, it is more likely that they are socialized to remain in sport. Early maturing males may also be more likely to be encouraged to participate in physical activities, particularly those that require a high degree of strength, speed or physical contact. In contrast, late maturing males may be dissuaded from participating in such activities and encouraged to participate in alternative activities.

As of present no studies have examined the relationship between biological maturity and perceptions of physical or sport specific competence. A number of studies, however, have examined the relationship between biological maturity and perceptions of the self. Lackovic-Grgin, Dekovic, and Opacic (1994) observed that early maturation in adolescent females was associated with higher levels of self-esteem. The strongest predictor of self-esteem, however, was the quality of the interaction between mother and daughter. In contrast to the observations of Lackovic-Grgin et al. (1994), Wade, Thompson, Tashakkori, and Valente (1989) found that early maturation in female adolescents was associated with lower levels of self-esteem. Similarly, Ulman (as cited in McGrory, 1990) reported that early maturation in female adolescents was associated with higher levels of depression. In contrast, research conducted by Simmons, Blyth, and McKinney (1983) found that maturational status was not significantly related to the global self-image of adolescent females. Similarly, Brack, Orr, and Ingersoll (1988) found that self-esteem of males and females did not vary significantly across Tanner's five stages of physical development.

In a review of studies examining the growth and maturational status of young athletes, Malina (1994) identified a number of trends regarding maturational status and sports participation. In general, male athletes tend to be of an advanced or average

maturational status. However, this pattern varies with race, nations, chronological age, competitive level, and the nature and demands of the sport. In sports that emphasized stature (e.g., volleyball, basketball), speed (e.g., sprints, baseball, soccer) or involved a relatively high degree of contact (e.g., football), males tended to be of advanced or average maturational status, particularly during late adolescence. This trend may reflect the more physical nature of these sports during the period of late adolescence. Males participating in aesthetic sports such as gymnastics, figure skating, and ballet tended to be shorter in stature, lighter, and delayed in their maturational status. Female athletes (e.g., basketball, volleyball, distance running, gymnastics, ballet, figure skating, and tennis) tended to be of average or delayed maturational status.

A number of studies have examined the height, weight, and maturational status of youth soccer players. Unfortunately, the vast majority of these studies have been limited to male athletes. In general, the heights and weights of youth soccer players fluctuate around the median from childhood through the age of 15 years (Malina, 1994). Male youth soccer players also tend to be of an average maturational status. However, a recent series of studies involving Portuguese youth soccer players playing at the national level reported that these athletes tended to be of an average or advanced maturational status.

Malina, Pena Reyes, Eisenmann, Horta, Rodriguez, & Miller (2000) examined the maturational status of 135 elite Portuguese male soccer players aged 11 to 16 years. In this investigation maturational status was determined by comparing skeletal age with chronological age. A series of comparative analyses suggested that the sport of soccer might systematically exclude late maturing males and favor males of an advanced or average maturational status. The proportion of late maturing males participating in

soccer decreased with age. The percentage of late and early maturing males aged between 11 and 12 years were equal (21%). However, there were a greater percentage of early in comparison to late maturing males in the 13 to 14 year old (late maturers=7%; early maturers=38%) and 15 to 16 year old (late maturers=2%; early maturers=65%) age groups. Studies, of Belgian (Vrijens, & Cauter, 1985), Italian (Mazanti, Tassanari, Bergamaschi, Nanni, Magnani, Ghini, Pini, Amendola, Drago, & Cacciari, 1989), Mexican (Pena-Reyes, Cardenas-Barahona, & Malina, 1994), and Japanese (Satake, Okajima, Atomi, Asami, & Kuroda, 1986) male soccer players suggest that an equal proportion of early and late maturers are represented between 10 and 13 years of age (Pena Reyes, Eisenmann, Horta, Ribiero, Aroso, & Malina, 2000). However, there was an increase in the proportion of early maturing males in the older age groups (i.e., 14 years of age and above). This trend may reflect the more physical nature of soccer in the older age groups.

Employing the same population of Portuguese youth soccer players, Pena-Reyes, Eisenmann, Horta, Ribiero, Aroso, and Malina (2000) examined the interactive and independent effects of body size, stage of sexual maturation, and years of training upon aerobic resistance, speed, and explosive power. Regression analyses demonstrated that 16 to 50 percent of the variances in performance were attributable to variation in body size, stage of sexual maturation, and years of training. In light of these observations one might predict that factors such as body size, maturational status, and experience might predict variance in perceptions of physical and soccer competence.

Presently, only one study has examined the biological maturity and physical size of female soccer players. Siegel (1995) examined the growth and maturity of status of

female soccer players from late childhood through early adulthood. All of the participants in Siegel's study participated in girls' travel soccer and can therefore be considered to be at the elite level of competition. The heights and weights of the female soccer players were, on average, marginally above the median for their age. This observation was relatively consistent across the age groups and may reflect the physical demands associated with more competitive female soccer programs. Greater height and mass, particularly when greater mass is associated with a greater proportion of fat free mass, may afford an advantage in competitive female soccer. To estimate the biological maturity of the female soccer players, Siegel asked the athletes to recall their age at menarche. Mean age of menarche for the 63 girls aged above 14 years was 12.9 years. This value is comparable to the mean age of menarche in white girls living in the US (12.8 years; Malina & Bouchard, 1991) and suggests that female soccer players tend to be average in their biological maturity status.

In accordance with prior research investigating the maturational status and physical performance of female athletes and soccer players (Malina, 1994, Siegel, 1995), it is predicted that the female soccer players will be average or delayed in the biological maturity status, particularly during the period of late adolescence. Further, it is predicted that girls participating in more competitive youth soccer programs (i.e., travel soccer) will be less maturationally advanced than girls participating in more recreational programs.

Conclusions

A review of the literature examining the influence of parents and educators upon children and adolescents' self-determined motivation in achievement contexts provides

consistent evidence to support a number of key principles of Deci and Ryan's (1985) theory of self-determined motivation. As predicted, parents and educators act as powerful social agents who play a significant role in influencing the self-determined motivation of youth. Parental or educational climates that are perceived as autonomy supportive and providing choice and positive and contingent feedback are associated with the development of self-determined motivation. Such a motivational climate leads to important achievement related consequences, such as increases in performance, effort, persistence, enjoyment and satisfaction (Vallerand, & Fortier, 1998).

The review of literature also provides consistent evidence to suggest that parenting and teaching styles may influence self-determined motivation throughout the lifespan, from early childhood (Grolnick, et al., 1994) through late adolescence (Norwich, 1999). The stability of this relationship across the lifespan helps substantiate Deci and Ryan's (1985) contention that the needs to feel self-determined, effective, and related in the social milieu are indeed innate. Further, the observed influence of parental behavior upon self-determined motivation during the periods of infancy and early childhood highlights the importance of providing autonomy oriented achievement climates at an early age.

Despite the overwhelming evidence to suggest that non-autonomous and evaluative climates may detrimentally affect self-determined motivation and performance, policy makers in education and youth sports continue to emphasize the importance of performance standards, early specialization, accountability, incentive systems, competition, and the resurrection of traditional teaching methods. This paradox is representative of the changing face of education and youth sports. Schools and

national sporting bodies are less concerned with the education of students and more concerned with attainment of national required performance standards and placement in league tables of academic or sporting excellence. As previously indicated such measures pressure teachers into adopting superficial and controlling teaching strategies that focus upon the performance outcomes and not conceptual understanding. In the UK such pressures have even lead teachers to exclude borderline students from taking examinations in order to maintain high pass/fail ratios. In light of this paradox it is important that future research seek to further examine administrative factors that may lead educators to adopt controlling or authoritarian styles of teaching. Furthermore, bureaucrats and policy makers need to be made aware of the negative implications and long-term consequences associated with the development of such learning environments. As identified by Sheldon and Biddle, (1998, p.176), policy makers need to be made aware that 'most students want to learn and most teachers want to teach'.

To better understand the influence of adult behavior upon participation motivation in youth sports, it is imperative that researchers examine the influence of controlling and non-controlling behavior in adults. At the present time only a few studies have employed Deci and Ryan's (1985) theory of self-determined motivation to examine the influence of parental behavior upon motivation in youth sports. Further, the majority of these studies have failed to examine the influence of mothers and fathers upon self-determined motivation in youth separately. One of the primary objectives in the current investigation is to examine how the self-determined motivation of young soccer players is related to their perceptions of autonomy support as provided by their mother, father, and coach.

The review of literature also revealed a consistently negative relationship between competition and self-determined motivation. However, the majority of this research has been conducted in a laboratory context using novel tasks. Whether or not a negative correlation between competition and self-determined motivation exists in the context of youth sports is as of yet unclear. Again, this question is addressed in the current investigation.

Another objective of the current investigation is to examine gender differences in self-determined motivation in youth sports. As previously indicated, female college athletes reported higher levels of self-determined motivation than males (Fortier, et al., 1995). Whether or not such differences exist in the context of youth sports is unknown. In an attempt to address this question and further examine potential sources of gender variation in self-determined motivation, the current study will compare self-determined motivation and perceptions of adult autonomy supportive behavior in male and female youth soccer players.

The final phase of the investigation attempts to bridge the gap between biological and psychological variables as predictors of motivated behavior in youth soccer. A review of literature concerning the biological maturity of young athletes provides consistent evidence to suggest that gender differences in biological maturity exists in youth sports. Males that are successful in youth sports tend to be of an advanced maturational status. In contrast, females that are successful in youth sports tend to be of a delayed maturational status. The nature and demands of the sport, however, may moderate the nature of this relationship. The majority of the research suggests that male youth soccer players tend to be of an average maturational status. However, those males

participating in the elite programs, particularly after the age of 13 years, tend to be advanced in their maturational status. Although preliminary data suggests that female youth soccer players tend to be average in their maturational status further research is needed to validate this observation.

Perceptions of competence play a central role in Deci and Ryan's theories of self-determined motivation and cognitive evaluation. Research investigating the relationship between biological maturity and physical aptitude has provided consistent evidence to suggest that biological maturity is significantly related to athletic competence. Males that are advanced in their maturational status tend to perform better in tasks that involve strength, explosive power, and muscular endurance. In contrast, females that are advanced in their maturational status tend to perform poorly, particularly in tasks that involve weight bearing or muscular endurance. Whether or not these differences will be reflected in perceptions of physical and soccer competence is yet unknown. Again these questions will be addressed in the current study.

CHAPTER III

METHODS

Participants Experience Playing Youth Soccer

The participants in this study were 54 boys (*M* Age = 11.5 years, *SD* = 2.0) and 74 girls (*M* Age = 11.5 years, *SD* = 1.7), aged between 8 and 17 years. A total of 46 of the participants (18 males and 28 females) competed in travel soccer programs and 82 of the participants (36 males and 46 females) competed in recreational soccer programs. Twenty-four of the participants, 12 males and 12 females, had a parent who acted as their coach. Ten males (6 travel players and 4 recreational players) and three females (all travel players) were excluded from the analyses involving biological maturity status. Exclusion from this portion of the study was based on two criteria, namely, the failure to provide the height of at least one of the biological parents, or being above the age of 15 years. The University Committee or Research Involving Human Subjects Office at Michigan State University approved this investigation (Appendix A). Informed assent and consent (Appendix B) was received from the participants and their parents, respectively.

The mean number of years that the participants had been playing adult competitive soccer was 5.2 years (*SD* = 2.1). The mean number of years that the participants had been playing competitive soccer for their current coach was 2.7 years (*SD* = 1.6). During the competitive season the participants typically attended between one and three practice sessions per week (*M* Number of Practices Attended = 2.2, *SD* = 1.0). The number of competitive games that participants played per week varied between

one and two (*M* Number of Competitive Games = 1.3, *SD* = .5). A more detailed breakdown of the demographic information by age groups and gender is presented in Tables 1-11.

Table 1
Descriptive statistics for female soccer players aged 8.81-9.99 years (N=15)

Variables	*M*	*SD*	Range
Age (yrs)	9.7	.3	8.81-9.96
Experience playing soccer (yrs)	3.6	1.2	1.0-6.0
Experience with coach (yrs)	2.7	1.1	1.0-5.0
Games per week	1.1	.2	1.0-1.5
Practices per week	1.9	.3	1.0-2.0
Height (cm)	139.0	6.3	131.2-149.0
Weight (kg)	35.1	6.2	26.0-48.4
BMI $(m/kg)^2$	18.1	2.5	14.6-23.9
% Predicted adult height	83.2	2.3	79.7-86.8
Maturity Z score	-.45	1.2	-2.58-1.24

Table 2
Descriptive statistics for female soccer players aged 10-10.99 years (N=20)

Variables	*M*	*SD*	Range
Age (yrs)	10.3	.2	10.0-10.7
Experience playing soccer (yrs)	3.8	1.4	1.0-6.0
Experience with coach (yrs)	2.7	1.1	1.0-5.0
Games per week	1.1	.2	1.0-2.0
Practices per week	2.0	.0	2.0-2.0
Height (cm)	143.5	5.0	134.4-151.3
Weight (kg)	36.8	5.1	27.8-44.4
BMI $(m/kg)^2$	17.8	2.2	14.4-21.0
% Predicted adult height	85.5	1.8	81.7-88.3
Maturity Z score	-.05	1.1	-1.85-2.08

Table 3
Descriptive statistics for female soccer players aged 11-11.99 years (N=12)

Variables	*M*	*SD*	Range
Age (yrs)	11.7	.2	11.1-11.98
Experience playing soccer (yrs)	5.7	1.4	3.0-7.5
Experience with coach (yrs)	2.3	1.3	1.0-4.0
Games per week	1.5	.5	1.0-2.5
Practices per week	2.5	1.5	1.0-7.0
Height (cm)	149.3	7.7	137.5-162.5
Weight (kg)	41.8	9.2	33.0-67.8
BMI $(m/kg)^2$	18.7	3.4	15.9-28.6
% Predicted adult height	90.1	2.8	86.1-96.7
Maturity Z score	-.61	1.43	-2.50-2.40

Table 4
Descriptive statistics for female soccer players aged 12-12.99 years (N=8)

Variables	*M*	*SD*	Range
Age (yrs)	12.5	.4	12.0-12.9
Experience playing soccer (yrs)	5.3	2.1	3.0-9.0
Experience with coach (yrs)	3.4	1.3	2.0-6.0
Games per week	1.3	.3	1.0-1.5
Practices per week	1.8	.3	1.5-2.0
Height (cm)	153.5	4.9	145.6-158.9
Weight (kg)	45.0	9.7	35.6-64.0
BMI $(m/kg)^2$	19.1	4.0	15.6-28.1
% Predicted adult height	93.4	2.2	91.1-96.4
Maturity Z score	-.02	1.71	-2.92-2.13

Table 5
Descriptive statistics for female soccer players aged 13-13.99 years (N=10)

Variables	*M*	*SD*	Range
Age (yrs)	13.5	.3	13.0-13.9
Experience playing soccer (yrs)	6.4	1.6	3.0-8.0
Experience with coach (yrs)	3.3	2.7	1.0-8.0
Games per week	1.7	.3	1.5-2.0
Practices per week	3.1	1.8	1.5-7.0
Height (cm)	160.8	4.6	155.5-169.5
Weight (kg)	58.0	10.5	45.0-82.6
BMI $(m/kg)^2$	22.3	2.9	17.6-28.8
% Predicted adult height	97.4	1.5	94.4-100.4
Maturity Z score	.19	.93	-1.34-1.71

Table 6
Descriptive statistics for female soccer players aged 14-15.7 years (N=8)

Variables	*M*	*SD*	Range
Age (yrs)	14.6	.5	14.1-15.7
Experience playing soccer (yrs)	7.8	1.5	6.0-10.0
Experience with coach (yrs)	2.9	2.4	1.0-7.0
Games per week	1.9	.4	1.0-2.5
Practices per week	4.0	1.3	3.0-7.0
Height (cm)	166.6	5.5	159.3-175.8
Weight (kg)	59.7	5.4	52.0-66.4
BMI $(m/kg)^2$	21.5	1.9	19.5-25.1
% Predicted adult height	98.7	.5	97.9-99.2
Maturity Z score	.17	.33	-.30-.46

Table 7
Descriptive statistics for male soccer players aged 9-9.99 years (N=13)

Variables	*M*	*SD*	Range
Age (yrs)	9.6	.3	9.0-9.9
Experience playing soccer (yrs)	4.4	.8	3.0-6.0
Experience with coach (yrs)	2.3	1.2	1.0-4.0
Games per week	1.3	.6	1.0-2.5
Practices per week	1.5	.7	1.0-3.0
Height (cm)	137.5	6.5	128.8-151.4
Weight (kg)	35.7	6.9	28.6-49.8
BMI $(m/kg)^2$	18.8	2.6	15.4-22.8
% Predicted adult height	77.6	1.5	75.1-81.3
Maturity Z score	.15	1.64	-2.39-3.22

Table 8
Descriptive statistics for male soccer players aged 10-10.99 years (N=15)

Variables	*M*	*SD*	Range
Age (yrs)	10.4	.3	10.0-10.9
Experience playing soccer (yrs)	4.2	1.5	2.0-7.0
Experience with coach (yrs)	2.4	1.9	1.0-7.0
Games per week	1.4	.5	1.0-3.0
Practices per week	1.9	.3	1.0-2.0
Height (cm)	141.1	4.5	132.5–148.4
Weight (kg)	36.0	5.7	26.8-46.4
BMI $(m/kg)^2$	18.0	2.6	14.4-23.5
% Predicted adult height	79.1	1.1	77.0-80.6
Maturity Z score	-.48	1.25	-2.63-1.80

Table 9
Descriptive statistics for male soccer players aged 11-11.99 years (N=10)

Variables	*M*	*SD*	Range
Age (yrs)	11.5	.3	11.1-11.96
Experience playing soccer (yrs)	6.0	1.3	4.0-9.0
Experience with coach (yrs)	2.7	1.9	1.0-6.0
Games per week	1.4	.7	1.0-3.0
Practices per week	1.9	.6	1.0-3.0
Height (cm)	150.8	6.0	141.6-160.2
Weight (kg)	44.8	7.6	30.4-53.6
BMI $(m/kg)^2$	19.7	3.1	15.1-23.4
% Predicted adult height	82.9	1.4	81.1-85.5
Maturity Z score	-.32	1.32	-2.66-1.30

Table 10
Descriptive statistics for male soccer players aged 12-13.99 years (N=7)

Variables	*M*	*SD*	Range
Age (yrs)	12.7	.6	12.0-13.8
Experience playing soccer (yrs)	6.0	2.5	3.0-11.0
Experience with coach (yrs)	2.5	.8	1.0-3.0
Games per week	1.1	.4	1.0-2.0
Practices per week	2.0	.6	1.0-3.0
Height (cm)	150.2	5.8	141.7-156.8
Weight (kg)	46.6	5.9	39.0-53.4
BMI $(m/kg)^2$	20.6	2.2	16.8-23.4
% Predicted adult height	87.3	2.7	84.6-89.9
Maturity Z score	-.12	.71	-.75- .65

Table 11
Descriptive statistics for male soccer players aged 14-17.30 years (N=9)

Variables	*M*	*SD*	Range
Age (yrs)	15.0	1.2	14.3-17.3
Experience playing soccer (yrs)	8.4	2.2	4.0-11.5
Experience with coach (yrs)	2.6	2.3	1.0-7.0
Games per week	1.8	.6	1.5-3.0
Practices per week	2.8	1.1	2.0-5.0
Height (cm)	174.8	9.1	159.2-189.3
Weight (kg)	67.3	7.1	58.8-78.6
BMI $(m/kg)^2$	22.0	2.0	20.0-25.8
% Predicted adult height	96.0	2.0	93.7-96.4
Maturity Z score	1.07	.71	.16-1.95

Participants' Physical Characteristics

To compare the mean heights, weights, and BMI values of the male and female soccer players against age and gender specific reference values, the participants were grouped relative to gender and age. Mean values for the height, weight, and BMI of the male and female soccer players by age group are presented in Tables 1-6, and Tables 7-11, respectively. The mean heights, weights, and BMI values of the male youth soccer players, by mean chronological age, are plotted against US reference values in Figures 2, 3 and 4 (see Appendix C), respectively. The mean heights of the male soccer players varied within the 25th and 75th centiles and approximated the median reference values. The mean weights of the male soccer players were above the median reference value in all five of the age groups, and above the 75th centile in the 9, 11, and 14year old age groups. The mean BMI values of the male soccer players varied between the median reference values and the 85th centile in all five of the age groups.

The mean heights, weights and BMI values of the female youth soccer players, by mean chronological age, are plotted against US reference values in Figures 5, 6, and 7 (see Appendix C), respectively. The mean heights of the female soccer players were above the median reference values in four of the six age groups (9, 10, 13, and 14 year olds). In contrast, the mean weights of the female soccer players were above the median reference values in all of the age groups and were above the 75th centile in the thirteen and fourteen year old age groups. The mean BMI values of the female soccer players varied between the median reference values and the 85th centile in all of the six age groups.

Probability Levels

The probability level for all of the analyses, except the analysis of gender and program related differences in biological maturity, was fixed at $p < .05$. Due to the limited number of participants who were male, competed in travel soccer programs, and were aged below 15 years ($n = 12$), the probability level for the analysis of gender and program related differences in biological maturity was set at $p < .10$.

Effect Sizes

Eta values (η) were calculated for the analyses that investigated gender and program related differences for self-determined motivation, biological maturity, perceived autonomy support, perceived physical competence, perceived physical competence, perceived autonomy in soccer, and biological maturity. The eta value is the square root of the ratio between the sum of squares (i.e., sum of squares between/total sum of squares) and represents the non-linear correlation between the independent and dependent variable. The eta value is comparable to the r value for linear correlations. As the eta value is never negative, it can only convey information regarding the magnitude of the relationship and not its direction.

Inventories

A total of six separate inventories were administered: a soccer specific version of the Self-Regulation Questionnaire (SRQ; Ryan, & Connell, 1989); the Perceived Soccer Competence Scale (PSCS; Feltz, & Brown, 1984); the Perceived Physical Self-Competence Subscale from Harter's Perceived Competence Scale for Children (PPSCS; Harter, 1979); three person specific versions (i.e., coach, mother, father) of the Coach's Interpersonal Style Scale (Pelletier, Fortier, Vallerand, Tuson, Briere, & Blais, 1995); a

soccer specific version of the Internal Source of Control subscale within the Physical Competency Domain from Connell's (1980) Multidimensional Measure of Children's Perceptions of Control; and a demographic questionnaire.

Soccer Self-Regulation Questionnaire (SRQ-S). A soccer specific version of the Self-Regulation Questionnaire (SRQ; Ryan & Connell, 1989) was employed to assess four dimensions of self-determined motivation (i.e., intrinsic motivation, identified regulation, introjected regulation, and external regulation) and amotivation. The SRQ was originally developed for late elementary and middle school students and assesses domain-specific individual differences in the types of motivation or regulation. The soccer specific version of the SRQ (see Appendix D) was modified from a previous version of the SRQ that had been developed to assess motivation in young gymnasts (SRQ-G; Gagne, Ryan, & Bargham, 2000). Completion of the SRQ for soccer required the participants to indicate their agreement, on a 7-point Likert scale (Not True at All = 1, Very True = 7), with a series of 15 items answering the question 'Why do you play soccer'. The items in the SRQ for soccer assessed five distinct dimensions of motivation, namely, intrinsic motivation, identified regulation, introjected regulation, external regulation, and amotivation. Each dimension was represented by three separate items. The five dimensions of the SRQ-G had previously demonstrated moderate to acceptable levels of internal reliability with Cronbach's alpha values ranging from .53 to .88. In the current investigation, however, the five subscales of the SRQ-S demonstrated low to moderate levels of internal reliability (Intrinsic motivation, Cronbach's alpha = .52; Identified regulation, Cronbach's alpha = .63; Introjected regulation Cronbach's alpha = .63; External regulation, Cronbach's alpha = .41; Amotivation, Cronbach's alpha = .73).

Perceived Soccer and Physical Self-Competence Scales. Modified versions of the Perceived Soccer Competence Scale (PSCS; Feltz, & Brown, 1984) and the Perceived Physical Self-Competence Subscale (PPSCS) from Harter's (1979) original Perceived Competence Scale for Children were employed to measure the participants' perceptions of competence in the domains of soccer and physical activity in general (see Appendix E). The PSCS, though specific to soccer, was originally constructed from the physical self-competence subscale from Harter's (1979) Perceived Competence Scale for Children. Prior research has shown the format employed by Harter's Perceived Competence Scale for Children may be confusing for some youth (Marsh, 1997). Thus, modified versions of these scales were used to enhance ease of understanding for the participants. The modified scale takes one stem of the original bipolar scale and places it on a 4-point Likert scale (1 = strongly disagree, 4 = strongly agree). Completion of the scale requires the participants to indicate their agreement with a series of seven soccer competence related statements (e.g., I do very well at soccer), and six physical competence related statements (e.g., I do very well at all kinds of sports). In accordance with Feltz and Brown (1984), the seven items in the PSCS were presented with the six items from the physical self-competence subscale. The PSCS and PPSCS have previously demonstrated accepted levels of reliability (PSCS, Cronbach's alpha = .75, Feltz & Brown, 1984; PPSCS, Cronbach's alpha = .78, Cumming, Ewing, & Malina 2000) In the current investigation, however, both scales demonstrated relatively low levels of reliability (PSCS, Cronbach's Alpha = .55; PPSCS, Cronbach's Alpha = .54)

Perceived Soccer Autonomy Scale. A soccer specific version of the Internal Source of Control within the Physical Domain Subscale from the Multidimensional

Measure of Children's Perceptions of Control (MMCPC; Connell, 1980) was employed to assess the participants' perceptions of personal autonomy in soccer (see Appendix F). The MMCPC is a self-report measure that was developed for children aged between 8 and 14 years to assess their understanding of what controls their successes and failures in a variety of domains. Completion of the subscale required the participants to indicate their agreement, on a 4 point Likert scale (1 = Not at all true, 4 = Very true), to a series of four statements regarding the causes of success and failure in soccer (e.g., I can be good at soccer if I try hard enough). The Internal Control Subscale has previously demonstrated adequate levels of internal reliability (Cronbach's alpha = .73, Connell, 1980). In the current investigation, however, the scale demonstrated a poor level of internal reliability (Cronbach's alpha = .40).

Perceived Adult Autonomy Support Scales. Three adult specific versions of the perceived autonomy support subscale from the Interpersonal Style Scale (ISS; Pelletier, et al., 1995) were employed to assess the participants' perceptions of autonomy support provided by their mother, father, and coach (see Appendix G). Completion of each of the scales required the participants to respond, on a 7-point Likert scale (Never = 1, Always = 7), to a series of 6 items asking how frequently their fathers, mothers, or coaches exhibited certain autonomy supportive behaviors. The perceived autonomy support scale has previously demonstrated adequate levels of internal reliability (Cronbach's alpha = .76, Pelletier et al., 1995). In the current investigation each of the perceived autonomy support scales demonstrated acceptable levels of internal reliability (Perceived Autonomy Support from Mother Scale, Cronbach's alpha = .81; Perceived Autonomy Support from

Father Scale, Cronbach's alpha = .86; Perceived Autonomy Support from Coach Scale, Cronbach's alpha = .83).

Demographic Questionnaire. Demographic information collected from the participants included the age and gender of the participant, the gender of the coach, the number of years the participant had been playing for their current coach, the number of years the participant had been playing adult organized soccer, how often the participants competed and attended practices in a typical week during the competitive season, and whether or not the participant's father or mother acted as their coach (see Appendix H).

Measurement of Body Size. Stature and body mass were measured according to standard procedures (Malina, 1995). The assessments of body size were conducted onsite by the author and a doctoral student. Both the author and the doctoral student were trained in the required protocol. A platform, consisting of a 2 ft square and an inch thick piece of hardwood, was used as a stable base for the rule and the scale. A hand held field anthrompometer was employed to assess the stature of the participants. Stature was measured with the subject standing erect, without shoes, and with weight distributed evenly between both feet, heels together, arms relaxed at the sides. All of the participants were dressed in shorts, socks, and tee-shirts and were required to remove their shoes prior to the assessments of stature and body mass. Body mass was measured on a balance beam scale. The researchers calibrated the scale prior to each of the meetings with the participants.

Repeated measures analyses were conducted to test for intra- and inter-investigator reliability in the measurement of mass and stature. Inter-investigator reliability for the measurement of stature was conducted prior to the commencement of

the study. The results of the analysis revealed adequate levels of inter-investigator reliability for stature, $F(1,10) = .41, p > .05$. Intra-investigator reliability for the measurement of stature and body mass was conducted on every tenth participant. Adequate levels of intra-investigator reliability were observed for stature, $F(1,10) = .02, p > .05$, and mass, $F(1,10) = 1.86, p > .05$. Technical error of measurement values were also calculated for inter-investigator reliability in the measurement of stature, and intra investigator reliability in the measurement of stature and body mass. The technical error of measurement value represents the degree to which a measurement is influenced by random error. The technical error of measurement value for inter-investigator in the measurement of stature was adequate (TEM = .20 cm.). The technical error of measurement values for intra investigator reliability in the measurement of mass and stature were also adequate (Mass TEM = .29 kg, Stature TEM = .16 cm.).

Measurement of Parental Height. Parental height was assessed through two self-report items that were included on the parental consent forms. Parents reported their heights in feet and inches. As adults generally over estimate their stature (Epstein, Valoski, Kalarchian, & McCurley, 1995), the self-reported stature of each parent was adjusted for over estimation and converted into centimeters using an equation constructed from over 1000 measured and estimated heights of subjects (Epstein et al., 1995). The equations and correlation coefficients for the adjusted height equations were as follows:

Adjusted Height, Females = 2.803 + (0.953 * reported height in inches)

Adjusted Height, Males = 2.316 + (0.987 * reported height in inches)

The adjusted values for height were then converted into centimeters. The equation for calculating the mid-parent height in centimeters was as follows

$$\frac{\text{(adjusted height, mother + adjusted height, father)}}{2}$$

Body Mass Index. The relationship between mass and stature was expressed in the form of the body mass index (BMI: (mass (kg)/stature $(m)^2$). Due to its ease of use, the BMI has been frequently employed in research as an indicator of relative fatness. A high BMI is indicative of a high proportion of fat mass relative to stature. In contrast a low BMI suggests that an individual has a low level of fat mass or fat free mass for their stature. Although the BMI has proved useful in the general population, the BMI is less valid during the periods of infancy and early childhood (Malina & Bouchard, 1991). The BMI is also less reliable as a measure of relative fat mass in adolescent males. Primarily, BMI fails to differentiate between gains in muscle mass and fat mass. Therefore, any results regarding the relationship between BMI and perceptions of competence in male adolescents should be interpreted with caution.

Biological Maturity Status. Percentage of predicted adult stature attained at a given age was employed as an estimate of biological maturity status. This method assumes that individuals, who are closer to their predicted adult stature than would be expected for their age and gender, are advanced in their maturational status. For example the mean percentage of adult stature already attained in girls at the age of 12 years is 91.98% (Roche, Tyleshevski, & Rogers, 1983). A girl who has already attained 95 % of

her predicted adult stature at the age of 12 years would be considered to be advanced in her maturity status.

The Khamis-Roche method (Khamis & Roche, 1994) for predicting adult stature was employed to estimate the percentage of predicted adult height that the participants had attained. This method employs three predictor variables to estimate adult stature, namely the stature and weight of the participants and mid-parent stature. The regression equation derived from the Khamis-Roche method for estimating predicted adult stature has the following form, where β_1, β_2, β_3, are the age and gender specific coefficients by which stature, weight, and mid-parent stature, respectively should be multiplied and β_0 is the value of the intercept (Khamis & Roche, 1994, p. 505). The chronological age of each athlete was converted to a decimal age at the time of examination. This is done by subtracting date of birth from date of examination. As the intercept and the constants are only available at half-year intervals, the decimal age of the participants was rounded up or down to the nearest half year. The percentage of predicted adult stature that the participants had attained was then calculated by comparing participants present stature with their predicted adult height using the following equation: (present stature/predicted adult stature) x 100.

Predicted adult stature = β_0 + (β_1 stature) + (β_2 weight) + β_3 mid-parent stature

Maturity status was expressed as a Z score. The Z score was calculated by first subtracting the mean expected percentage of adult height attained for age and gender from the percentage of adult height attained by the participants at the time of

measurement. The resultant differential was then divided by the standard deviation of the expected percentage of predicted adult height for age and gender to produce the Z score. Age and gender specific reference values for expected percentage of predicted adult height attained were derived from the Fels Longitudinal Study (Males aged 10 to 15 years and Females aged 9 to 13 years; Roche et al., 1983) and data collected by Bayer and Bayley (1959; Girls aged 14 to 15 years). As the reference values provided by the Fels population were only available at one-year intervals, the decimal age of the participants at measurement was rounded either up or down to the nearest whole number. The magnitude of the Z score provides information regarding how many standard deviations the observed score lies from the mean. The Z score conveys information regarding whether an individual is advanced, average, or delayed in their maturational status. The equation for calculating the Z scores for biological maturity was as follows.

$$\frac{\text{(\% of predicted adult height} - \textit{M}\text{ \% of predicted adult height)}}{\text{(standard deviation of } \textit{M}\text{ \% of predicted adult height)}}$$

Initial research involving the non-invasive method for assessing biological maturity has demonstrated that this method is applicable in boys between 5 and 15 years of age, and females between 3 and 13 years of age (Roche, Tyleshevski, & Rogers, 1983). More recent research (Khamis & Roche, 1994), however, suggests that this method of assessing biological maturity is applicable for males and females between the ages of four and seventeen years.

Procedures. During the first half of the competitive season the investigators met with the participants in the presence of their coach to distribute the parental consent and participant assent forms. The participants were briefly informed that the investigators and the soccer organization with which they were affiliated were interested in discovering why they participated in soccer and how much encouragement they received from parents and coaches.

During the second half of the competitive season the instructors returned to collect the completed consent/assent forms and administer the questionnaires. The amount of time between the two contacts ranged from one to three weeks. Only those participants providing completed consent/assent forms were allowed to participate in the study. Prior to conducting the study an instructor, trained in administrating the questionnaires, provided examples of how each of the questionnaires should be completed. Participants were allowed to request additional help from the investigator if they did not understand any of the instructions, words or phrases. The participants completed the questionnaires in the absence of their coach and their parents. The time taken to complete the questionnaires ranged from six to fifteen minutes.

Following completion of the questionnaires the participants were assessed for stature and mass. All of the assessments were conducted on site and on an individual basis. Participants waiting to be assessed for stature and body mass were asked to wait quietly while fellow participants were being measured. The instructors insured that all records of stature and body mass were made available only to the individual being measured.

Participation in vigorous bouts of physical activity can lead to temporary reductions in stature and body mass through compression of the spine and dehydration. To control for any variance in body mass and stature associated with participation in physical activity, all measurements of body size were conducted before the participants began to practice. On one occasion, however, the stature and body mass of 12 male participants was assessed following practice. To account for any systematic error associated with the measurements of stature and body mass following activity, all of the participants concerned were kept well-hydrated during and following the practice session (i.e., water breaks every 20 mins., and following the training session), consumed a packed lunch, and were required to lay down for at least 30 mins. before any of the anthropometric measurements were taken.

Limitations. The sample in the current investigation is limited to US youth participating in recreational and travel soccer programs. A significant portion of this investigation is also reliant on self-report data. Finally, the results of this investigation are limited to the sport of soccer.

Assumptions. It was assumed in the current investigation that the participants have had at least half a season of experience with their current coach and attended practices. It is also assumed that the participants were aware of their parents' past and present involvement in soccer (e.g., experience playing soccer or coaching soccer). It was also assumed that recreational soccer programs are less competitive than the travel soccer programs and that all of the participants completed the questionnaires honestly.

Delimitations. To study the effects of gender, competition, and adult behavior upon self-determined motivation in youth soccer, the current study has delimited itself to current participants in youth soccer.

CHAPTER IV

RESULTS

Preliminary analysis

The number of years that college athletes have participated in sports is significantly related to a number of dimensions of self-determined motivation (Pelletier et al., 1995). A series of five separate Pearson product moment correlations (2-tailed) were conducted to determine if the number of years the participants had been playing adult organized youth soccer was correlated with the five dimensions of self-determined motivation included in the SRQ-S. Years of experience playing adult organized soccer was significantly correlated with identified regulation, $r(128) = .18$, $p < .05$, but not intrinsic motivation, $r(128) = .12$, $p > .05$, introjected regulation, $r(128) = .04$, $p > .05$, external regulation, $r(128) = -.10$, $p > .05$, or amotivation, $r(128) = -.14$, $p > .05$.

A 2 (program) x 2 (gender) analysis of covariance (ANCOVA), controlling for chronological age, was conducted to test for gender and program related differences in the number of years the participants had been playing adult organized soccer. Significant differences in years of experience playing adult organized youth soccer were observed for program structure, $F(1,127) = 7.17$, $p < .01$, $\eta = .17$, and gender, $F(1,127) = 5.03$, $p < .05$, $\eta = .14$, but not the interaction between gender and program structure, $F(1,127) = .04$, $p > .05$, $\eta = .01$. A closer inspection of the results revealed that males and the participants competing in the travel programs reported that they had been playing adult organized soccer for a greater number of years than females and the participants competing in the recreational programs, respectively (Table 12). In accordance with the results of the

preliminary analyses years of experience were treated as a covariate in the analysis of gender and program related differences in identified regulation.

Table 12
Means and standard deviations for years of experience playing adult organized youth soccer as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Males	18	7.08	(2.58)	36	4.72	(1.45)	54	5.51	(2.19)
Female	28	6.66	(1.59)	46	3.93	(1.50)	74	4.97	(2.02)
Program	46	6.83	(2.02)	82	4.28	(1.52)			

Program and Gender Differences in Self-Determined Motivation

A series of four 2 (program) x 2 (gender) analyses of variance (ANOVA) were conducted to examine both gender and program related differences in intrinsic motivation, introjected regulation, external regulation, and amotivation. A 2 (program) x 2 (gender) analyses of covariance (ANCOVA), using number of years of experience playing adult organized youth soccer as a covariate, was conducted to examine gender and program differences in identified regulation. The results of the analyses revealed a significant gender difference in identified regulation, $F(1,127) = 4.12, p < .05, \eta = .18$. Specifically, males reported significantly higher levels of identified regulation than females did. The magnitude of this difference, however, was small. No significant gender differences were observed in intrinsic motivation, $F(1,127) = .01, p > .05, \eta = .01$, introjected regulation, $F(1,127) = .00, p > .05, \eta = .00$, external regulation, $F(1,127) = 1.21, p > .05, \eta = .10$, and amotivation, $F(1,127) = .89, p > .05, \eta = .08$. No significant program related differences were observed in intrinsic motivation, $F(1,127) = 1.06, p > .05, \eta = .09$, identified regulation, $F(1,127) = 1.36, p > .05, \eta = .10$, introjected

regulation, $F(1,127) = .07$, $p > .05$, $\eta = .02$, external regulation, $F(1,127) = .44$, $p > .05$, $\eta = .06$, and amotivation, $F(1,127) = 1.37$, $p > .05$, $\eta = .10$.

A significant interaction between gender and program structure was observed in introjected regulation, $F(1,127) = 4.64$, $p < .05$, $\eta = .19$. A closer examination of the results revealed a disordinal interaction between gender and program structure in introjected regulation. (See Figure 8). The magnitude of this interaction, however, was relatively small. Post-hoc analyses (Tukey's HSD) revealed that in travel soccer, females reported significantly higher levels of introjected regulation than the boys did. Similarly, the girls participating in travel soccer reported significantly higher levels of introjected regulation than the girls participating in recreational soccer. No significant gender by program structure interactions were observed in intrinsic motivation, $F(1,127) = 2.98$, $p > .05$, $\eta = .15$, identified regulation, $F(1,127) = .14$, $p < .05$, $\eta = .03$, external regulation, $F(1,127) = 3.46$, $p > .05$, $\eta = .16$, and amotivation, $F(1,127) = .43$, $p > .05$, $\eta = .06$. Descriptive statistics for each of the analyses can be found in the following tables: Intrinsic motivation (Table 13); Identified regulation (Table 14); Introjected regulation (Table 15); External regulation (Table 16); Amotivation (Table 17).

Table 13
Means and standard deviations for intrinsic motivation as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*N*	*M*	*SD*	*n*	*M*	*SD*
Males	18	5.54	(1.02)	36	5.68	(1.19)	54	5.63	(1.12)
Female	28	5.90	(.73)	46	5.36	(1.14)	74	5.56	(1.04)
Program	46	5.76	(0.86)	82	5.50	(1.17)			

Note. Scores ranged from 1 to 7 and are based upon the item means for each of the scales.

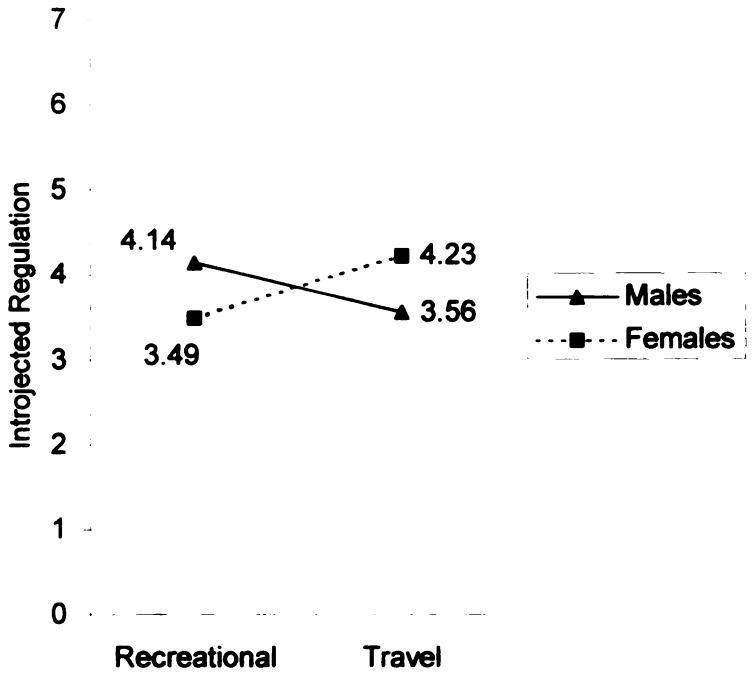


Figure 8.
The interaction between gender and league structure in introjected regulation.

Table 14
Means and standard deviations for identified regulation as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*N*	*M*	*SD*	*n*	*M*	*SD*
Males	18	5.93	(1.33)	36	5.34	(1.42)	54	5.54	(1.40)
Female	28	5.30	(1.28)	46	4.88	(1.27)	74	5.04	(1.29)
Program	46	5.54	(1.32)	82	5.08	(1.35)			

Note. Scores ranged from 1 to 7 and are based upon the item means for each of the scales.

Table 15
Means and standard deviations for introjected regulation as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*N*	*M*	*SD*	*n*	*M*	*SD*
Males	18	3.56	(1.82)	36	4.14	(1.67)	54	3.94	(1.72)
Female	28	4.23	(1.41)	46	3.49	(1.67)	74	3.77	(1.61)
Program	46	3.96	(1.60)	82	3.77	(1.69)			

Note. Scores ranged from 1 to 7 and are based upon the item means for each of the scales.

Table 16
Means and standard deviations for external regulation as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*N*	*M*	*SD*	*n*	*M*	*SD*
Males	18	1.52	(.89)	36	2.00	(1.22)	54	1.84	(1.14)
Female	28	2.08	(.91)	46	1.86	(.94)	74	1.94	(0.93)
Program	46	1.86	(0.94)	82	1.92	(1.07)			

Note. Scores ranged from 1 to 7 and are based upon the item means for each of the scales.

Table 17
Means and standard deviations for amotivation as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*N*	*M*	*SD*	*n*	*M*	*SD*
Males	18	1.59	(.93)	36	1.95	(1.23)	54	1.83	(1.14)
Female	28	1.54	(.86)	46	1.64	(1.06)	74	1.60	(0.98)
Program	46	1.56	(0.88)	82	1.78	(1.14)			

Note. Scores ranged from 1 to 7 and are based upon the item means for each of the scales.

Program and Gender Differences in Perceived Soccer Competence

A 2 (program) x 2 (gender) analysis of variance (ANOVA) was conducted on the participants' perceptions of competence in soccer. The results of the analysis for perceived soccer competence failed to reveal any significant differences across gender, $F(1,126) = 1.67, p > .05, \eta = .11$, program structure, $F(1,126) = 2.52, p > .05, \eta = .14$, or

the interaction between gender and program structure, $F(1,126) = .56, p > .05, \eta = .07$. Descriptive statistics for the analysis are presented in the Table 18.

Table 18
Means and standard deviations for perceived soccer competence as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Males	18	3.01	(.45)	36	2.95	(.39)	54	2.97	(.41)
Female	28	2.97	(.33)	45	2.80	(.37)	73	2.87	(.36)
Program	46	2.98	(.38)	81	2.87	(.38)			

Note. Scores ranged from 1 to 4 and are based upon the item means for each of the scales.

Program and Gender Differences in Perceived Physical Competence

A 2 (program) x 2 (gender) analysis of variance (ANOVA) was also conducted on the participants' perceptions of physical competence. The results of the analysis examining gender and program related differences in perceived physical competence failed to reveal significant effects for gender, $F(1,126) = .57, p > .05, \eta = .07$, or the interaction between gender and program structure, $F(1,126) = .75, p > .05, \eta = .08$. A significant effect, however, was observed for program structure, $F(1,126) = 6.30, p < .05, \eta = .22$. Specifically, the participants in the travel programs reported higher levels of perceived physical competence than the participants in the recreational programs did. The magnitude of the effect, however, was relatively small. Descriptive statistics for the analysis are presented in Table 19.

Table 19
Means and standard deviations for perceived physical competence as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Males	18	2.93	(.36)	36	2.80	(.40)	54	2.84	(.39)
Female	28	2.93	(.39)	45	2.68	(.44)	73	2.78	(.44)
Program	46	2.93	(.37)	81	2.73	(.42)			

Note. Scores ranged from 1 to 4 and are based upon the item means for each of the scales.

Program and Gender Differences in Perceived Autonomy in Soccer

A 2 (program) x 2 (gender) analysis of variance (ANOVA) was conducted on the participants' perceptions of autonomy in soccer. The results of the analysis for perceived autonomy in soccer failed to reveal significant effects for program structure, $F(1,123) = .49$, $p > .05$, $\eta = .06$, and the interaction between gender and program structure, $F(1,123) = 1.73$, $p > .05$, $\eta = .12$. A significant effect, however, was observed for gender, $F(1,123) = 6.21$, $p < .05$, $\eta = .22$. Specifically, males reported higher levels of perceived autonomy in soccer than females. The magnitude of this effect, however, was small. Due to the low reliability of the Perceived Soccer Autonomy Scale this result must be viewed with some caution. Descriptive statistics for the analysis are presented in the Table 20.

Program and Gender Differences in Perceptions of Adult Autonomy Support

A 2 (program) x 2 (gender) multivariate analysis of variance (MANOVA) was conducted to examine gender and program related differences in the participants' perceptions of adult autonomy support (i.e., coach, mother, father). The results of the analysis revealed a significant main effect for program structure, Wilk's Lambda = 93, $F(3,118) = 2.96$, $p < .05$, but not gender, Wilk's Lambda = .99, $F(3,118) = .39$, $p > .05$, or the interaction between program structure and gender, Wilk's Lambda = .98, $F(3,118) =$

.68, $p > .05$. Follow up univariate F tests failed to reveal any significant program related differences in perceived adult autonomy support: coach, $F(1,123) = 3.26$, $p > .05$, $\eta = .16$; mother, $F(1,123) = .16$, $p > .05$, $\eta = .04$; father, $F(1,123) = 2.49$, $p > .05$, $\eta = .14$.

Descriptive statistics for each of the perceived autonomy support scales are presented in the following tables; Coach (Table 21); Mother (Table 22); Father (Table 23).

Table 20
Means and standard deviations for perceived soccer autonomy as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Males	18	3.13	(.49)	36	2.96	(.40)	54	3.01	(.44)
Female	25	2.81	(.47)	45	2.86	(.41)	70	2.84	(.43)
Program	43	2.94	(.50)	81	2.90	(.41)			

Note. Scores ranged from 1 to 4 and are based upon the item means for each of the scales.

Table 21
Means and standard deviations for perceived autonomy support from the coach as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Males	17	4.92	(1.28)	36	4.75	(1.35)	53	4.81	(1.31)
Female	27	5.23	(.91)	44	4.48	(1.54)	71	4.76	(1.38)
Program	44	5.11	(1.06)	80	4.60	(1.45)			

Note. Scores ranged from 1 to 7 and are based upon the item means for each of the scales.

Table 22
Means and standard deviations for perceived autonomy support from the mother as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Males	17	5.93	(.99)	36	5.98	(1.10)	53	5.96	(1.06)
Female	27	6.07	(.65)	44	6.16	(.73)	71	6.12	(.70)
Program	44	6.02	(.79)	80	6.07	(.91)			

Note. Scores ranged from 1 to 7 and are based upon the item means for each of the scales.

Table 23
Means and standard deviations for perceived autonomy support from the father as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Males	17	5.55	(1.33)	36	5.83	(1.28)	53	5.74	(1.29)
Female	27	6.07	(.65)	44	6.16	(.73)	71	5.78	(.97)
Program	44	6.02	(.79)	80	6.08	(.91)			

Note. Scores ranged from 1 to 7 and are based upon the item means for each of the scales.

Motivational Model of Adult Influence in Youth Soccer

The proposed motivational model of adult influence in youth sports. (See Figure 1, Page 10) was tested using structural equation modeling. The hypothesized model contained three exogenous variables (i.e., mother's autonomy support, father's autonomy support, and coach's autonomy support) and three endogenous variables (i.e., perceived soccer autonomy, perceived soccer competence, and self-determined motivation). In accordance with Deci and Ryan's (1985) theory of self-determined motivation, it was hypothesized that perceptions of adult autonomy support would positively predict differences in perceived competence and personal autonomy in soccer. Further, the model predicted that perceptions of competence and autonomy in soccer would positively predict differences in self-determined motivation.

Pearson product moment correlations (2 tailed) were conducted on all of the variables included in the hypothesized motivational model of adult influence in youth soccer. Intrinsically motivation was positively and significantly correlated with identified regulation, introjected regulation, perceived soccer competence, and perceived autonomy support from the coach and mother. Identified regulation was positively and significantly correlated with introjected regulation, perceived soccer autonomy, and perceived autonomy support from the coach, mother, and father. Introjected regulation

was positively and significantly correlated with perceived autonomy support from the coach. Amotivation was negatively and significantly correlated with perceived soccer competence. Perceived soccer competence was positively and significantly correlated with perceived autonomy support from the coach and father. Perceived autonomy support from the coach was positively and significantly correlated with perceived autonomy support from the mother and father. Finally, perceived autonomy support from the father was positively and significantly correlated with perceived autonomy support from the mother. The results of the analyses are reported in Table 24.

To reduce the number of latent variables assessing self-determined motivation, a composite index of self-determined motivation, based upon methods developed by Guttman (1954) was created. To create the composite measure of self-determined motivation, the items in the SRQ-S for the subscales of external regulation, introjected regulation, identified regulation, and intrinsic motivation were averaged to form four separate subscale scores. Weights were then assigned to the four separate subscale scores according to their respective placement on the self-determination continuum. Intrinsic motivation and identified regulation items are assigned weights of 2, and 1, respectively. Introjected and external regulation items, which are defined, as less self-determined forms of motivation, are assigned weights of –2, and –1, respectively. The composite index of self-determined motivation consisted of a summation of the weighted scores, and integrated the information from the different motivational subscales under one scale. Support for the validity and reliability of this type of composite index has been provided in a number of previous studies (Blais, Sabourin, Boucher, & Vallerand, 1990; Grolnick & Ryan, 1987; Vallerand & Bissonnette, 1992). Participants who had a mother or father

who acted as their coach were removed from the sample in order to reduce collinearity between the participants' perceptions of autonomy support from their parents and their coaches. The remaining participants' mean score on the composite index of self-determined motivation was 8.78 (SD = 3.51).

Table 24
Intercorrelations between the variables included in the hypothesized motivational model of adult influence in youth soccer

Variables	*n*	2	3	4	5	6	7	8	9	10
1.Intrinsic motiv.	128	.36*	.33*	.07	-.12	.22*	.11	.35*	.19*	.12
2.Identified reg.	128	-	.27*	.09	-.02	.15	.26*	.35*	.40*	.27*
3.Introjected reg.	128		-	.26	-.03	.07	.01	.24*	.13	-.09
4.External reg.	128			-	.06	.04	.10	.08	.15	.10
5.Amotivation	128				-	-.27*	.03	-.04	-.01	-.17
6.PS competence	127					-	.02	.23*	.05	.21*
7.PS autonomy	127						-	-.03	.01	.17
8.PAS coach	126							-	.49*	.32*
9. PAS mother	126								-	.56*
10.PAS father	124									-

Note. PS = Perceived Soccer; PAS = Perceived Autonomy Support; * = $p < .05$

All structural equation modeling was conducted with the AMOS graphics program. The AMOS graphics program uses maximum likelihood estimation to generate standardized estimates of all parameters not constrained to specific values. The goodness of fit of the model is calculated by comparing the reproduced covariance matrix, which is based upon the specified constraints, with the observed covariance matrix. The AMOS program calculates and reports a number of indexes of model fit. The indexes of fit reported in the current study included the chi-square statistic (χ^2), the goodness of fit index (GFI), the root mean square error of approximation (RMSEA; Steiger & Lind, 1980), the comparative fit index (CFI; Bentler, 1990), and the incremental index of fit (IFI; Bollen, 1989). The GFI and the RMSEA were selected on the basis of their

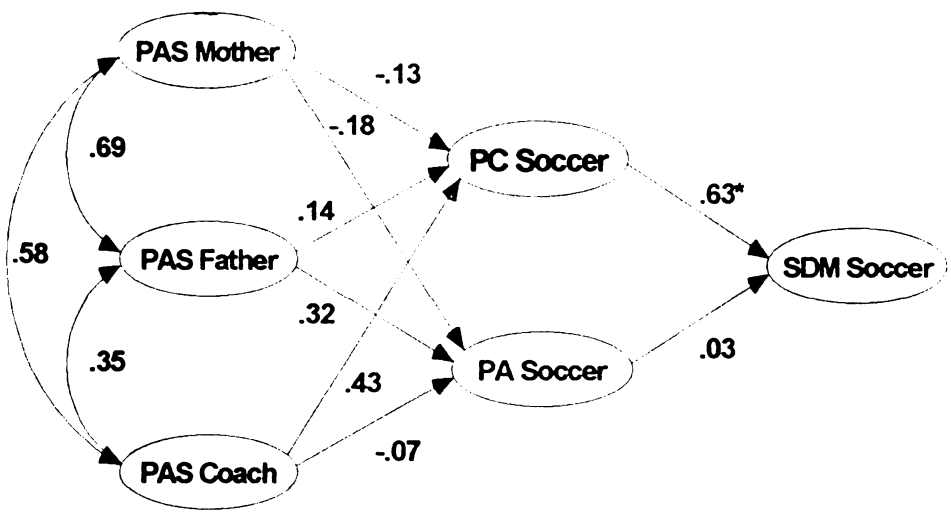
popularity. The CFI and IFI were selected on the basis of their sensitivity toward model parsimony and sample size.

The first analysis failed to provide an estimation of model fit due to empirical underidentification. Underidentification occurs when the number of estimable parameters is less than the number of data points (i.e., variances, covariances of the observed model) (Byrne, 2001). Empirical underidentification occurs when measurement or path coefficients for direct effects are close to zero (e.g., .01) (Kline, 1988). These paths are in essence eliminated from the model leading to underidentification.

In reviewing the measurement and path coefficients associated with the hypothesized model, it was noted that the standardized measurement coefficient associated with one of the items measuring perceived autonomy in soccer was close to zero (Item 1: 'I can be good at soccer if I try hard enough, $\beta = .07$). As previously identified the measure of perceived soccer autonomy had demonstrated a low level of internal reliability. To address this issue a second coefficient (Item 2: 'If I try to trap a ball and I miss, it is usually because I didn't try hard enough') associated with the measure of perceived autonomy in soccer was fixed. Fixing the second coefficient led to an increase in the value of the measurement coefficient associated with the item ($\beta = .17$). This modification led to the development of an empirically overidentified model that was admissible to scientific investigation.

The results of the second analysis for the hypothesized motivational model of adult influence in youth soccer demonstrated a poor level of fit with data, $\chi^2(458) = 818.11$, $p < .05$. The poor fit of the model was also reflected in the goodness of fit indexes, GFI (.71), CFI (.71), IFI (.72), and RMSEA (.08). Structural coefficients from

the standardized solution under maximum likelihood estimation are presented in Figure 9 and Table 25. To preserve space the standardized measurement coefficients associated with the hypothesized model are presented in Table 26. Only two of the path coefficients predicted in the hypothesized model were found to be statistically significant. The perception of the autonomy support provided by the coach acted as a significant and positive predictor of participants' perceptions of competence in soccer (β = .43, C.R. = 2.53, p <.05). Further, perceptions of competence in soccer positively and significantly predicted variation in the composite measure of self-determined motivation (β = .63, C.R. = 3.51, p <.001).



Note. PAS = Perceived autonomy support; PC Soccer = Perceived Competence in soccer; PA Soccer = Perceived autonomy in soccer; SDM Soccer = Self-determined motivation in soccer; * = p <.05.

Figure 9.
Path coefficients for the hypothesized motivational model of adult influence in youth soccer (Model 1).

All three of the correlations predicted in the hypothesized model achieved significance. Significant correlations were observed between perceived autonomy support from the mother and father ($r = .69$, C.R. = 4.80, $p < .001$), perceived autonomy support from the mother and coach ($r = .58$, C.R. = 4.10, $p < .001$), and perceived autonomy support from the father and coach ($r = .35$, C.R. = 2.96, $p < .01$).

Six of the path coefficients predicted in the hypothesized model were not supported at a significant level. The participants' perceptions of the autonomy support provided by their mother ($\beta = -.13$, C.R. = -.58, $p > .05$) and father ($\beta = .14$, C.R. = 0.77, $p > .05$) did not significantly predict variation in perceived competence in soccer. Perceived autonomy support from the mother ($\beta = -.18$, C.R. = -.64, $p > .05$), father ($\beta = .32$, C.R. = 1.43, $p > .05$), and coach ($\beta = -.07$, C.R. = -.38, $p > .05$) also failed to significantly predict perceived autonomy in soccer. These results, however, may reflect inadequate levels of internal reliability in the measure of perceived autonomy in soccer and not the true relationship between adult autonomy support and perceived autonomy in youth soccer.

Finally, perceived autonomy in soccer failed to significantly predict any variation in the composite measure of self-determined motivation ($\beta = .04$, C.R. = .22, $p > .05$). Again, this result may be related to the low reliability of the measure of perceived soccer autonomy, and may not reflect the true nature of the relationship between the perceived autonomy and self-determined motivation in youth soccer.

Table 25
Standardized path coefficients from the hypothesized motivational model of adult influence in youth soccer (Model 1)

Standardized Regression Weight	Estimate	SE	C.R.	*p*
PAS Mother – Perceived Soccer Competence	-.13	.08	-.58	>.05
PAS Father – Perceived Soccer Competence	.14	.06	.77	>.05
PAS Coach – Perceived Soccer Competence	.43	.05	2.53	<.001
PAS Mother – Perceived Soccer Autonomy	-.18	.12	-.64	>.05
PAS Father – Perceived Soccer Autonomy	.32	.09	1.43	>.05
PAS Coach – Perceived Soccer Autonomy	-.07	.07	-.38	>.05
Perceived Soccer Competence – SDM	.63	.67	3.51	<.001
Perceived Soccer Autonomy – SDM	.03	.48	.22	>.05

Note. S.E., Standard error; C.R., Critical ratio; *p*, Significance level

Respecification of the Hypothesized Motivational Model of Adult Influence in Youth Soccer

The hypothesized motivational model of adult influence in youth soccer did not have adequate fit. A major limitation of the one step method for evaluating the structural integrity of the hypothesized model is that in most cases the initial model has inadequate fit (Bollen, 2000). Testing the whole model in a single step makes locating the areas of model misspecification difficult and provides little guidance for future research. In response, the hypothesized model was subjected to further analysis to identify areas of model misspecification and develop a model that demonstrated a more adequate level of fit with the data. Three sources of information were used to identify areas of model misspecification, namely, the significance level of the path coefficients, the standardized residuals and the modification indexes. Weak or non-significant path coefficients are indicative of model misspecification and should be considered for deletion from the model.

Table 26
Standardized measurement coefficients from the hypothesized motivational model of adult influence in youth soccer (Model 1)

Standardized Regression Weight	Estimate	SE	C.R.	*p*
M1 – Perceived Autonomy Support from Mother	.45	.09	4.56	<.001
M1 – Perceived Autonomy Support from Mother	.52	.15	5.29	<.001
M3 – Perceived Autonomy Support from Mother	.63	.11	6.45	<.001
M4 – Perceived Autonomy Support from Mother	.64	.13	6.57	<.001
M5 – Perceived Autonomy Support from Mother	.59	.10	6.07	<.001
M6 – Perceived Autonomy Support from Mother*	.78			
F1 – Perceived Autonomy Support from Father	.66	.10	7.22	<.001
F2 – Perceived Autonomy Support from Father	.59	.12	6.35	<.001
F3 – Perceived Autonomy Support from Father	.75	.12	8.33	<.001
F4 – Perceived Autonomy Support from Father	.71	.12	7.81	<.001
F5 – Perceived Autonomy Support from Father	.77	.11	8.64	<.001
F6 – Perceived Autonomy Support from Father*	79			
C1 – Perceived Autonomy Support from Coach	.64	.13	6.15	<.001
C2 – Perceived Autonomy Support from Coach	.49	.14	4.80	<.001
C3 – Perceived Autonomy Support from Coach	.75	.16	7.11	<.001
C4 – Perceived Autonomy Support from Coach	.67	.17	6.41	<.001
C5 – Perceived Autonomy Support from Coach	.75	.14	7.12	<.001
C6 – Perceived Autonomy Support from Coach*	.70			
PSCS1 – Perceived Soccer Competence*	.63			
PSCS2 – Perceived Soccer Competence	.04	.27	.36	>.05
PSCS3 – Perceived Soccer Competence	.61	.28	4.46	<.001
PSCS4 – Perceived Soccer Competence	.58	.33	4.36	<.001
PSCS5 – Perceived Soccer Competence	.21	.19	1.85	>.05
PSCS6 – Perceived Soccer Competence	.24	.20	2.10	<.05
PSCS7 – Perceived Soccer Competence	.26	.24	2.25	<.05
PSAS1 – Perceived Soccer Autonomy	.27	.17	1.92	<.05
PSAS2 – Perceived Soccer Autonomy*	.55			
PSAS3 – Perceived Soccer Autonomy	.19	.20	.20	>.05
PSAS4 – Perceived Soccer Autonomy*	.56			
Intrinsic Motivation – Self-Determined Motivation*	.65			
Identified Regulation – Self-Determined Motivation	.50	.14	3.40	<.001
Introjected Regulation – Self-Determined	-.49	.17	-3.38	<.001
External Regulation – Self-Determined Motivation	-.21	.18	-1.78	>.05

Note. S.E., Standard error; C.R., Critical ratio; *p*, Significance level
Critical ratios are not calculated for measurement coefficients constrained to a value of 1.0

The standardized residuals (S.R.) identify any discrepancies between the restricted covariance matrix, implied by the hypothesized model, and the sample covariance matrix (Byrne, 2001). Standardized residuals are fitted residuals divided by

their asymptotically (large sample) standard errors (Joreskog & Sorbom, 1988) and are analogous to Z scores (Byrne, 2001). In more simple terms the standardized residuals represent an estimate of the number of standard deviations the observed residuals differ from the zero residuals that would exist if the model were perfect. Values that are greater than 2.58 or less than –2.58 are considered large (Joreskog & Sorbom, 2001) and are indicative of a high level of covariance between specific variables or error variances.

Modification indexes (M.I.) reflect the extent to which the hypothesized model is appropriately described (Byrne, 2001). The AMOS program, when requested, calculates a modification index for each of the fixed parameters in the hypothesized model, i.e., those parameters that were fixed to 0. This index, 'which can be conceptualized as a χ^2 statistic with one degree of freedom' (Byrne, 2001, p.90), represents the expected drop in the overall χ^2 value for the model if the parameter was freely estimated in a subsequent analysis. Values greater than 10 are generally considered to be large and worthy of consideration. The AMOS program presents modification indexes for covariance and regression weights.

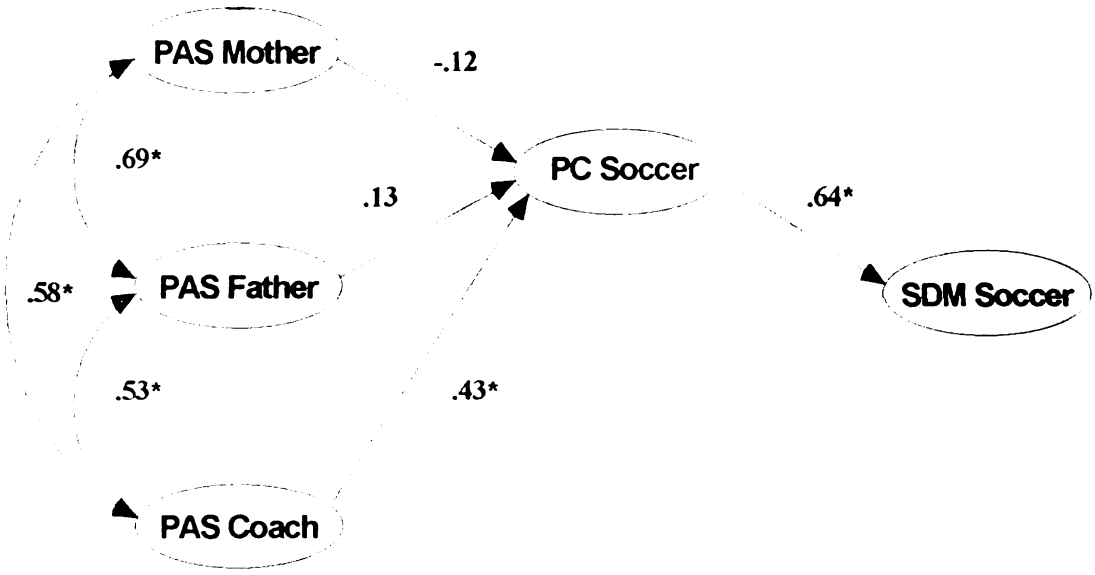
A number of criteria for model respecification were established before any modifications were made to the hypothesized model. First, and foremost, any modification to the hypothesized model had to make sound theoretical and substantive sense. Any modification to the hypothesized model that was not substantively meaningful would be ignored. Secondly, any modifications to the hypothesized model had to lead to significant improvements in the overall fit of the model. Improvements in the fit of the model were determined by comparing the fit of the respecificied model with the fit of its predecessor. Thirdly, any modifications to the hypothesized model should

not lead to an 'overfitted' model (Byrne, 2001, p.92). An overfitted model can occur from the inclusion of parameters that (a) represent weak effects and are not likely to be replicable, (b) lead to a significant inflation of standard errors, and/or (c) adversely effect established parameters in the model (Byrne, 2001). Finally, only parameters or correlations that had a modification index value higher than 10, and/or a standardized residual value greater or less than 2.58 or –2.58, respectively, would be considered for inclusion into the model.

Modifications to the structure of a model can lead to changes in the statistical properties of the model (e.g., fit indexes, path coefficients, standardized residuals and modification indexes). Therefore, the structural validity of the respecified models was assessed after each modification. To provide a sense of order, the respecified models are numbered in relation to the sequence of modifications. By default, the hypothesized model will be known as Model 1.

As previously indicated the results of the initial analysis failed to empirically support the structural validity of the hypothesized model (Model 1). A review of the results associated with the estimation of the hypothesized model revealed that none of the parameters predicting a relationship between perceived adult autonomy support and perceived autonomy support in soccer were supported at a significant level. The results also failed to support the predicted relationship between perceived autonomy in soccer and the composite measure of self-determined motivation. As previously indicated, these results may have been due to low levels of internal reliability in the measure of perceived autonomy and perceived competence in soccer. In response to these concerns the measure

of perceived autonomy in soccer and the four paths associated with it were excluded from the second model (Model 2, see Figure 10).



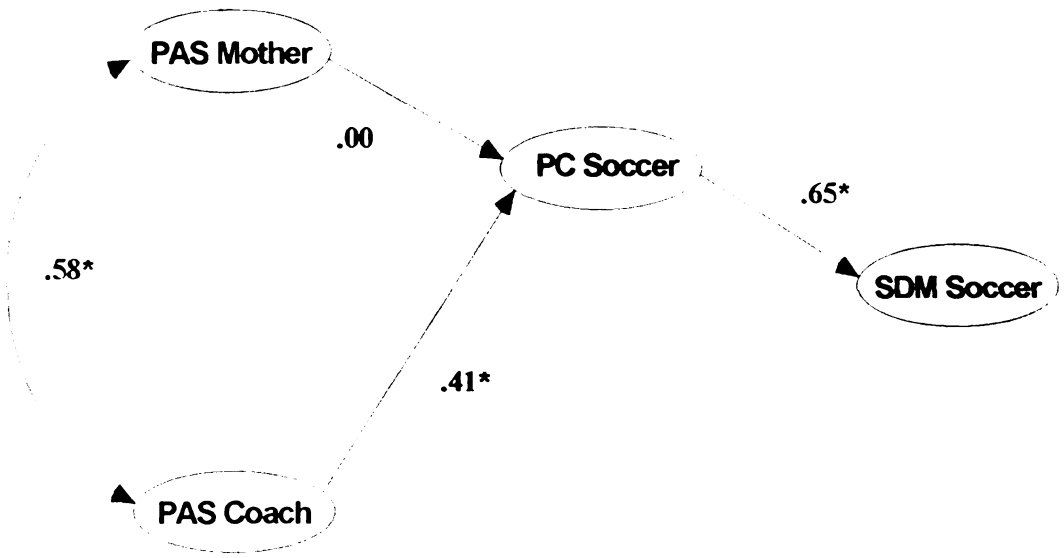
Note. PAS = Perceived autonomy support; PC Soccer = Perceived Competence in soccer; PA Soccer = Perceived autonomy in soccer; SDM Soccer = Self-determined motivation in soccer; * = $p < .05$.

Figure 10.
Path coefficients for the respecified motivational model of adult influence in youth soccer (Model 2).

The deletion of the measure assessing perceived autonomy in soccer and the four causal paths associated with it lead to a significant improvement in the fit of the model, $\Delta\chi^2(115) = 201.387, p < .05$. The path coefficients associated with the estimation of Model 2 are presented in Figure 10. The improved fit of Model 2 was also reflected in the indexes of fit; $\chi^2(370) = 616.78, p < .05$; GFI = .743; RMSEA = .075; CFI = .768; IFI = .776). These indexes, however, still suggested that Model 2 did not provide an adequate fit for the data.

In reviewing the results associated with the estimation of Model 2, it was noted that the path coefficient representing the relationship between perceived autonomy support from the father and perceived soccer competence did not achieve the required level of significance. Further, a review of the modification indexes associated with the estimation of Model 2 gave little evidence to suggest that the fit of the model could be improved by adding any paths between perceived autonomy support from the father and any of the other variables included in the model. In response, the measure of perceived autonomy support from the father and the path associated with it was deleted in the third model (Model 3, see Figure 11). This modification lead to an improvement in the overall fit of the model, $\Delta\chi^2(144) = 281.46$, $p < .05$. The path coefficients associated with the estimation of Model 3 are presented in Figure 5. The improved fit of Model 3 was again reflected in the indexes of fit, $\chi^2(226) = 335.30$, $p < .05$; GFI = .816; RMSEA = .064; CFI = .821; IFI = .829. These indexes, however, suggested that Model 3 exhibited a poor to moderate level of fit to the data.

A review of the path coefficients associated with the estimation of Model 3 revealed that the predicted path between perceptions of autonomy support from the mother and perceived soccer competence also failed to reach significance. A review of the modification indexes associated with the estimation of Model 3, however, provided evidence that the inclusion of a path reflecting the impact of perceived autonomy support from the mother upon the composite measure of self-determined motivation (Perceived autonomy support from mother → self-determined motivation, M.I. = 14.31) could lead to an improvement in the fit in the model. The addition of a direct link between perceived autonomy support from the mother and the composite measure of self-determined

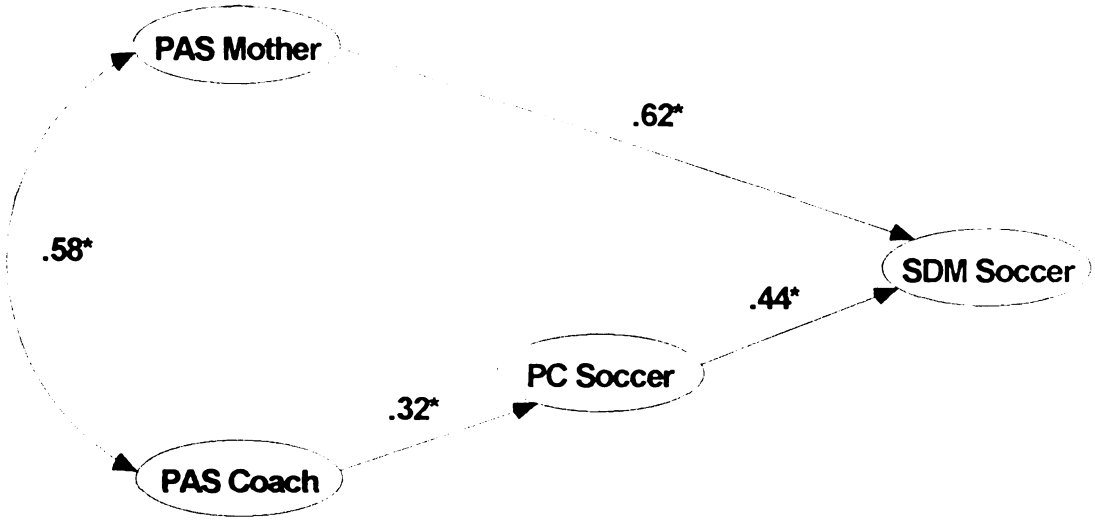


Note. PAS = Perceived autonomy support; PC Soccer = Perceived Competence in soccer; SDM Soccer = Self-determined motivation in soccer; * = $p < .05$.

Figure 11.
Path coefficients for the respecified motivational model of adult influence in youth soccer (Model 3).

motivation made theoretical and substantive sense, particularly when one considered the deletion of perceived soccer autonomy from the hypothesized model. The theory of self-determined motivation holds that autonomy support can influence self-determined motivation through changes in competence or autonomy. The direct relationship between autonomy support from the mother and the composite measure of self-determined motivation may have represented the indirect effect of autonomy support, provided by the mother, upon self-determined motivation through changes in perceived soccer autonomy. In the interest of further examining the relationship between parental autonomy support and self-determined motivation, the path between perceived autonomy support from the

mother and perceived soccer competence was replaced with a direct path between the perceived autonomy support from the mother and the composite measure of self-determined motivation in Model 4 (see Figure 12). This modification lead to an improvement in the overall fit of the model, $\Delta\chi^2(1) = 22.66$, $p < .001$. The path coefficients associated with the estimation of Model 4 are presented in Figure 12. The improved fit of Model 4 was also reflected in the indexes of fit, $\chi^2(226) = 312.67$, $p < .05$; GFI = .823; RMSEA = .057; CFI = .858; IFI = .864. The fit indexes, however, still suggested that Model 4 exhibited a poor to moderate fit with the data.



Note. PAS = Perceived autonomy support; PC Soccer = Perceived Competence in soccer; SDM Soccer = Self-determined motivation in soccer; * = $p < .05$.

Figure 12.
Path coefficients for the respecified motivational model of adult influence in youth soccer (Models 4 and 7).

A review of the standardized residuals and the modification indexes associated with the estimation of Model 4 gave evidence that a high degree of error covariance existed among a number of the items measuring perceived adult autonomy support and perceived soccer competence. The highest degree of error covariances was observed between the one item measuring perceived autonomy support from the mother and another item measuring perceived autonomy support from the coach, S.R. = 3.09, M.I. = 16.96. There was strong substantive evidence to correlate the error terms of the two items. Both items included the same stem 'When I ask my coach/mother to help me with a problem he or she/she asks me what I think before giving me his or her/her opinion'. Byrne (2001) suggests that error covariance between items is often the result of a high degree of content overlap in the items The correlation of the errors for the two items led to a significant improvement in the fit of the model, $\Delta\chi^2(1) = 18.56$, $p < .001$. The superior fit of Model 5 was also reflected in the indexes of fit, $\chi^2(225) = 294.11$, $p < .05$; GFI = .834; RMSEA = .057; CFI = .887; IFI = .892. As no changes were made to the causal structure of the model, Model 5 is not presented in a figure.

A review of the standardized residuals and modification indexes associated with the estimation of Model 5 provided evidence of further model misspecification due to error covariance. On this occasion another high degree of error covariance was found between an item measuring perceptions of autonomy support of the mother and an item measuring perceptions of autonomy support of the coach, S.R. = 1.79, M.I. = 10.55. Both items again followed the same stem, namely 'My coach/mother encourages me to be myself' and displayed a high degree of content overlap. Therefore, it seemed logical to correlate the errors between these items. The modification led to a significant

improvement in the fit of the model, $\Delta\chi^2(1) = 11.53$, $p < .001$. The superior fit of Model 6 was also reflected in the indexes of fit, $\chi^2(224) = 282.58$, $p < .05$; GFI = .841; RMSEA = .047; CFI = .904; IFI = .908. The fit indexes associated with the estimation of Model 6 also suggested that the model exhibited a moderate fit with the data. As no changes were made to the causal structure of the model, model 6 is not presented in a figure.

A review of the standardized residuals associated with the estimation of Model 6 gave further evidence of model misspecification due a high degree of error covariance. Two of the items measuring perceived competence in soccer 'In soccer I usually watch more than I play' and 'I am among the last to be chosen for a soccer scrimmage', exhibited a high level of error covariance, S.R. = 2.95. As the two items displayed a high degree of content overlap and redundancy (i.e., the items essentially made the same statement; 'I am not good at soccer'), there was enough substantive evidence to merit the correlation of their errors. This modification led to a significant improvement in the fit of the model, $\Delta\chi^2(1) = 10.12$, $p < .005$. The improved fit of Model 7 (Figure 12) was also reflected in the indexes of fit, $\chi^2(223) = 272.46$, $p < .05$; GFI = .848; RMSEA = .043; CFI = .919; IFI = .923. The indexes of fit associated with the estimation of Model 7 suggested the model exhibited a moderate to good fit with the data.

A final review of the standardized residuals and modification indexes associated with the estimation of Model 7 failed to provide any evidence to suggest that the overall fit of the model could be improved without violating its structural (i.e., creating an overfitted model) and theoretical integrity. Although the standardized residuals revealed two pairs of items that suffered from a high degree of error covariance there was no substantive or theoretical reason for correlating their errors.

The final respecified model (Model 7) demonstrated a moderate to good fit with the data (See Figure 12). Only two of the eight casual paths specified in the hypothesized model were found to be statistically significant in the final respecified model. These paths reflected the impact of perceived autonomy support from coach on perceived competence in soccer, $\beta = .32$, C.R. = 2.51, $p < .005$, and perceived competence in soccer on the composite measure of self-determined motivation, $\beta = .44$, C.R. = 2.80, $p < .005$. The predicted correlation between perceived autonomy support from the mother and coach was also supported at a significant level in the final respecified model, $r = .58$, C.R. = 4.12, $p < .001$. Only one casual path not specified a priori proved to be an essential and significant component of the causal structure and was added to the model. This path reflected the impact of perceived autonomy support from mother on the composite measure of self-determined motivation, $\beta = .62$, C.R. = 3.83, $p < .001$. The path coefficients associated with the estimation of Model 7 are presented in Figure 12 and Table 27. The measurement coefficients associated with the respecified model (Model 7) are presented in Table 28.

Table 27
Standardized path coefficients from the respecified motivational model of adult influence in youth soccer (Model 7)

Standardized Regression Weight	Estimate	S.E.	C.R.	*p*
PAS Mother – SDM	.62	.18	2.81	<.001
PAS Coach – Perceived Soccer Competence	.32	.04	2.51	<.001
Perceived Soccer Competence – SDM	.44	.46	3.83	<.001

Note. S.E., Standard error; C.R., Critical ratio; *p*, Significance level

The invariance of the final respecified model (Model 7) across gender and program structure was tested using the AMOS program. In testing for invariance across gender,

the goodness of fit of the initial multi-group (i.e., males and females, travel and recreational participants) model, is compared against the goodness of fit of the multi-group model when equality constraints are imposed upon the model's structural paths. The results of the analyses revealed that the causal structure of the respecified model was equivalent across gender, $\Delta\chi^2(4) = 2.76$, $p > .05$, but not program structure, $\Delta\chi^2(4) = 11.62$, $p < .05$. Having established that the causal structure of the respecified model was not equivalent across program structure, the next logical step was to determine which structural paths (i.e., factor loadings, factor covariances) contributed to the inequality of the model.

The process of testing for invariance across gender and program structure involves testing for of the structural paths, independently. A structural parameter is said to be invariant when the χ^2 value of the multi group model with the equality constraint imposed upon it differs significantly from the χ^2 value of the multi group model without the equality constraint. Structural parameters that are found to be invariant are cumulatively retained in the comparative model through the remainder of the invariance testing process. The invariance of subsequent parameters is then tested against the multi group model with equality constraints imposed upon the invariant structural parameters.

The invariance of all causal paths and inter-factor correlations associated with the respecified model (Model 7) was tested across program structure. Table 29 provides a sequential summary of the stages involved in the process of testing for invariance in the final respecified model across program structure. As previously identified, the χ^2 value of the multi group model with no equality constraints imposed upon it differed significantly from the χ^2 value multi group model with equality constraints imposed upon all of the

structural parameters. The first structural parameter to be tested for invariance across program structure was the correlation between perceived autonomy support from the coach and perceived autonomy support from the mother. Results indicated that the factor

Table 28
Standardized measurement coefficients from the respecified motivational model of adult influence in youth soccer (Model 7)

Standardized Regression Weight	Estimate	C.R.	*p*
M1 – Perceived Autonomy Support from Mother	.48	4.78	<.001
M2 – Perceived Autonomy Support from Mother	.46	4.73	<.001
M3 – Perceived Autonomy Support from Mother	.57	5.74	<.001
M4 – Perceived Autonomy Support from Mother	.65	6.42	<.001
M5 – Perceived Autonomy Support from Mother	.62	6.10	<.001
M6 – Perceived Autonomy Support from Mother*	.76		
C1 – Perceived Autonomy Support from Coach	.64	6.28	<.001
C2 – Perceived Autonomy Support from Coach	.49	5.05	<.001
C3 – Perceived Autonomy Support from Coach	.75	7.27	<.001
C4 – Perceived Autonomy Support from Coach	.69	6.68	<.001
C5 – Perceived Autonomy Support from Coach	.75	7.22	<.001
C6 – Perceived Autonomy Support from Coach*	.70		
PSCS1 – Perceived Soccer Competence*	.64		
PSCS2 – Perceived Soccer Competence	.05	.43	ns
PSCS3 – Perceived Soccer Competence	.63	4.51	<.001
PSCS4 – Perceived Soccer Competence	.63	4.51	<.001
PSCS5 – Perceived Soccer Competence	.17	1.49	ns
PSCS6 – Perceived Soccer Competence	.24	2.08	<.05
PSCS7 – Perceived Soccer Competence	.22	1.96	<.05
Intrinsic Motivation – Self-Determined Motivation*	.52		
Identified Regulation – Self-Determined Motivation	.68	4.28	<.001
Introjected Regulation – Self-Determined	-.40	-3.17	<.001
External Regulation – Self-Determined Motivation	-.19	-1.66	<.05

Note. S.E., Standard error; C.R., Critical ratio; *p*, Significance level
Critical ratios not calculated for measurement coefficients constrained to a value of 1.0

correlation between perceived autonomy support from the coach and the mother was equivalent across program structure, $\Delta\chi^2(1) = .64$, $p > .05$. The equality constraint associated with this parameter was retained in the comparative model. The second structural parameter to be tested for invariance across program structure was the causal

Table 29
Goodness of fit statistics for tests of invariance across travel and recreational youth soccer participants

Model Description	Comparative Model	χ^2	*df*	$\Delta\chi^2$	Δdf	*p*
1. Respecified model (Model A)	-	556.60	446	-	-	-
2 Structural paths constrained equal	Model A	568.22	450	11.62	4	<.05
3. Correlation (PAS Coach to PAS Mother) constrained (Model B)	Model A	557.24	447	.64	1	>.05
4 Path (PAS Coach to PSC) constrained (Model C)	Model B	557.29	448	.05	1	>.05
5 Path (PSC to SDM) constrained	Model C	564.46	449	7.17	1	<.05
6 Path (PAS Mother to SDM) constrained	Model C	564.10	449	6.81	1	<.05

Note. $\Delta\chi^2$, difference in χ^2 values between models; Δdf, difference in the degrees of freedom between models; PAS, perceived autonomy support from; PSC, perceived soccer competence; SDM, self-determined motivation

path reflecting the impact of perceived autonomy support from the coach upon perceived competence in soccer. The results again indicated that the parameter was invariant across program structure, $\Delta\chi^2(1) = .05, p > .05$. Therefore, the equality constraint associated with this parameter was retained in the comparative model. The third structure parameter to be tested for invariance across program structure was the causal path that reflected the impact of perceived competence in soccer upon the composite measure of self-determined motivation. On this occasion the results revealed that the parameter was not invariant across program structure, $\Delta\chi^2(1) = 7.17, p < .05$. In response, the equality constraint associated with this pathway was removed from the comparative model. The final structural parameter to be tested for invariance across program structure was the causal path reflecting the impact of perceived autonomy support from the mother upon

the composite measure of self-determined motivation. The results again indicated that the parameter was not invariant across program structure, $\Delta\chi^2(1) = 6.81, p < .05$.

Program and Gender Differences in Biological Maturational Status

A 2 (league) x 2 (gender) analysis of variance was conducted to examine gender and program related differences in biological maturity. The analysis failed to reveal any significant effects for gender, $F(1,114) = 1.21, p > .10, \eta = .10$, league structure, $F(1,114) = 1.50, p > .10, \eta = .11$. A significant interaction, however, was observed for gender and program structure in biological maturity, $F(1,114) = 3.03, p < .10, \eta = .16$. Though significant, the magnitude of the interaction was relatively small. A closer inspection of the interaction between gender and program structure in biological maturity revealed a disordinal interaction (see Figure 13). Post hoc-analyses (Tukey's HSD) revealed that males participating in the travel leagues were significantly more maturationally advanced in their status, for their age, than the males participating in the recreational programs and the females participating in the travel programs. Descriptive statistics associated with the analysis of gender and program related differences in biological maturity are presented in Table 30.

Table 30
Means and standard deviations for biological maturity Z scores as a function of gender and program structure

	Travel			Recreational			Gender		
	n	*M*	*SD*	*n*	*M*	*SD*	*n*	*M*	*SD*
Males	12	.51	1.06	32	-.28	(1.41)	44	-.06	(1.36)
Female	25	-.24	(1.30)	46	-.11	(1.18)	71	-.15	(1.21)
Program	37	.02	(1.26)	78	-.18	(1.27)			

Note. Z Scores are age and gender specific

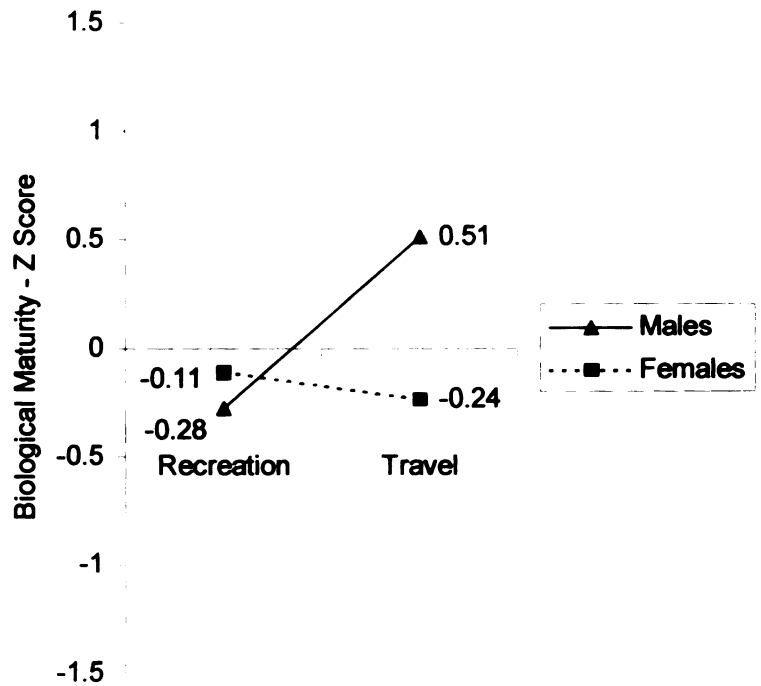


Figure 13.
The interaction between gender and league structure in biological maturity.

Biological Maturity and Perceptions of Physical Competence

One-tailed Pearson product moment correlations were conducted to examine the relationship between biological maturity and perceptions of physical competence. Separate analyses were conducted for males and females. The results of the analyses failed to support the predicted relationships between biological maturity and perceptions of physical competence in males, $r(44) = -.11$, $p > .05$ (See Figure 14 in Appendix I.), and females, $r(71) = .01$, $p > .05$. (See Figure 15 in Appendix I).

Biological Maturity and Perceptions of Soccer Competence

One-tailed Pearson product moment correlations were also conducted to examine the relationship between biological maturity and perceptions of soccer competence.

Again separate analyses were conducted for males and females. The results of the analyses for boys, $r(44) = -.06$, $p > .05$ (See Figure 16 in Appendix I.), and girls, $r(71) = .17$, $p > .05$ (See Figure 17 in Appendix I.), failed to support the predicted relationships between biological maturity and perceptions of soccer competence.

Biological Maturity and Perceptions of Physical Competence in Youth Aged Above and Below the Mean Ages of Peak Height Velocity

The males and females were separately split into two distinct groups based upon their current age and the age at which peak height velocity generally occurs in each sex. As previously indicated, females aged above 11.70 years and males aged above 14.10 years were categorized as being aged above the mean age of peak height velocity. Accordingly, females aged below, 11.70 years and males aged below 14.10 years were categorized as being aged below the mean age of peak height velocity.

Separate one-way Pearson product moment correlations were conducted for the boys and girls aged above and below the mean ages of peak height velocity. The results of the analyses for males gave evidence to suggest that the nature and direction of the relationship between biological maturity and perceptions of physical competence varied before and after the period of peak height velocity. A significant, positive and particularly strong correlation was observed between biological maturity and perceptions of physical competence in males who were above the mean age of peak height velocity, $r(5) = .85$, $p < .05$. (See Figure 18 in Appendix I.) In contrast a negative, yet non-significant relationship, was observed between biological maturity and perceptions of physical competence in the males who were below the mean age of peak height velocity, $r(39) = -.19$, $p > .05$. (See Figure 19 in Appendix I.)

The results of the analyses for females failed to produce any significant results. In girls aged below the mean age of peak height velocity, a positive, yet non-significant, correlation was observed between biological maturity and perceived physical competence, $r(41) = .11, p > .05$. (See Figure 20 in Appendix I.) In contrast a negative, yet non significant, correlation was observed between biological maturity and perceptions of physical competence in girls aged above the mean age of peak height velocity, $r(29) = -.20, p > .05$. (See Figure 21 in Appendix I.)

Biological Maturity and Perceptions of Soccer Competence in Youth Aged Above and Below the Mean Ages of Peak Height Velocity

The correlations of biological maturity and perceptions of soccer competence in males and females aged above and below the mean age of peak height velocity failed to produce any significant results. A positive, yet non-significant relationship, was observed between biological maturity and perceived soccer competence for males aged above the mean age of peak height velocity, $r(5) = .33, p > .05$ (See Figure 22 in Appendix I). In contrast, a negative relationship between biological maturity and perceptions of soccer competence was observed in males aged below the mean age of peak height velocity, $r(39) = -.07, p > .05$. (See Figure 23 in Appendix I) A series of positive, yet non-significant, correlations were observed between biological maturity and perceptions of soccer competence in females aged below the mean age of peak height velocity, $r(41) = .16, p > .05$ (See Figure 24 in Appendix I.), and females aged above the mean age of peak height velocity, $r(29) = .16, p > .05$. (See Figure 25 in Appendix I.)

Body Mass Index and Perceptions of Physical Competence

Partial one-tailed Pearson product moment correlations, controlling for age, were conducted to examine the relationship between body mass index (BMI) and perceptions of physical competence. Again, separate analyses were conducted for boys and girls. The results of the analyses failed to support the predicted relationships between body mass index and perceptions of physical competence in males or females. A negative yet non significant correlation was observed between BMI and perceptions of physical competence in males, $r(52) = -.14$, $p > .05$. (See Figure 26 in Appendix I.) In females, a positive yet non significant relationship was observed between BMI and perceptions of physical competence, $r(71) = .12$, $p > .05$. (See Figure 27 in Appendix I.)

Body Mass Index and Perceptions of Soccer Competence

Partial one-tailed Pearson product moment correlations, controlling for age, were also conducted to examine the relationship between body mass index and perceptions of soccer competence. Again, separate analyses were conducted for boys and girls. The results of the analyses failed to support the predicted relationships between body mass index and perceptions of soccer competence. In males, a marginally positive and non-significant relationship was observed between BMI and perceptions of soccer competence, $r(52) = .02$, $p > .05$. (See Figure 28 in Appendix I). A marginally positive, yet non significant, relationship was also observed between BMI and perceptions of soccer competence in females, $r(71) = .06$, $p > .05$. (See Figure 29 in Appendix I.)

CHAPTER V

DISCUSSION

The primary purpose of the current investigation was to empirically test a motivational model of adult influence in youth soccer that was founded upon cognitive evaluation theory (Deci & Ryan, 1985). The hypothesized model predicted that the youth soccer players who perceived their coaches, mothers, and fathers as being more autonomy supportive would report higher perceptions of soccer competence and higher perceptions of autonomy in youth soccer. In turn, the model predicted that the players who reported higher levels of perceived autonomy and perceived competence would also report higher levels of self-determined motivation.

Structural equation modeling failed to empirically support the structural validity of the hypothesized model. This failure may have been related to a number of factors including collinearity, instrument reliability, and sample size. As previously noted, all three measures of perceived autonomy support were significantly correlated with one another. The magnitude of these correlations ranged from .35 to .69. Collinearity between predictive factors increases the likelihood that regression coefficients associated with these factors will have high standard errors, and thus reduce the statistical power of the analysis.

Structural equation modeling assumes that the measurement of each latent variable is psychometrically sound (Byrne, 2001). The measures of perceived competence in soccer and perceived autonomy in soccer, however, both demonstrated low levels of reliability. Low levels of reliability in a specific measure can result in large standard errors for regression coefficients associated with this measure. This reduces the

statistical power of the analysis and the likelihood that regression coefficients associated with the measures will be observed at a significant level.

A review of the results associated with the estimation of the hypothesized model indicated that the standard errors of the path coefficients associated with the measure of perceived adult autonomy were not severe (see Table 25). The standard errors associated with the measures of perceived autonomy in soccer and perceived competence in soccer, however, were large enough to be of concern.

Structural equation modeling also assumes that the size of the sample is adequate for the model that is to be tested. When sample sizes are small, maximum likelihood estimation tends to produce χ^2 values that are over inflated. This reduces the likelihood that the model will demonstrate an appropriate level of fit with the data. The size of the sample in the current investigation, though not small, was moderate. A review of the fit indexes sensitive to sample size (e.g., CFI, IFI) suggested, however, that even when sample size was controlled for, the hypothesized model did not provide an adequate fit with the data.

Modifications to the hypothesized model (Model 1) based upon post-hoc analyses and criteria established by Byrne (2001) produced a respecified model (Model 6) that demonstrated a moderate to good level of fit with the data. Youth soccer players who perceived their coaches as being more autonomy supportive reported higher perceptions of their competence in soccer. In turn, players who perceived themselves as being more competent in soccer also reported higher levels of self-determined motivation. Given the role of the coach as an educator, it is perhaps not surprising that the relationship between perceptions of autonomy support from the coach and self-determined motivation were

mediated by perceptions of soccer competence. This result is consistent with Cognitive Evaluation Theory and the findings of prior research examining the relationship between coaching behaviors and motivation in youth sport. As previously indicated, athletes who perceive their coaches to be more autonomy supportive tend to exhibit a more self-determined motivational profile (Amorose & Horn, 2000; Goudas & Biddle, 1996; Vallerand & Pelletier, 1985) and a more positive image of themselves (Goudas & Biddle, 1996; Vallerand & Pelletier, 1985).

The causal structure of the respecified model also indicated that youth soccer players who perceived their mothers as being more autonomy supportive were more likely to report higher levels of self-determined motivation. This result only partially supported Cognitive Evaluation Theory as the relationship between self-determined motivation and perceived autonomy support is supposed to vary as a function of changes in perceived autonomy or perceived competence. Contrary to expectation, the participants' perceptions of autonomy support from their fathers were found to be unrelated to self-determined motivation in youth soccer.

The mothers of the soccer players, in comparison to fathers, appeared to be more actively involved in their children's experiences, providing both logistical and emotional support (i.e., transporting players to and from practice and competitions, attending practices and competitions). As a result, mothers may have had more of an opportunity to share in, and gain insight into, their children's experiences in youth soccer. This, in turn, may have resulted in mothers being more capable of providing autonomy support and having an impact upon the self-determined motivation of their children.

Alternatively, children and adolescents may be more likely to perceive, and rely upon, their mothers as a source of autonomy support.

There is a growing body of evidence to suggest that the behavior of mothers, and not fathers, may have a greater impact upon children's experiences in youth sports. As previously identified competitive youth wrestlers, who perceived lower levels of maternal pressure and fewer negative maternal performance reactions, were more likely to report higher levels of enjoyment (Gould, et al., 1991; Gould, et al., 1983; Scanlan & Lethwaite, 1986). Similarly, research conducted in the UK, suggests that although fathers are more likely to be involved in introducing the child to sport, mothers are more likely to be involved in children's continued participation (Rowley, 1986).

The failure to observe a relationship between perceptions of autonomy support from the father and self-determined motivation in youth soccer was surprising. Fathers have traditionally been perceived as being the parent who is most involved and most influential in the experiences of young athletes. The parenting style of fathers, however, may be less conducive to the development of self-determined motivation. Indeed, a review of the descriptive data for the analyses of group and gender differences in perceived adult autonomy support (Tables 22 and 23) revealed that fathers were perceived as being less autonomy supportive than mothers. Fathers may be more reluctant to share control with their children and may feel that such actions would undermine their position of authority within the family. Alternatively, children and adolescents may be less likely to rely upon, or perceive their fathers as a source of autonomy support. As previously noted, Grolnick and Ryan (1991) found that self-

determined motivation in high school students was unrelated to their perceptions of autonomy support from their fathers.

Although the respecified model provides some insight into the relationship between adult autonomy support and self-determined motivation in youth soccer, it is important to recognize that this model is framed within an exploratory, rather than confirmatory, mode. The respecified model is exploratory in the sense that it focuses upon the detection of missing parameters in the hypothesized model. Hence, the respecified model acts as a guide for future investigation and not as a definitive model of adult influence upon self-determined motivation in youth soccer. It is also important to recognize that there is an increased risk of making Type I or Type II errors when post-hoc model fitting in the analysis of covariance structures (Byrne, 2001). With multiple model specifications there is also an increased chance that any modifications to the models will be related to the characteristics of the sample used (e.g., size, heterogeneity).

To address the problems associated with post hoc model fitting, the structural validity of the respecified model was tested across gender and program structure. Cross validation of the respecified model across males and females, and youth participating in recreational and travel soccer demonstrated that the model was equivalent across gender, but not program structure. Further tests revealed that the parameters that reflected the impact of perceived autonomy support from the mother upon self-determined motivation, and the impact of perceived soccer competence upon self-determined motivation were invariant across program structure. This failure of the respecified model to demonstrate equivalence across program structure may have been the result of low statistical power. As previously noted, the number of participants in recreational and travel programs was

not equivalent. The result does, however, suggest future researchers examining the motivational influences of adults in youth sports may wish to differentiate between youth participating in recreational and more competitive programs. However, any future research should attempt to revalidate the hypothesized model using more psychometrically sound measures of perceived autonomy and competence in soccer before attempting to validate the respecified model.

In accordance with research conducted by Fortier and her associates (Fortier et al., 1995), it was predicted that male soccer players, in comparison to female soccer players, would report lower levels of intrinsic motivation and identified regulation, and higher levels of introjected regulation, external regulation, and amotivation. The results of the current study revealed, however, that male and female soccer players did not differ significantly in the measures of intrinsic motivation, introjected regulation, external regulation, and amotivation. Contrary to expectations, males reported significantly higher levels of identified regulation than females did. This difference, though small in its magnitude, is surprising as identified regulation represents a more self-determined form of extrinsic motivation. Identified regulation, by definition, refers to behaviors in which the goal of action extends beyond those inherent to the activity itself (e.g., improved fitness, playing competitive soccer as an adult). A long-term goal of youth soccer players, which is not inherent to the activity itself, might be to play competitive soccer in the collegiate or professional ranks. Males in comparison to females may hold greater expectations of playing competitive soccer as adults. As a result, males may feel that they are more committed to their sport and may have come to identify more with their decision to participate in soccer. Although girls have the opportunity to play competitive

soccer at the college and professional ranks, there is more opportunity for males to compete at these levels.

The current investigation also examined differences in self-determined motivation across program structure. In accordance with the research conducted by Fortier and her associates (Fortier et al., 1995), it was predicted that youth participating in travel, in comparison to recreational soccer, would report higher levels of introjected regulation, external regulation, and amotivation, and lower levels of intrinsic motivation and identified regulation. The results of the current study revealed that recreational and travel soccer players did not differ significantly across any of the five motivational dimensions included in the SRQ-S. These results, though not predicted, are encouraging as they counter concerns that participation in more competitive or specialized youth sports programs may reduce intrinsic motivation and feelings of self-determination (Fortier, et al. 1995). Deci and Ryan (1985) propose that competition can have a facilitative or debilitative effect upon self-determined motivation. The effect, however, is dependent upon the individual's perceptions of the competitive environment as controlling or not. In line with their reasoning, one might contend that although travel programs may be more competitive than recreational programs, the players participating in travel programs did not perceive their environments as being any more controlling.

A significant group by program interaction was observed for the measure of introjected regulation. In the context of travel soccer, females reported higher levels of introjected regulation than males. In contrast, males participating in recreational programs reported higher levels of introjected regulation than their female counterparts.

The nature of this interaction may have been the result of gender differences in perceptions of control. Parents of youth participating in travel soccer programs generally invest a great deal of time, effort, and money in supporting their children. Females, in comparison to males, may be more inclined to perceive these investments as controlling, rather than informational. The demands associated with participation in travel soccer programs (i.e., more time spent traveling, overnight stays) may also lead parents to exercise more control over their daughters than their sons. This may lead females to internalize these external contingencies, resulting in lower perceptions of self-determination, greater feelings of guilt, and a greater feeling of pressure to succeed or continue participating in the sport (i.e., I would feel guilty if I did not continue playing soccer). In the context of recreational soccer, males may be more inclined to perceive their social environment as controlling. Traditionally, society has placed a greater value upon participation in sport for males. Males participating in recreational soccer may have perceived a greater degree of external pressure to participate in soccer or sport in general. Perceptions of external pressure from parents or peers may have resulted in males internalizing these external contingencies and may have lead to reduced feelings of self-determination and control.

Male and female youth soccer players, and players participating in recreational and travel programs, did not differ significantly in their perceptions of adult autonomy support. These results, though not predicted, are consistent with the relative absence of gender and program related differences in self-determined motivation. The results of this analysis are encouraging as they counter concerns that parents and educators of male athletes, and athletes participating in more competitive sports programs, are less likely to

adopt autonomy supportive styles of behavior. As previously noted, Brophy and Good (1986) reported that teachers tend to be more critical of male students, are more likely to adopt a less autonomy supportive style of teaching when dealing with males, and are more likely to view males as being less motivated, less able, and less well behaved. Similarly, Vallerand and associates (Vallerand et al., 1997) reported that boys, in comparison to girls, were less likely to perceive their teachers, parents, and academic administrators as being autonomy supportive. Research in the context of youth sports has demonstrated that the athletes of coaches who employ more informational and less controlling approaches to teaching report higher levels of success, competence, and enjoyment (Horn, 1985). Less autonomy supportive styles of teaching may undermine the development of self-determined motivation in boys and may further inhibit the learning and performance of male students or athletes.

Male and female soccer players, and players participating in recreational and travel programs did not report any significant differences in perceived soccer competence. These results, though not predicted, are consistent with the relative absence of program and gender differences in self-determined motivation and perceived adult autonomy support. Given that travel teams hold trials to select the most competent players it is surprising that travel participants did not report higher levels of perceived soccer competence. This result, however, may have been related to how the participants judged their competence in soccer. Research conducted by Horn and Hasbrook (1986, 1987) and Horn and Weiss (1991) has consistently demonstrated that children between the ages of ten and fourteen years are more likely to rely upon peer comparison and evaluation as a source for judging their competence. As a result, the participants in the

recreational and travel programs may have judged their competence in relation to the abilities of their teammates and not a more common reference group (e.g., classmates, recreational and travel players). Similarly, male and female soccer players may have judged their competence in soccer relative to the ability of soccer players of their own gender.

As predicted, male soccer players reported significantly higher perceptions of autonomy in soccer than female soccer players. This result, however, is not consistent with the relative absence of gender difference in self-determined motivation and perceptions of adult autonomy support. Given the low reliability of the measure of perceived autonomy in soccer, this result should be interpreted with a degree of caution. Soccer players in recreational and travel programs did not differ in their perceptions of autonomy in soccer. This result, though not predicted, is consistent with absence of program related differences in self-determined motivation and perceptions of adult autonomy support.

The relative absence of gender or program related differences in self–determined motivation, perceived autonomy support and perceptions of autonomy may be attributable to the similarity of male and female, and travel and recreational soccer programs at the youth level. Although youth participating in travel programs tend to practice and compete more frequently, travel greater distances to and from competition, undergo selection trials, and play a greater number of games during the season, their experiences are perhaps more similar to those of recreational players than they are different. Youth participating in recreational and travel programs both compete in regional leagues, and hold structured practices under the supervision of a coach.

Similarly, youth participating in recreational and travel programs generally do so on a voluntary basis. The experiences of coaches in recreational and travel programs may also be more similar than they are different. Both sets of coaches tend to participate on a voluntary basis, and do not receive any payment for their work. The coaches of travel teams may experience higher levels of scrutiny from the parents of players. Their greater experience and knowledge of motivating young soccer players may, however, offset this difference.

As predicted, soccer players competing in the travel programs reported significantly higher perceptions of physical competence than the soccer players competing in recreational programs. This result may have been related to a number of factors including the policies for selecting players in travel soccer, and the populations against which the players judged their competence. First, it is likely that the soccer players on travel teams were more physically competent than soccer players on recreational teams. Prior to the competitive season travel teams hold trials to select the most competent players. The more physical, aggressive, and competitive nature of play in travel soccer may lead coaches to exclude players that are less physically competent. As recreational soccer programs do not hold trials, the less physically competent players are not excluded from participation. Secondly, the generic (i.e., non-sport specific) nature of the scale used to measure perceived physical competence makes it less likely that the soccer players would have judged their competence relative to their teammates. The soccer players may have been more likely to judge their physical competence against a more general population, such as their classmates (i.e., children of their same age and gender who are not playing soccer). These factors, combined, may explain why the

youth participating in the travel programs reported significantly higher perceptions of their physical competence but not their soccer competence.

Contrary to expectations, male soccer players did not report significantly higher perceptions of physical competence than female soccer players. This result may be related to the fact that all of the participants in the current study were involved in youth sports. Many of the studies that have identified significant gender differences in perceived physical competence have included both athletes and non-athletes. Given that males are more likely to participate in sports, and that participation in sport is associated with high perceptions of physical competence, it is perhaps not surprising that these studies have observed gender differences in perceived physical competence. Although, gender differences in perceived physical competence might exist in the general population, it appears that this difference may be eliminated or reduced in the athletic population.

The primary purpose of the third phase of the investigation was to examine the relationship between biological maturity and a number of variables related to participation motivation in youth soccer. Specifically, the investigation sought to examine gender and program related differences in biological maturation, the relationships between biological maturation and perceptions of soccer and physical competence, and the relationships between body mass index and perceptions of physical and soccer competence. In addition the researchers wished to examine the heights, weights, and BMI values of the male and female soccer players and compare them against US reference values.

The heights of the male soccer players approximated the reference medians, through ages 9 to 15. The weights and BMI values of the male players, however, were above the reference medians in all of the age groups. In Europe and North America the average heights and weights of male youth soccer players fluctuate above and below the reference medians for the general population from childhood to mid adolescence (Malina et al., 2000). In later adolescence, however, the heights of male soccer players typically fall at or below the reference medians, while the weights continue to fall above and below the reference medians. The male soccer players greater weight, relative to height, most likely reflect an increase in proportions of fat-free mass (Malina et al., 2000). Male youth soccer players tend to be dominant mesomorphs (Siegel, Katzmarsyk, & Malina, 1996).

The heights of the female soccer players were above the reference medians in 4 of the 6 age groups. The weights of the female soccer players, however, were above the reference medians in all of the age groups and above the 75th centile in the 13 and 14 year old age groups. The BMI values of the female soccer players were also above the reference medians in all of the age groups. Collectively these results suggest that female youth soccer players, like their male counterparts, have greater weight for height, particularly in the older age groups. The greater weight for height of the female participants may be attributable to gains in both fat mass and fat free mass.

The results of the current study indicated that male and female soccer players, and soccer players participating in recreational and travel programs, did not differ significantly in their biological maturational status. Males and females at all stages of maturity status are represented in youth soccer programs. Male soccer players tend to be

average to advanced in the maturity status. The maturity status of the male soccer players is consistent with their size and physique. Males that are average or advanced in the maturity status tend to have a greater weight to height ratio and a more mesomorphic frame. The female youth soccer players in the current investigation, like most female athletes, tended to be average to delayed in their biological maturity status. The maturity status of the females is relatively consistent with their size and physique, particularly in the younger age groups. Females that are average or delayed in their maturity status typically have heights and weights that approximate median reference values.

As predicted, a significant gender by program structure interaction was observed in biological maturational status. A closer examination of the relationship between gender, program structure, and biological maturity revealed a disordinal interaction. The males participating on travel teams were typically advanced in their maturational status. In contrast, males who participated in recreational soccer programs tended to be slightly delayed in their maturational status. Travel teams may systematically exclude late maturing males in favor of males that are advanced in their maturational status. This lends support to Malina's contention that maturational status acts as an exclusionary factor in elitist soccer programs for males (Malina et al., 2000). The more aggressive, physical, and competitive nature of play in travel programs may have lead team coaches and managers to select those males who are maturationally advanced for their age. In addition, the age at which males generally enter their age divisions (e.g., 11-13 boys, 13-15 boys) in travel soccer may also lead coaches and managers of travel teams to select players that are maturationally advanced for their age. Soccer players typically enter their age division at the lower end of the age bracket (e.g., 13 years in 13-15 years age

bracket). Greater physical size, mass, and strength may afford early, in comparison to average or late, maturing males an advantage when competing against males who are older than them, particularly in a league that is more physically competitive. For example, when competing against 14 and 15 year old boys, a 13 year old boy who is advanced in his maturational status may be more physically competitive than a 13 year old boy who is average or delayed in his maturational status. As previously noted, Malina and his associates (Malina et al., 2000) found that the proportion of early, in comparison to late, maturing males participating in elite level soccer programs increases significantly from the age of 13 years (Malina et al., 2000). Similarly, Pena-Reyes and her associates observed that advanced maturational status is associated with superior performance on a number of measures of physical competence in youth soccer players (Pena-Reyes et al., 2000).

The results of the current investigation failed to provide any evidence to suggest that biological maturity acted as a selection factor in girls' travel soccer. Although the girls participating in travel, in comparison to recreational, programs were marginally more delayed in their maturational status, the magnitude of this difference was not large. The results did, however, suggest that female soccer players in general tend to be slightly delayed in their maturational status. Although maturational status does not act as an exclusionary factor in girls' travel soccer, it may act as an exclusionary factor in terms of playing soccer in general. Delayed or average maturational status in females is associated with a leaner frame and superior performance in a number of physical tasks, particularly those that demand a significant degree of endurance or the bearing of body weight (Malina & Bouchard, 1991). As the sport of soccer is a weight bearing activity

and requires a significant degree of endurance, it is perhaps not surprising that female soccer players tend to be average or delayed in their maturation status.

In accordance with research conducted by Pena-Reyes and associates (Pena-Reyes et al., 2000) and a review of research examining the relationship between maturational status and physical performance in females (Malina & Bouchard, 1991), it was predicted that the biological maturational status would be positively correlated with males' perceptions of soccer competence and negatively correlated with females' perceptions of soccer competence. The results of the current investigation suggest that biological maturity is not related to male or female players' perceptions of competence in soccer. Biological maturity failed to correlate significantly with perceptions of soccer competence in males or females. Separate correlations for males and females aged either above or below the mean age of peak height velocity also failed to identify any significant correlations between biological maturity and perceptions of competence in soccer. Alternative factors such as skill, experience, or knowledge of the game may be more influential determinants of competence or success in soccer.

A significant and positive correlation was observed between biological maturity and perceptions of physical competence in males aged above the mean age of peak height velocity. In contrast, biological maturity was found to be unrelated to perceptions of physical competence in males aged below the mean age of peak height velocity. Separate correlations for females aged either above or below the mean age of peak height velocity also failed to reveal any significant correlations between biological maturity and perceptions of physical competence.

The existence of a moderate to strong relationship between biological maturity status and perceptions of physical competence in males aged above the mean age of peak height velocity makes substantive sense. Maturity associated variation in the growth and performance of males is at its greatest following the mean age of peak height velocity. Early maturing males have already experienced rapid gains in stature, mass, explosive strength, static strength, muscular endurance, and a decline in relative fat-free mass (Malina & Bouchard, 1991). In contrast, late maturing males have yet to experience any significant gains in these attributes. As previously noted, biological maturity acts as a significant determinant of the performances of male soccer players on a number of measures of physical competence including aerobic resistance, explosive power, and speed (Pena-Reyes et al., 2000). Such discrepancies in size and physical aptitude afford the early maturing male with a marked advantage in athletic and physical activities and may result in higher perceptions of physical competence in early maturing males.

Biological maturity in females, regardless of age, did not appear to be related to their perceptions of their physical competence. It is important to recognize that the results of the correlations between biological maturity and perceptions of physical and soccer competence are limited to youth participating in recreational and travel youth soccer. The nature of the sample in the current investigation may have influenced the direction and magnitude of the observed correlations, particularly in females. As previously noted, all of the participants in the current study were currently involved in youth sports. As participation in sport is associated with high perceptions of physical or sport-specific competence, individuals with low perceptions of competence may have been under-represented in the current sample. Similarly, female youth soccer players tend to be

delayed in their biological maturational status. Hence, early maturing females may also have been under-represented in the current sample. In order to gain a more comprehensive understanding of the true relationship between biological maturity and perceptions of physical competence, it is important that future researchers seek to include both athletes and non-athletes in their investigations, particularly when working with females.

Controlling for age, body mass index (BMI) was not significantly related to perceptions of soccer competence in males or females. The failure to observe the predicted relationships between BMI and perceptions of soccer competence may have been due to limitations associated with the population sample employed in the current investigation and the reliability of BMI as a measure of relative fatness. In athletes, and in particular adolescent male athletes, BMI may be more indicative of relative muscle mass than relative fat mass. This may explain why a slightly positive yet non-significant relationship was observed between BMI and perceptions of competence in males. Body mass index is a more reliable measure of relative fatness in females. Its value, however, may be limited when the sample upon which it is applied is restricted to athletes. This may explain why the relationship between BMI and perceived soccer competence in girls was relatively weak and failed to achieve the required significance.

Controlling for age, body mass index (BMI) was not significantly related to perceptions of physical competence in males or females. A series of weak, negative, and non-significant correlations were observed between BMI and perceived soccer competence in males and females. The failure to observe the predicted relationships between BMI and perceptions of physical competence may again have been due to

limitations associated with the sample and the reliability of BMI as a measure of relative fatness. As previously noted, BMI is a more accurate measure of relative fatness in the general population. In an athletic population, and in particular for adolescent males, BMI may be more reflective of relative muscle mass than fat mass.

The results of the current study highlight the limitations associated with using the BMI as a measure of relative fatness in young athletes. In order to gain a more complete understanding of the relationship between body composition and perceptions of physical competence it is imperative that future researchers include both athletes and non-athletes in their populations. Further, researchers wishing to examine the relationship between body composition and perceptions of competence may have to consider sacrificing the practicality of the BMI for the precision of alternative methods such as under water weighing, bioelectrical impedance, or sum of skinfolds.

CHAPTER VI

SUMMARY, CONCLUSIONS, & IMPLICATIONS

The findings of the current investigation have a number of important practical and theoretical implications. The first implication is that the autonomy supportive behavior of adults, in particular that of coaches and mothers, appears to be a significant determinant of self-determined motivation in youth soccer. Parents and coaches of youth soccer players need to be aware of how their behavior may influence children's reasons for participating in sport and other achievement related activities. Parents and coaches of youth soccer players need to recognize the importance of giving their players a sense of control and reinforcing their perceptions of self-competence. This can be achieved by giving young athletes the opportunity to make decisions with regards to the sports they choose to play, allowing them to take an active role in the selection of team rules, practice drills, and set plays. Adults also need to provide the opportunity for young athletes to express themselves, be creative, and try new skills, strategies, or activities (Vallerand, 2001). In addition, adults need to provide as much opportunity for young athletes to succeed, improve their skills, and develop a sense of competence. In doing so children will be more likely to enjoy their experiences in youth sport, feel competent, autonomous, and will be less likely to discontinue their participation in sport.

A second implication of the current investigation is that the behavior of mothers and fathers may not have the same level of impact upon the self-determined motivation of youth soccer players. In the current study, perceptions of autonomy support from the mother, but not the father were found to have an impact upon the self-determined

motivation of youth soccer players. To gain a more comprehensive understanding of the relationships between adult behavior and participation motivation in youth soccer, it is imperative that future research challenge traditional stereotypes regarding the involvement and influence of mothers and fathers in youth sports. Researchers should seek to explore the roles that mothers and fathers play in youth sports, the support systems that they provide, and the nature of their interactions with their children. Future research should also attempt to examine children's perceptions of adults and the roles or functions that they provide.

The results of the current investigation suggest that the gender and program related differences in self-determined motivation that are apparent in college athletes are not present in youth soccer. Further research, however, is required before one can make any confident statements regarding the presence or absence of gender and program related differences in self-determined motivation in collegiate and youth sports. If the results of the current study and the research conducted by Fortier and her associates (Fortier et al., 1995) are found to be consistent in subsequent studies, then a major goal of future research should be to investigate when and why any such changes in self-determined motivation occur. Social factors that could induce change in self-determined motivation may be worthy of investigation. These factors would include the behavior of coaches, athletic administrators, and the media. Similarly, the structure and purposes of recreational and competitive sports programs may also be responsible for changes in the self-determined motivation of athletes.

The results of the current investigation also provided evidence to support the contention that the biological maturational status of male soccer players may act as

exclusionary factor in travel soccer. Youth sports programs that emphasize elitism and/or implement selection policies (e.g., high school sports) need to recognize that many males who may be interested in participating in their sport may be excluded from participation on the basis of their maturational status or physical size. A number of the boys who participated in the recreational programs informally revealed to the instructors that they had attended trials for travel teams but had not been selected. In the interests of the long-term development of athletes and participation for all, it is important that the governing bodies recognize the need for soccer programs that do not employ selection policies or provide other developmental programs. Particularly, since the differences in size and physical aptitude of early and late maturing males decrease with age.

The results of the current investigation also provided empirical evidence to suggest that biological maturity was related to perceptions of physical competence in males, though only following the mean age of peak height velocity. Although this result was significant, it should be recognized that the number of participants involved in this analysis was small. To validate the direction and magnitude of the observed relationship between biological maturity and perceptions of competence, it is imperative that future researchers actively recruit more male participants aged between 14. 1 years (i.e., the mean age of peak height velocity in males) and 15 years (i.e., the oldest age group that reference data are available for mean percentage of predicted adult stature). Further, future researchers looking to examine the relationship between biological maturity and perceptions of physical competence in males and females also need to consider recruiting both athletes and non-athletes

A major limitation of the current investigation was the inadequate levels of internal reliability associated with a number of psychometric scales. The scales associated with the measurement of perceived physical competence, perceived soccer competence perceived autonomy in soccer, and external regulation demonstrated less than adequate levels of internal reliability. These results were surprising as all of these scales had been specifically designed for children and adolescents and had previously demonstrated adequate levels of internal reliability. As previously noted, low standards of reliability reduce the accuracy of the analyses and the confidence that one can have in their results.

A closer examination of each of the subscales failed to provide any evidence to suggest why they had failed to demonstrate more acceptable levels of reliability. The low reliability of these scales may, however, have been related to the length of the entire questionnaire and time at which the questionnaire was administered. The time taken to complete the entire questionnaire and be assessed for stature and mass ranged from 7 to 15 minutes, depending upon the age and ability of the participants. At the request of the coaches, the majority of the participants completed the questionnaire prior to participating in practice sessions. Some of the participants may have been eager to complete the questionnaire in order to spend more time practicing. The desire to start practicing may have led some participants to rush through the latter stages of the questionnaire and pay less attention to completing the questionnaire appropriately. During completion of the questionnaire, a number of the participants did indicate that the questionnaire was long.

With regards to the items measuring external regulation in the SRQ-S, it is possible that these items were not as relevant to the sport of soccer. As previously indicated the SRQ-S scale was modified from a sport specific version of the SRQ scale that was used to assess the self-determined motivation in young gymnasts (SRQ-G; Gagne et al., 2001)). The items designed to measure external regulation in the SRQ-S may identify behaviors that are more common to gymnastics than soccer (e.g., my parents or other family members give me money or rewards when I do gymnastics, my parents family or friends would be mad if I didn't do gymnastics any more). In comparison to parents of soccer players, parents of young gymnasts have to make greater investments in terms of money, time, and effort. Parents of young gymnasts typically pay thousands of dollars per year for the instruction of the children, equipment and travel to and from competitions. As a result of these investments, the parents of young gymnasts may be more likely to behave in a manner that is consistent with the items measuring external regulation in the SRQ-G and SRQ-S. Researchers need to examine the validity of the SRQ-G across different sports contexts. It is possible that researchers wishing to employ the SRQ in sports other than gymnastics may have to develop new items that are more representative of behavior in their sport.

The low levels of internal reliability naturally reduce the level of confidence that one can have in the results of the current investigation. In order to validate these results, it is imperative that future researchers seek to develop or employ more reliable measures of perceived autonomy, competence, and external regulation.

Another limitation of the current study is that it did not employ an experimental or longitudinal design. Therefore, it is not appropriate to interpret that the independent

variables caused any differences in the independent variables. It is possible that any of the observed differences in the dependent variables could have been caused by another variable that caused changes in both the independent and dependent variable. Finally, by employing a correlational or quasi-experimental design, it is not possible to determine the direction of the observed relationships. For example, the observed program related difference in perceived physical competence could reflect the impact of participation in travel programs upon perceptions of physical competence, or that travel programs select players that have high perceptions of their physical competence.

APPENDIX A

UNIVERSITY COMMITTEE ON RESEARCH INVOLVING

HUMAN SUBJECTS FORM

MICHIGAN STATE
UNIVERSITY

February 13, 2001

TO: Martha E. EWING
201 IM Sports Circle
MSU

RE: **IRB# 01-053** CATEGORY: EXEMPT 1-C

APPROVAL DATE: February 12, 2001

TITLE: THE RELATIONSHIP SELF DETERMINED MOTIVATION AND PERCEPTIONS OF ADULT AUTONOMY SUPPORT IN RECREATIONAL AND TRAVEL YOUTH SOCCER

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete and I am pleased to advise that the rights and welfare of the human subjects appear to be adequately protected and methods to obtain informed consent are appropriate. Therefore, the **UCRIHS approved this project.**

RENEWALS: UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Projects continuing beyond one year must be renewed with the green renewal form. A maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for a complete review.

REVISIONS: UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. If this is done at the time of renewal, please use the green renewal form. To revise an approved protocol at any other time during the year, send your written request to the UCRIHS Chair, requesting revised approval and referencing the project's IRB# and title. Include in your request a description of the change and any revised instruments, consent forms or advertisements that are applicable.

PROBLEMS/CHANGES: Should either of the following arise during the course of the work, notify UCRIHS promptly: 1) problems (unexpected side effects, complaints, etc.) involving human subjects or 2) changes in the research environment or new information indicating greater risk to the human subjects than existed when the protocol was previously reviewed and approved.

If we can be of further assistance, please contact us at 517 355-2180 or via email: UCRIHS@msu.edu. Please note that all UCRIHS forms are located on the web: http://www.msu.edu/user/ucrihs

Sincerely,

David E. Wright, Ph.D.
UCRIHS Chair

AK:

cc: Sean Cumming
202 IM sports Circle

OFFICE OF
RESEARCH AND GRADUATE STUDIES

University Committee on Research Involving Human Subjects

Michigan State University
246 Administration Building
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48824-1046

517/355-2180
FAX: 517/353-2976
b: www.msu.edu/user/ucrihs
E-Mail: ucrihs@msu.edu

APPENDIX B

CONSENT/ASSENT FORMS

Dear Parent/Guardian,

You and your child have been invited to participate in a study being conducted by the Institute for the Study of Youth Sports at Michigan State University and the East Side Soccer Club. The Institute for the Study of Youth Sport helps run skills workshops for the East Side Soccer Club and conducts education courses for youth sports coaches all over Michigan.

The purpose of this study is to see how children's perceptions of adult support (e.g., coaches and parents) helps motivates them to participate in youth soccer. A secondary purpose is to investigate how children's physical maturity, as assessed by their height in relation to their parents' heights, is related to their perceptions of competence in soccer. It is hoped that this research will help practitioners understand how coaches and parents can best motivate their children to excel in and enjoy sports.

As part of this study your child will be asked to complete a 15-minute questionnaire. All of their responses to the questionnaire will be entirely confidential- - no one except the primary researcher will have access to the questionnaires. Your participation in this study would be gratefully appreciated. However, please know that you may refuse to answer any questions or discontinue your participation at any time without any penalty. If you would like to participate then please have you and your child sign this form.

If you have any questions concerning your participation in this study, please contact us at 353-2180. Further if you have any questions related to human subjects, feel free to contact Dr. David Wright at the University Committee on Research Involving Human Subjects Office at 355-2180 or at 246 Administration Building, Michigan State University, East Lansing, MI 48824-1046.

Parent/Guardian: I have read and understood the information above and grant permission for (Child's Name):_____ to participate in this study.

Signature:_____ Date:_____

Child: I have read and understood the information above and volunteer to participate in this study

Signature:_____ Date:_____

Mother's Height in Feet & Inches _____

Father's Height in Feet & Inches _____

UCRIHS APPROVAL FOR
THIS project EXPIRES:

FEB 12 2002

SUBMIT RENEWAL APPLICATION
ONE MONTH PRIOR TO
ABOVE DATE TO CONTINUE

APPENDIX C

FIGURES 2 – 7 (MEAN HEIGHTS, WEIGHTS, AND BMI VALUES FOR MALES AND FEMALES)

Figure 2. The mean heights of male soccer players by age relative to, United States reference data (5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th}, and 95^{th} percentiles)....136

Figure 3. The mean weights of male soccer players by age relative to, United States reference data (5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th}, and 95^{th} percentiles)....137

Figure 4. The mean BMI values of male soccer players by age relative to, United States reference data (25^{th}, 50^{th}, 85^{th}, and 90^{th} percentiles)....138

Figure 5. The mean heights of female soccer players by age relative to, United States reference data (5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th}, and 95^{th} percentiles)....139

Figure 6. The mean weights of female soccer players by age relative to, United States reference data (5^{th}, 10^{th}, 25^{th}, 50^{th}, 75^{th}, 90^{th}, and 95^{th} percentiles)....140

Figure 7. The mean BMI values of female soccer players by age relative to, United States reference (25^{th}, 50^{th}, 85^{th}, and 90^{th} percentiles)....141

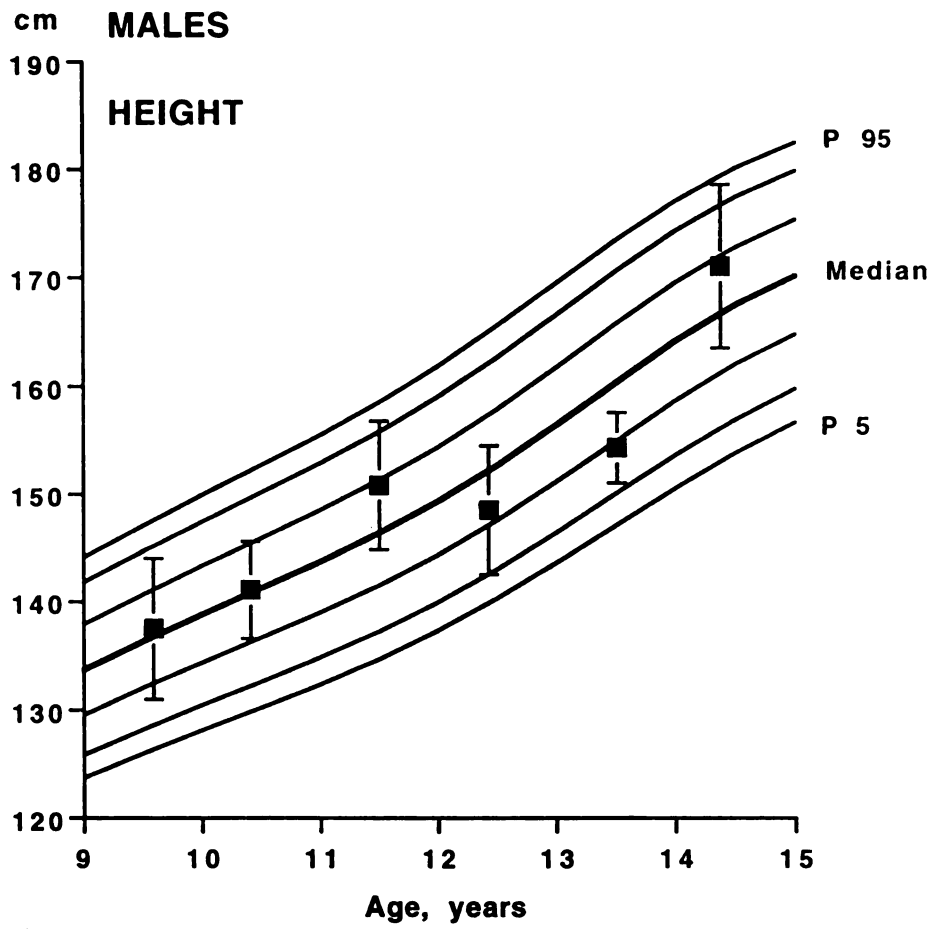

Figure 2. Mean heights of male soccer players by age relative to United States reference data (5th, 10th, 25th, 50th, 75th, 90th, 95th percentiles).

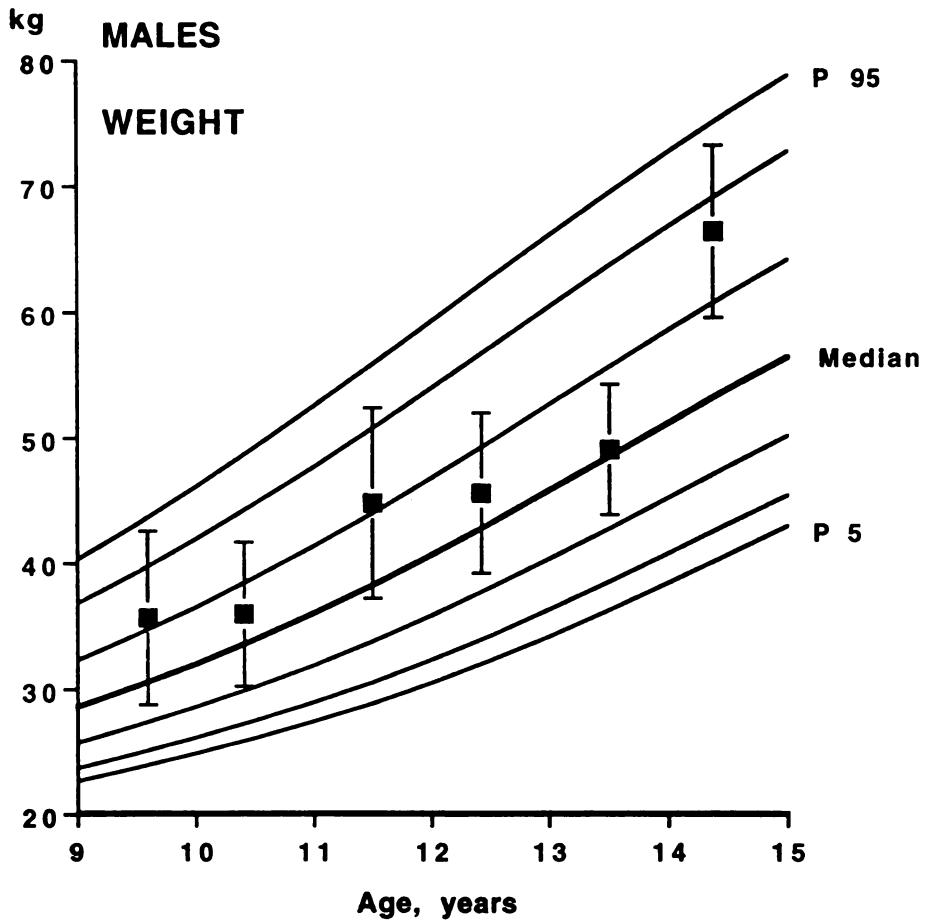

Figure 3. Mean weights of male soccer players by age relative to United States reference data (5th, 10th, 25th, 50th, 75th, 90th, 95th percentiles).

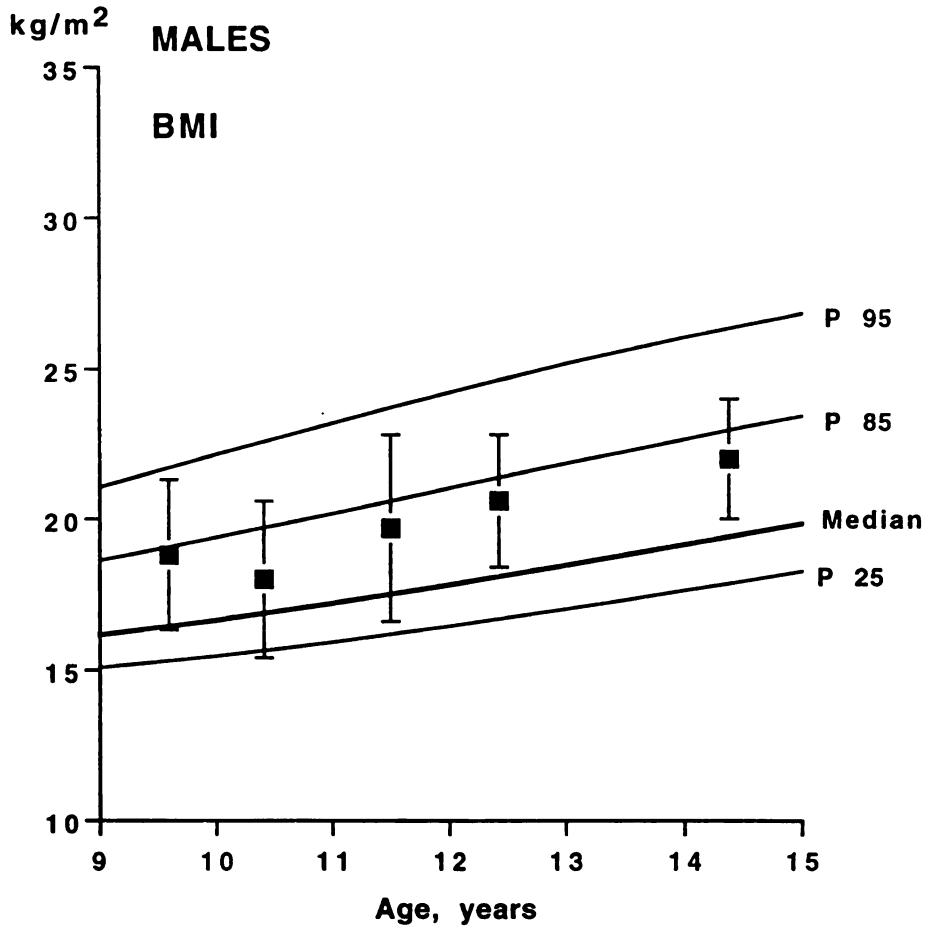

Figure 4. Mean BMI values of male soccer players by age relative to United States reference data (25th, 50th, 85th, 95th percentiles).

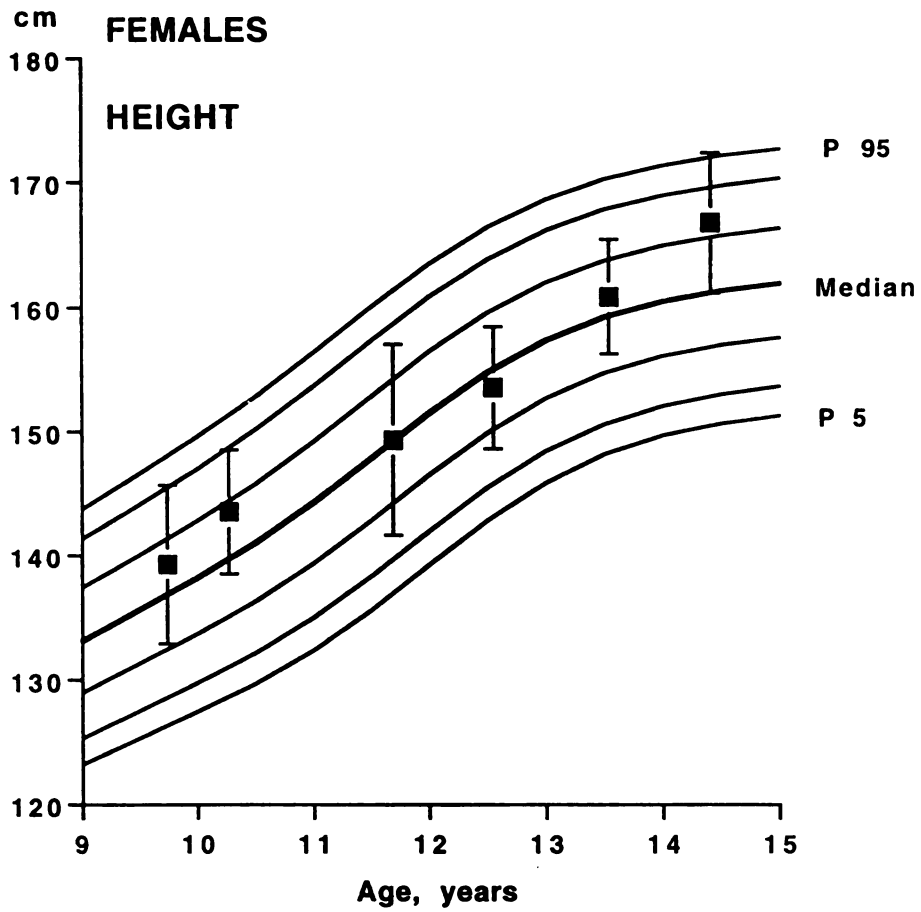

Figure 5. Mean heights of female soccer players by age relative to United States reference data (5th, 10th, 25th, 50th, 75th, 90th, 95th percentiles).

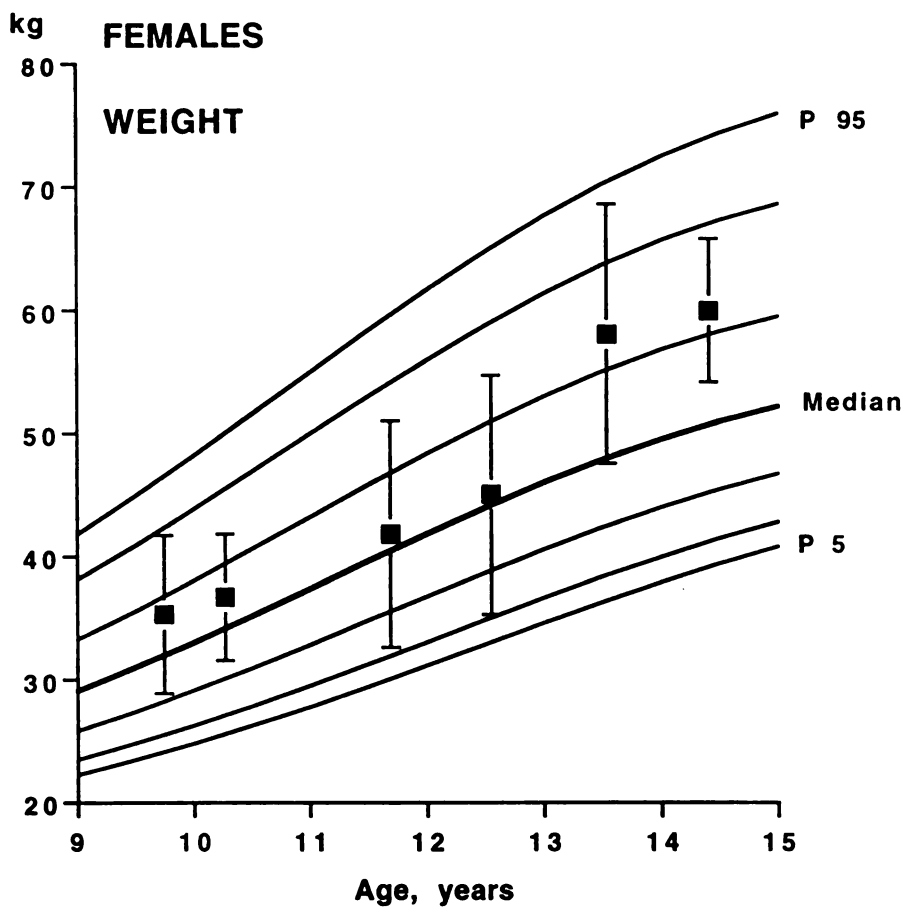

Figure 6. Mean weights of female soccer players by age relative to United States reference data (5th, 10th, 25th, 50th, 75th, 90th, 95th percentiles).

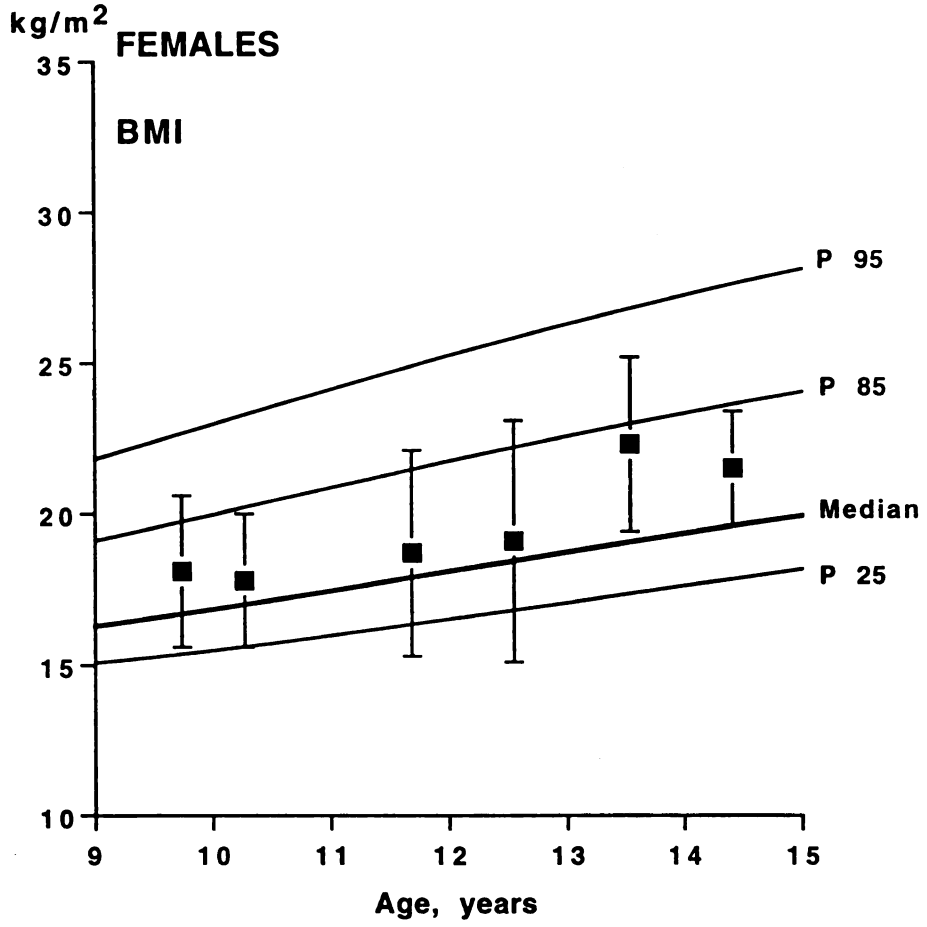

Figure 7. Mean BMI values of female soccer players by age relative to United States reference data (25th, 50th, 85th, 95th percentiles).

APPENDIX D

SELF REGULATION QUESTIONNAIRE – SOCCER (SRQ-S)

Why do you play soccer?

There are a variety of reasons why people play soccer. Please indicate, by circling a number, how true each of the reasons is for why you play soccer.

Why do you play soccer?	Not At all True			Somewhat True			Very True
1. For the pleasure I feel when I play soccer	1	2	3	4	5	6	7
2. I used to have good reasons for playing soccer but now I am asking myself if I should continue playing it	1	2	3	4	5	6	7
3. I would feel bad about myself if I was not taking the time to play soccer	1	2	3	4	5	6	7
4. It is a good way to get exercise	1	2	3	4	5	6	7
5. My parents or other family members give me money or other rewards when I play soccer	1	2	3	4	5	6	7
6. For the excitement I feel when I am really involved in soccer	1	2	3	4	5	6	7
7. I learn valuable lessons from soccer	1	2	3	4	5	6	7
8. It is absolutely necessary for me to play soccer to feel good about myself	1	2	3	4	5	6	7
9. It is not clear to me anymore; I really don't think soccer is my sport	1	2	3	4	5	6	7
10. My parents, other family members, or friends tell me to play soccer	1	2	3	4	5	6	7
11. For the pleasure of discovering new skills	1	2	3	4	5	6	7

Why do you play soccer?	Not At all True						Very True
12. I'm not sure why I still play soccer, I don't seem to be going anywhere in it	1	2	3	4	5	6	7
13. I think soccer is a useful way to stay healthy	1	2	3	4	5	6	7
14. My parents family or friends would be mad if I didn't play soccer anymore	1	2	3	4	5	6	7
15. I would feel awful if I didn't play soccer anymore	1	2	3	4	5	6	7

APPENDIX E

PERCEIVED SELF-COMPETENCE IN SOCCER AND PHYSICAL ACTIVITY SCALES

Soccer and Sports

In this questionnaire we'd like to know what you think you are good or bad at. Read each of the statements listed below and then show us how much you agree with each statement by circling the appropriate response. Remember, there are no right or wrong answers.

	Strongly Disagree	**Disagree**	**Agree**	**Strongly Agree**
I do very well at all kinds of sport	**1**	**2**	**3**	**4**
I do very well at soccer	**1**	**2**	**3**	**4**
I wish I could be a lot better at sports	**1**	**2**	**3**	**4**
I wish I could be a lot better at soccer	**1**	**2**	**3**	**4**
I think I could do well at just about any new sport I hadn't tried before	**1**	**2**	**3**	**4**
I think I could do well at just about any new soccer skill that I hadn't tried before	**1**	**2**	**3**	**4**
I usually prefer to watch instead of play games and sports	**1**	**2**	**3**	**4**
I feel that I am better than others my age at soccer	**1**	**2**	**3**	**4**
I don't do well at new outdoor games	**1**	**2**	**3**	**4**
In soccer I usually watch more than I play	**1**	**2**	**3**	**4**
I don't do well at new soccer skills	**1**	**2**	**3**	**4**
I feel that I am better than other kids my age at sport	**1**	**2**	**3**	**4**
I am among the last to be chosen for a soccer scrimmage	**1**	**2**	**3**	**4**

APPENDIX F

PERCEIVED AUTONOMY IN SOCCER SCALE

Soccer Practice & Ability

How much do you agree with the following statements? Circle the appropriate numbers for each answer.

	Strongly Disagree	Disagree	Agree	Strongly Agree
I can be good at soccer if I try hard enough	**1**	**2**	**3**	**4**
If I try to trap a ball and I miss it's usually because I didn't try hard enough	**1**	**2**	**3**	**4**
Anyone can be a good soccer player if they try hard enough	**1**	**2**	**3**	**4**
Kids who lose in soccer, lose because they didn't try hard enough	**1**	**2**	**3**	**4**

APPENDIX G

PERCEIVED ADULT AUTONOMY SUPPORT SCALES

Coaches and Parents

Please tell us how often your coach, mother, or father behaves in these ways.

	Never			Sometimes			Always
Coach							
My coach is always willing to help me make decisions.	1	2	3	4	5	6	7
When I ask my coach to help me with a problem he or she asks me what I think before giving me his or her opinion.	1	2	3	4	5	6	7
My coach encourages me to be myself.	1	2	3	4	5	6	7
My coach makes me feel that I could tell him or her anything.	1	2	3	4	5	6	7
My coach provides me with lots of opportunity to make personal decisions in what I do.	1	2	3	4	5	6	7
My coach openly acknowledges my thoughts and feelings although they may be different from his or hers.	1	2	3	4	5	6	7
Mother							
My mother is always willing to help me make decisions.	1	2	3	4	5	6	7
When I ask my mother to help me with a problem she asks me what I think before giving me his or her opinion.	1	2	3	4	5	6	7
My mother encourages me to be myself.	1	2	3	4	5	6	7
My mother makes me feel that I could tell her anything.	1	2	3	4	5	6	7

	Never			Sometimes			Always
My mother provides me with lots of opportunity to make personal decisions in what I do.	1	2	3	4	5	6	7
My mother openly acknowledges my thoughts and feelings although they may be different from hers.	1	2	3	4	5	6	7
Father							
My father is always willing to help me make decisions.	1	2	3	4	5	6	7
When I ask my father to help me with a problem he or she asks me what I think before giving me his opinion.	1	2	3	4	5	6	7
My father encourages me to be myself.	1	2	3	4	5	6	7
My father makes me feel that I could tell him anything.	1	2	3	4	5	6	7
My father provides me with lots of opportunity to make personal decisions in what I do.	1	2	3	4	5	6	7
My father openly acknowledges my thoughts and feelings although they may be different from his.	1	2	3	4	5	6	7

APPENDIX H

DEMOGRAPHIC QUESTIONNAIRE

DEMOGRAPHIC QUESTIONNAIRE

Height

Weight

Please answer the following questions by circling or checking the appropriate answer. For questions 1, 2, 4, 6, 8, 9, 10, 11, 15, 16, simply write the answer in the spaces provided.

Φιγυρε 21 Name. _____

Φιγυρε 21 On what date were you born? _____

3. What is your gender? Male or Female

4. How many years have you played soccer, including this year? _____ Years

5. Is soccer the only sport that you play just now? Yes or No

6. If **no**, what other sports do you play just now? _____
_____
_____

6. What is the gender of your coach? Male or Female

7. Is your mother or your father a coach for your team? Yes or No

Φιγυρε 21 How many years have you been training with your coach, including this year?
_____ Years

9. What soccer teams do you play for just now? _____
_____

10. Who do you live with just now? (for example: mother and father, mother only, father only, mother and friend, grandparents)

    Answer: _____

11. Has your mother ever played soccer? Yes or No or Don't Know

12. Has your father ever played soccer? Yes or No or Don't Know

13. Have any of your brothers or sisters played soccer? Yes or No

14. Has anybody else living with you played soccer? Yes or No

How many games do you play each week? _____

On how many days do you practice each week? _____

APPENDIX I

FIGURES 14 – 29 (CORRELATIONS OF BIOLOGICAL MATURITY STATUS AND BODY MASS INDEX)

Figure 14. Correlation between biological maturity and perceptions of physical competence in males.....157

Figure 15. Correlation between biological maturity and perceptions of physical competence in females.....158

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Figure 18. Correlation between biological maturity and perceptions of physical competence in males aged above the mean age of peak height velocity.....161

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Figure 25. Correlation between biological maturity and perceptions of soccer competence in females aged above the mean age of peak height velocity.....168

Figure 26. Partial correlation between body mass index and perceptions of physical competence in males, controlling for age 169

Figure 27. Partial correlation between body mass index and perceptions of physical competence in females, controlling for age 170

Figure 28. Partial correlation between body mass index and perceptions of soccer competence in males, controlling for age 171

Figure 29. Partial correlation between body mass index and perceptions of soccer competence in females, controlling for age 172

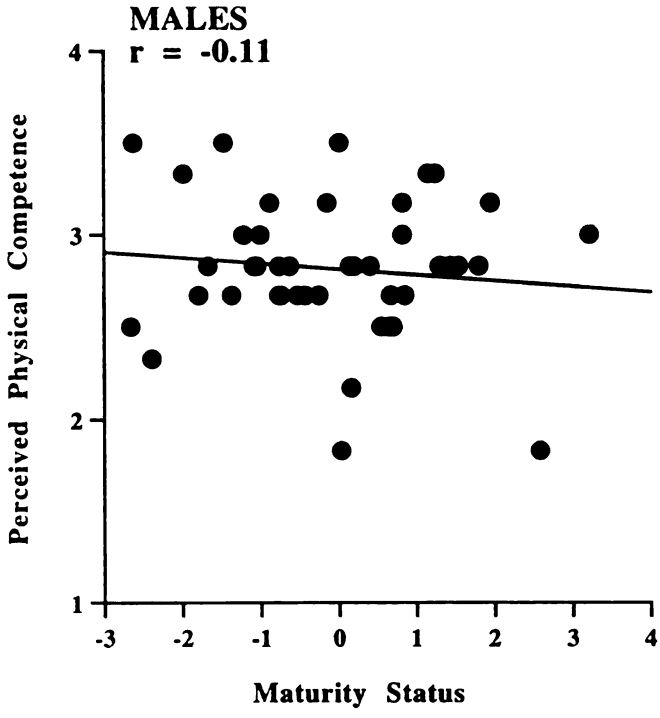

Figure 14. Correlation between biological maturity and perceptions of physical competence in males.

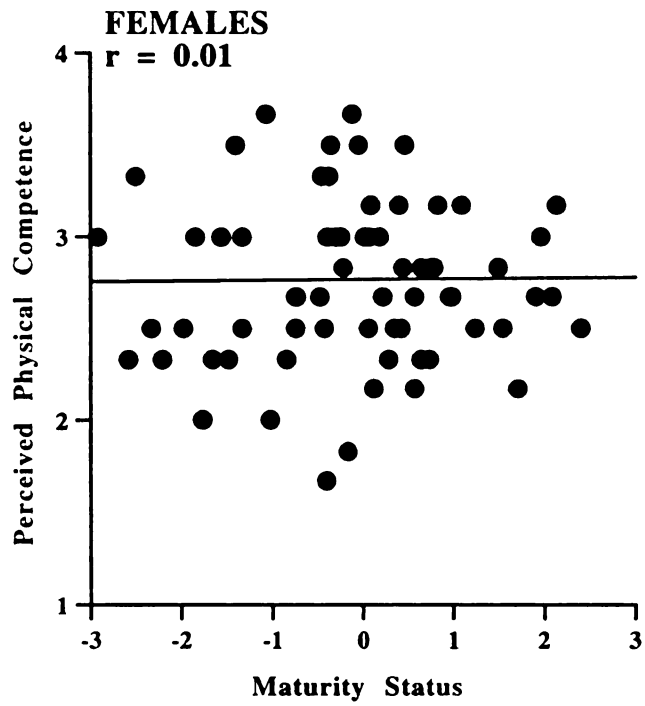

Figure 15. Correlation between biological maturity and perceptions of physical competence in females.

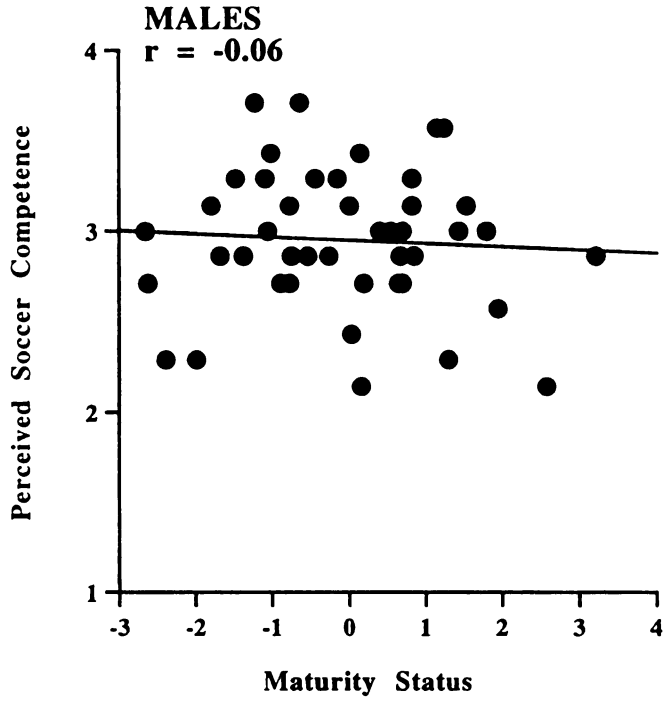

Figure 16. Correlation between biological maturity and perceptions of soccer competence in males.

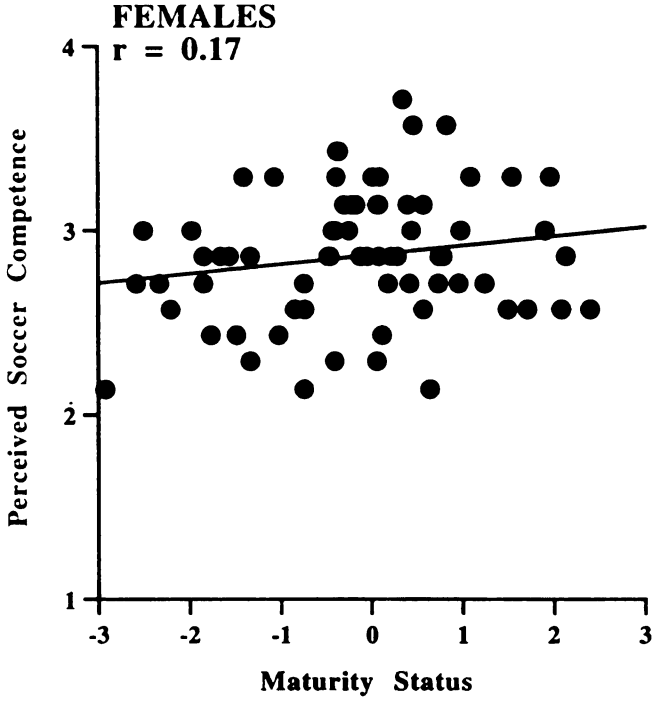

Figure 17. Correlation between biological maturity and perceptions of soccer competence in females.

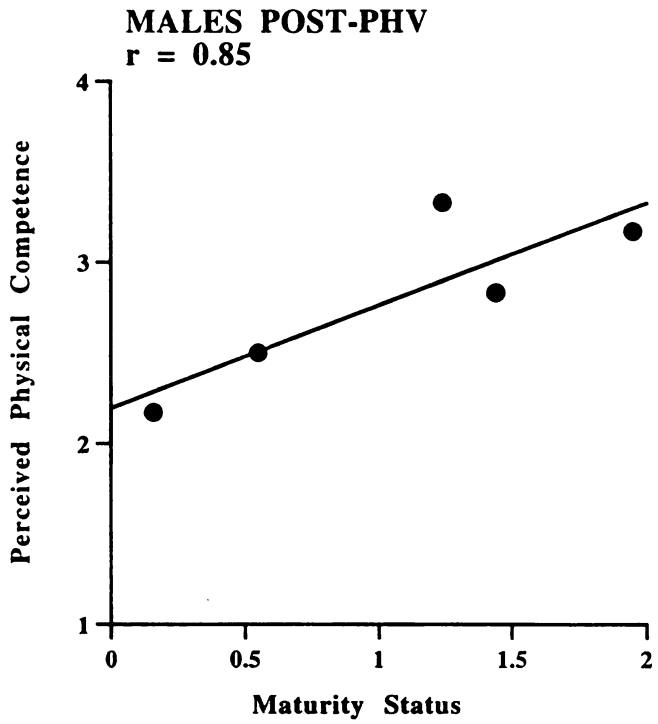

Figure 18. Correlation between biological maturity and perceptions of physical competence in males aged above the mean age of peak height velocity.

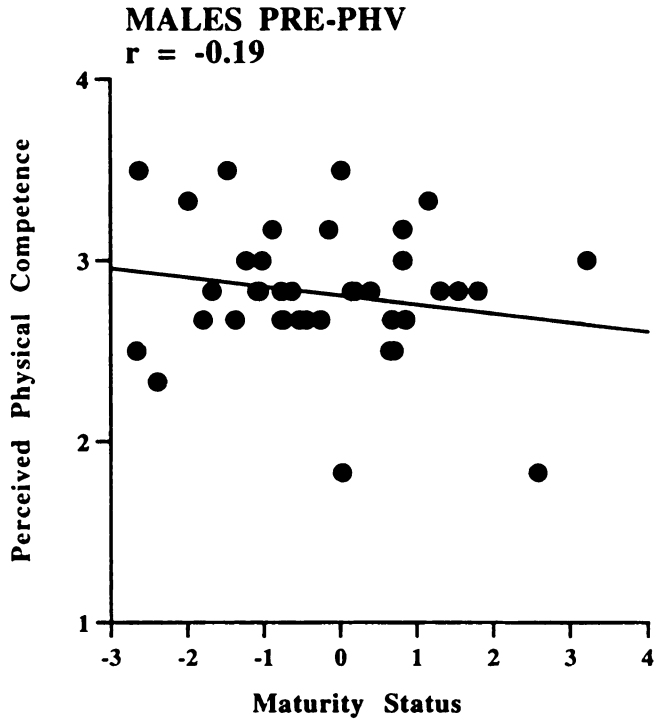

Figure 19. Correlation between biological maturity and perceptions of physical competence in males aged below the mean age of peak height velocity.

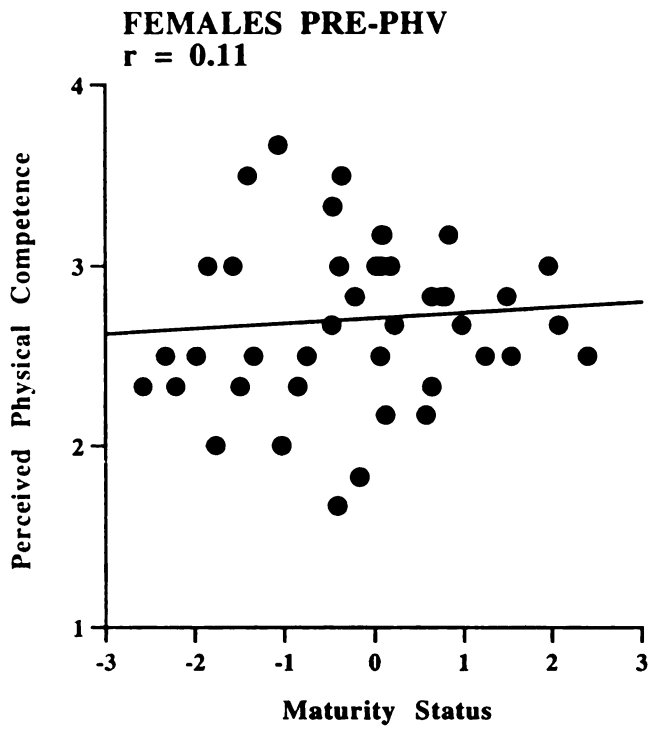

Figure 20. Correlation between biological maturity and perceptions of physical competence in females aged below the mean age of peak height velocity.

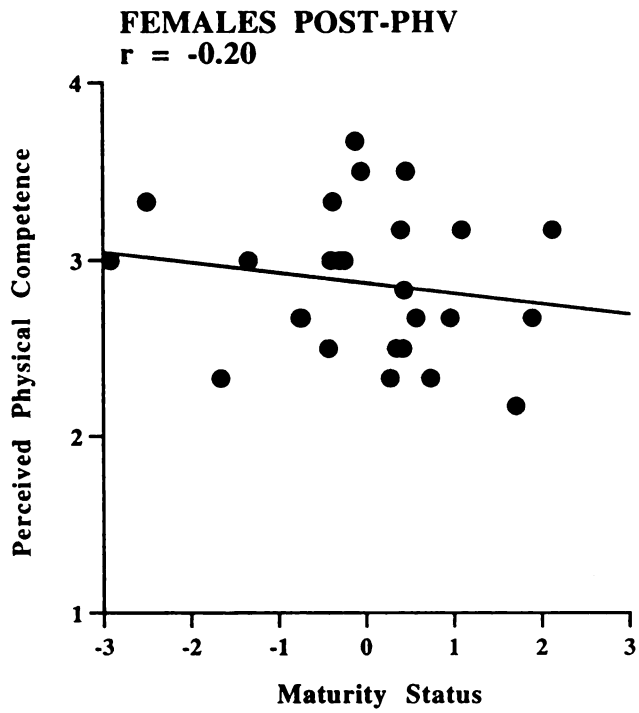

Figure 21. Correlation between biological maturity and perceptions of physical competence in females aged above the mean age of peak height velocity.

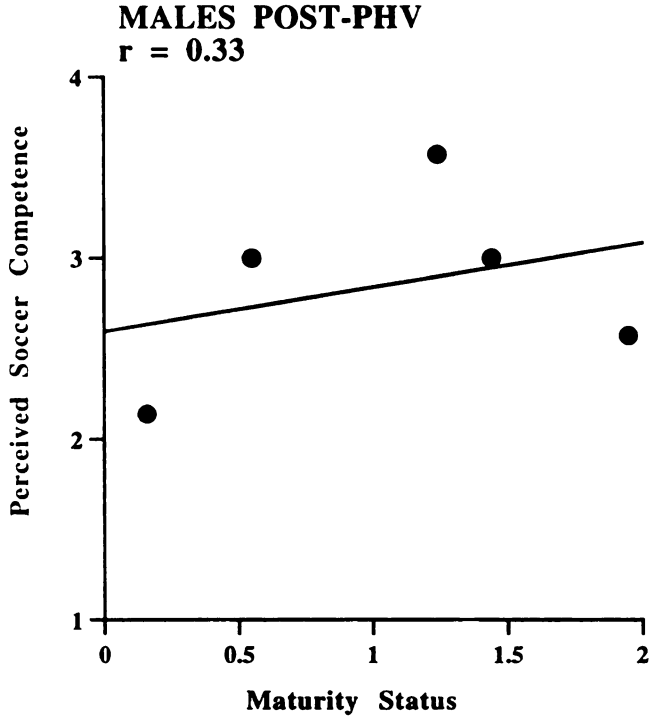

Figure 22. Correlation between biological maturity and perceptions of soccer competence in males aged above the mean age of peak height velocity.

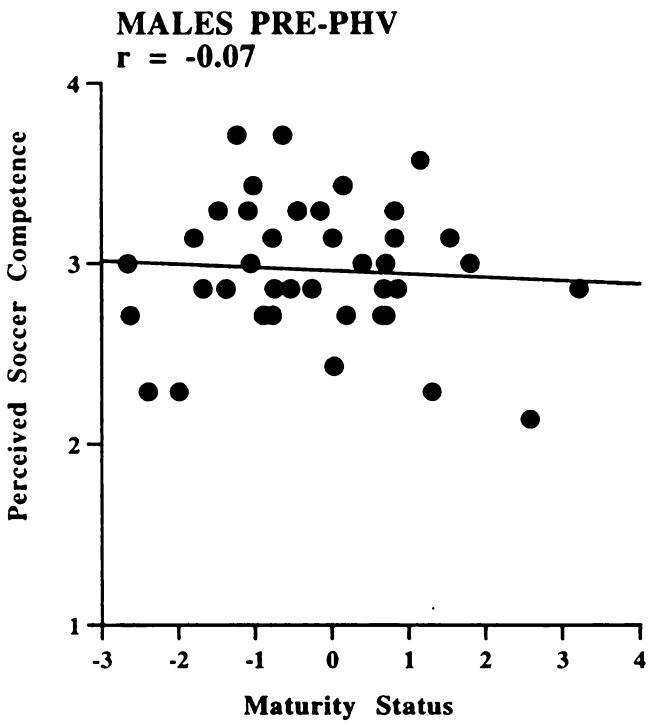

Figure 23. Correlation between biological maturity and perceptions of soccer competence in males aged below the mean age of peak height velocity.

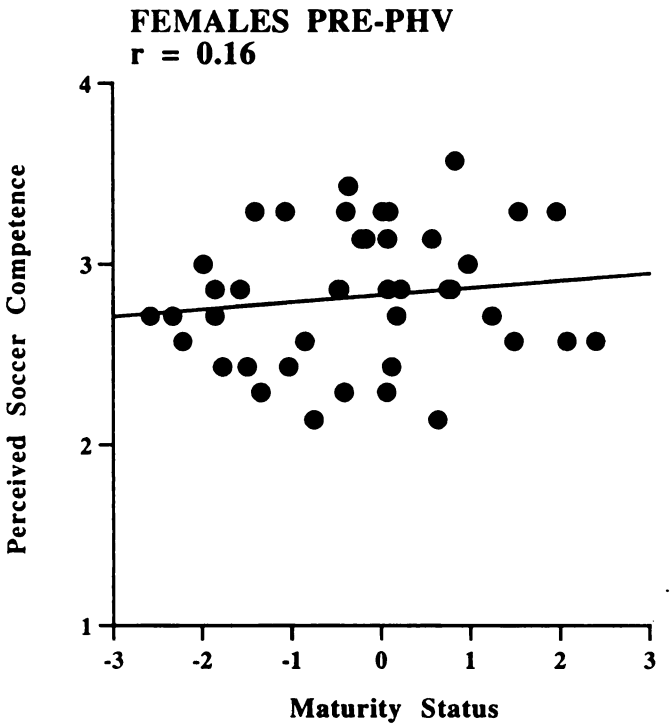

Figure 24. Correlation between biological maturity and perceptions of soccer competence in females aged below the mean age of peak height velocity.

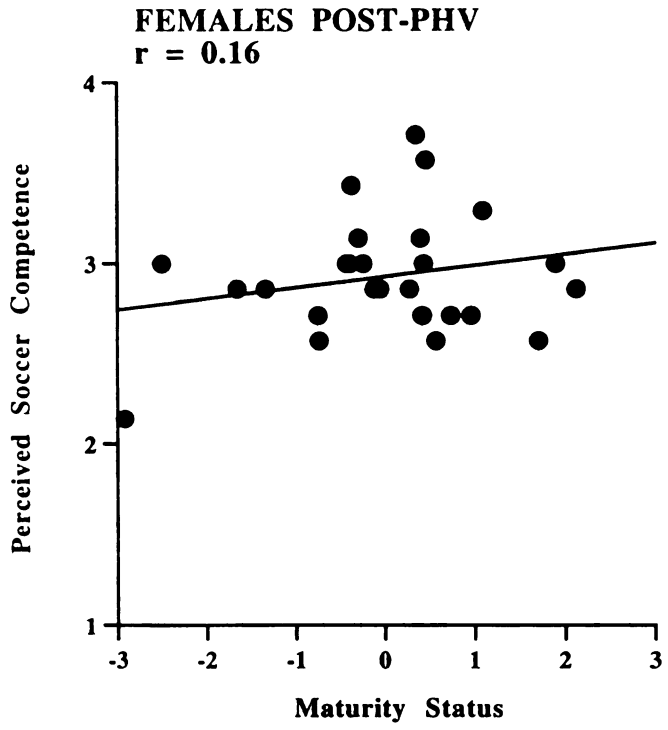

Figure 25. Correlation between biological maturity and perceptions of soccer competence in females aged above the mean age of peak height velocity.

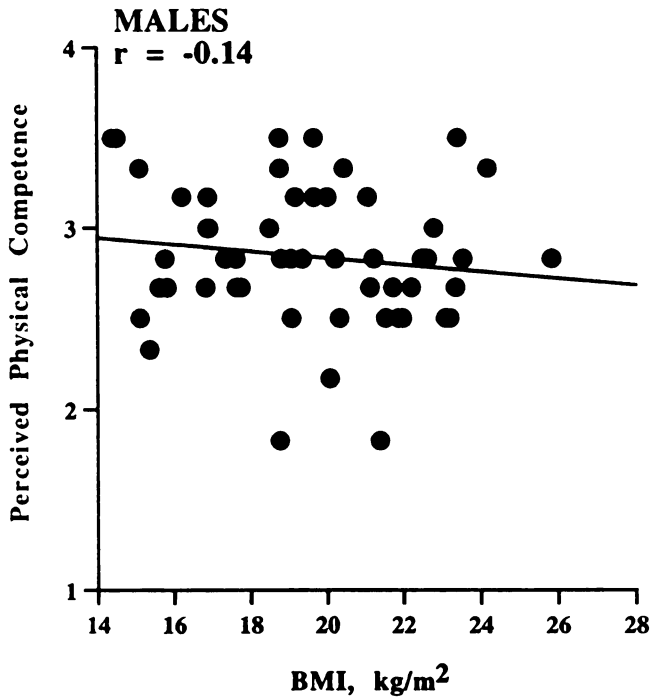

Figure 26. Partial correlation between body mass index and perceptions of physical competence in males, controlling for age.

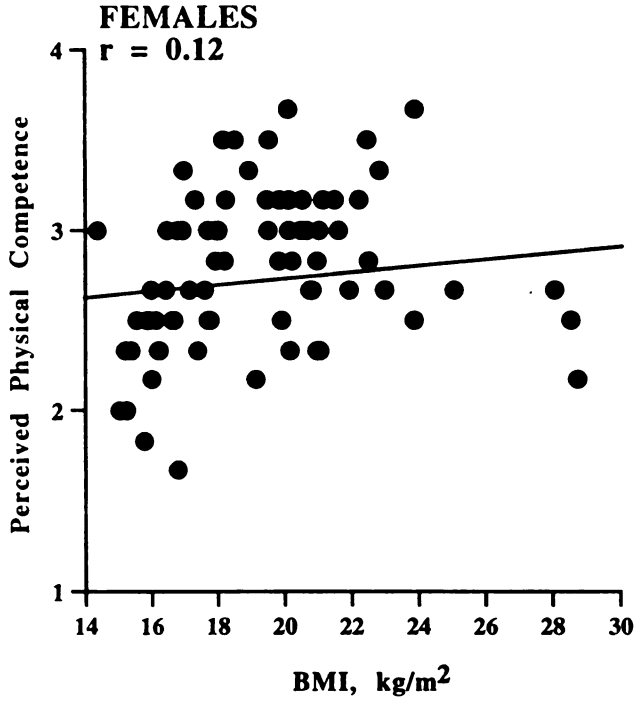

Figure 27. Partial correlation between body mass index and perceptions of physical competence in females, controlling for age.

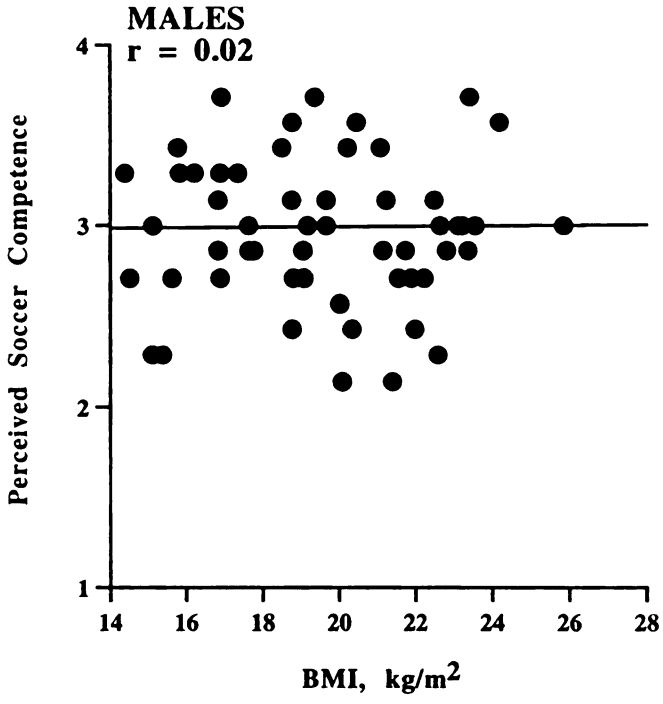

Figure 28. Partial correlation between body mass index and perceptions of soccer competence in males, controlling for age.

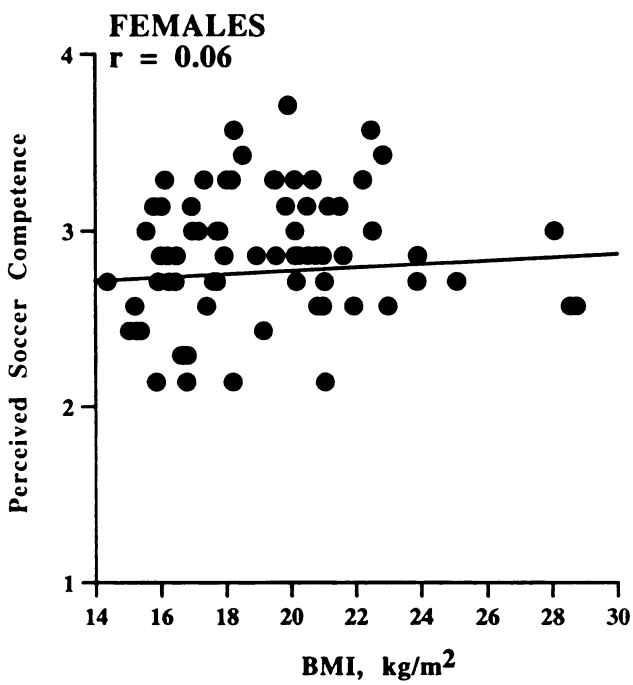

Figure 29. Partial correlation between body mass index and perceptions of soccer competence in females, controlling for age.

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