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THE EFFECTS OF RANDOM SUCCESS OR FAILURE FEEDBACK AND PERCEIVED COMPETENCE ON INTRINSIC MOTIVATION OF COLLEGIATE ELITE AND NON-ELITE ATHLETES

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THE EFFECTS OF RANDOM SUCCESS OR FAILURE FEEDBACK AND PERCEIVED COMPETENCE ON INTRINSIC MOTIVATION OF COLLEGIATE ELITE AND NON-ELITE ATHLETES

By

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ABSTRACT

THE EFFECTS OF RANDOM SUCCESS OR FAILURE FEEDBACK AND PERCEIVED COMPETENCE ON INTRINSIC MOTIVATION OF COLLEGIATE ELITE AND NON-ELITE ATHLETES

By

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This study explored the effects that perceived competence and random feedback have on intrinsic motivation for elite and non-elite athletes after performance on the Wayne Saccadic Fixator motor task. The experiment investigated cognitive evaluation theory's (Deci,1975; Deci & Ryan,1985) proposition that perceptions and feelings of competence increase intrinsic motivation while those of incompetence diminish levels of intrinsic motivation. A 2 x 2 x 2 Athlete Status (elite or non-elite) by Sex (male or female) by Feedback (success or failure) design was employed. Ninety male and female undergraduate elite and non-elite athletes were randomly assigned to a feedback condition. Perceived competence was measured by the Intrinsic Motivation Inventory (IMI). Results supported cognitive evaluation theory. Athletes receiving success feedback displayed increases in intrinsic motivation. Athletes receiving failure feedback displayed decreases in intrinsic motivation. There were no significant differences between status of athletes, sex, or feedback on persistence during a free-choice period.

DEDICATION

This thesis is dedicated to my parents, Howard and Annette Beckerman,

for all of their encouragement, support and love, and for their constant belief in me.

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INTRODUCTION

Nature of the Problem

Sports are viewed as an environment overflowing with achievement-oriented behaviors and actions. Sports provide individuals with opportunities to be self-determining, physical, and social as well as to gain competence feedback and to exhibit creative expression (Deci & Ryan, 1985). In general, individuals engage in sports because the activity is enjoyable and genuinely interesting. Individuals are believed to be intrinsically motivated when they participate in an activity for the mere pleasure obtained from the activity alone and not for the extrinsic rewards associated with the activity (Vallerand & Reid, 1984). The rewards for such intrinsic activities are the impulsive and unpremeditated thoughts and feelings that accompany these activities. "Intrinsic motivation is based in the innate, organismic needs for competence and self-determination. It energizes a wide variety of behaviors and psychological processes ... The intrinsic needs for competence and self-determination motivate an ongoing process of seeking and attempting to conquer optimal challenges" (Deci & Ryan, 1985, p. 32).

Intrinsic motivation has been offered as an explanation for the wide range of behaviors that exist for individuals when no apparent reward is present. For example, athletes continuously engage in rigorous physical activity, suffering through pain, injury, and exhaustion, for no apparent rewards other than the pleasure and satisfaction of participation. Wankel and his colleagues (Wankel & Kreisel, 1982; Wankel & Pabich, 1982) found evidence from youth athletes involved in amateur sports that the most important factor influencing their sports enjoyment and participation were skill enhancement, sense of personal achievement, and excitement derived from the

activity. Extrinsic factors such as uniforms, trophies, and social approval were less important. The gratification and purposes of sports appear to be intrinsic to the young participants.

Sports provide a comparison of one's skills and competencies against a standard of excellence and are likely to enhance meaningful feedback, thereby supporting intrinsic motivation (Deci & Ryan, 1985). Participation in sports also allows one to gain self-esteem that is not always present in the working world. By actively engaging in the activity and conquering challenges that are optimum for their capacities, individuals often achieve a sense of personal efficacy (Ryan, Vallerand, & Deci, 1984).

However, sometimes sports are structured to allow for pressures of conforming, making the widespread social acceptance of sports an arena that is conducive to the introduction of many extrinsic factors. For instance, parent's, coach's and the media's focus on winning can create an extrinsic pressure. Winning is also related to other extrinsic motivators such as monetary rewards, trophies, and social approval. Therefore, the maintenance of one's self-esteem is hinged upon one's athletic performance. The interaction between intrinsic motivation and extrinsic controls is explained by cognitive evaluation theory and is directly relevant to the field of sports (Ryan, Vallerand, & Deci, 1984).

Edward Deci's (1975) and Deci and Ryan's (1985) model of cognitive evaluation theory is the most widely used model in the study of intrinsic motivation. This theory suggests that the need to feel competent and self-determining are two principles that mediate intrinsic motivation. This theory suggests that an event which affects an individual's feelings and perceptions of self-determination and/or competence will affect the individual's intrinsic motivation. Deci's theory provided the impetus for an area of research which remains very important to the intrinsic motivation literature. "Cognitive evaluation theory describes the effects of events that initiate or regulate behavior on motivation and motivationally relevant processes" (Deci & Ryan, 1985, p. 62). The

theory suggests that the important considerations in the characterization of initiating or regulatory events are in the implications of those events in the person's experience of self-determination and competence (Deci & Ryan, 1985). The theory is presented as four propositions.

Proposition I states briefly that people have an intrinsic need to be self-determining. A process that is responsible for changes in intrinsic motivation is the perceived locus of causality. Events that cause a person to have an external perceived locus of causality undermine a person's intrinsic motivation and deny a person's self-determination. Conversely, events leading to an internal perceived locus of causality, enhance intrinsic motivation and facilitate a person's self-determination.

Proposition II states that people have an intrinsic need to be competent and master optimal challenge. This proposition reports the effects of challenge and feedback in that an individual's perceived competence is increased when positive feedback is given and decreased when negative feedback is given. This effect is true with random feedback as long as the individual feels some sense of self-determination toward the activity. In sum, events that promote increased perceived competence will enhance intrinsic motivation, while events diminishing perceived competence will decrease intrinsic motivation.

Proposition III states that there is an informational, controlling, and amotivating aspect to every event. The determination of which process is operative is suggested by the relative salience of the three aspects to the person. The salient event will affect changes in the person's perceived causality and perceived competence, and later, changes in intrinsic motivation (Deci & Ryan, 1985).

Proposition IV clarifies proposition III in that events that are internally informational facilitate self-determined functioning which maintains and/or enhances intrinsic motivation. On the other hand, internally controlling events that are experienced as pressure toward a specific outcome undermines intrinsic motivation.

Given the comprehensive definitions of cognitive evaluation theory, the question of what factors are likely to undermine intrinsic motivation and what factors will enhance intrinsic motivation for sport activities become integral within the context of sport psychology. Competition, a component of sport activities, has strong effects on intrinsic motivation.

Innate to most sporting situations is competition, a goal directed and social process upon which many individuals thrive. For instance, achieving success in a competitive sport environment enables the individual to increase confidence in his or her ability, and therefore, attain the belief that they can acquire and anticipate success in future competitive situations. However, for some people, competition may represent a source of anxiety, discomfort, and stress, especially if winning and losing are equated with success and failure. Studies have implied that it is inaccurate to equate winning and losing with success and failure (Maehr & Nicholls, 1980; McAuley, 1985). Interpretations of competitive outcomes need to be considered from the individual's perspective rather than by assuming the outcome is the antecedent of cognitive processing (McAuley & Tammen, 1989).

Researchers have provided different definitions and meanings of competition. Csikszentmihalyi (1975) stated that competition is a basic component of intrinsically motivated activities. McClelland, Atkinson, Clark, and Lowell (1953) stated that achievement motivation, made up of intrinsic and extrinsic motivators, involves competition against a standard of excellence. Ross and Van den Haag (1957) introduced two distinctions of competition. Indirect competition can be defined as the individual or group struggling to perform against an impersonal standard such as previously established personal best or ability norms (Deci & Ryan, 1985). Direct competition involves the struggle of one against another in an attempt to maximize one's own successes and minimize the success of their opponents (Deci & Ryan,

1985). Competition does have different meanings to different researchers, and this contributes to the difficulty of investigating its motivational underpinnings.

There are two different types of involvement associated with competition, ego involvement and task involvement. The construct of ego involvement is similar to the construct of competition. DeCharms (1968) defined ego involvement as the state in which a person's self-esteem is hinged upon attaining a specified performance outcome. Nicholls (1984) defined ego involvement as a self-evaluative state where an individual's goal is the demonstration of high competence compared to others and that mastery of a task is seen as only the means to the end. Task involvement can be defined as an individual's goal to learn and that mastery is an end in itself (DeCharms, 1968; Nicholls, 1984). Because of the recognition inherent to ego involvement and its associated pressuring of individuals to perform in certain ways, Ryan (1982) believed that ego involvement could undermine intrinsic motivation.

Ryan (1982) explored the effects of internally informational versus internally controlling events on intrinsic motivation and on the experience of pressure and tension. Ego involvement and task involvement concepts were used to define internally controlling and internally informational states, respectively. Ego involvement that is contingent with self-esteem is an example of an internally controlling state, which Deci and Ryan (1980) suggested can diminish intrinsic motivation by controlling individuals and decreasing feelings of self-determination. Therefore, it is believed that when a subject's involvement with a task or an activity shifts from task-involved, involved with the activity because he or she is interested in the activity, to being ego-involved, feeling as if he or she has to perform well in order to maintain self-worth and achieve a particular outcome, the character of the motivation to do well is changed. Thus, Ryan (1982) demonstrated that being ego-involved decreased subjects' intrinsic motivation toward the activity compared to being more mastery or task-involved because of self-esteem contingencies on the activity. Self-esteem is geared toward winning or toward

achieving a particular outcome. Studies using a free-choice period under ego-involving conditions report significant decreases in subjects' intrinsic motivation (e.g., Koestner, Zuckerman, & Koestner, 1987; Plant & Ryan, 1985). Thus, subjects who are ego-involved in the activity (task) are likely to lose intrinsic motivation for the activity (task) since their motivation has now shifted in an effort to preserve self-worth and self-esteem.

Competition and ego involvement are quite similar in that during competition, people can easily become ego-involved rather than remaining task-involved with the activity. People's self-esteem is now hinged upon the outcome of the activity. People who are ego-involved in competition need to "win" in order to maintain self-esteem (Deci & Ryan, 1985). If people see the activity as an instrument for winning, competition must be present in order for the ego-involved individual to persist. A competitive focus on winning and an ego-involved state, can be motivating, and at the same time, decrease one's intrinsic motivation (Deci & Ryan, 1985; Ryan, Koestner, & Deci, 1991). Competition and ego involvement are forms of motivation for those who are always winning or meeting the expected standards. People who lose suffer motivational consequences such as negative self-esteem, continued negative feedback, perceived incompetence, and a feeling of amotivation toward the activity in the absence of competition (Deci & Ryan, 1985). To efficiently assess intrinsic motivation and cognitive evaluation theory specifically, studies should use task-involved conditions. The concepts of ego-involved and task-involved, competition, competence, and self-determination directly affect intrinsic motivation.

In situations where opponent capabilities are comparable, success or failure is usually attributed to internal, unstable, and controllable causes (Weiner, 1985). When an individual perceives himself or herself to have been successful in this environment, the individual's interest in and enjoyment of the activity is enhanced. In other words, if the experience is perceived as having an internal locus of control, the individual feels

that he or she has a capacity to have choices and to feel self-determining. Thus, the need to be self-determining, that is to have a choice, is recognizable. People want a choice about whether to be in control (Deci, 1980). People need to feel free from depending on outcomes over which they lack control. "Control refers to there being a contingency between one's behavior and the outcomes one receives, whereas self-determination refers to the experience of freedom in initiating one's behavior" (Deci & Ryan, 1985, p. 31). The concept of a need for self-determination (i.e., choice) is basic to intrinsic motivation. The opportunity to be self-determining, usually determined by one's level of perceived choice, enhances one's intrinsic motivation, while the denial of this opportunity decreases one's intrinsic motivation (Deci, 1980).

This innate propensity to be self-determining leads individuals to engage in interesting behaviors which develop competencies and flexible accommodation within the social environment (Deci & Ryan, 1985). "Interest is involved whenever one orients toward an object, and it plays an important role in the amplification and direction of attention. Therefore, interest-excitement can activate many types of investigative or manipulative behaviors, particularly under conditions of novelty and freedom from other pressing demands of drives or emotions" (Deci & Ryan, 1985, p. 28). Csikszentmihalyi (1975) stated that intrinsically motivated activities are those that are characterized by enjoyment. Interest in the activity and excitement are integral emotions accompanying intrinsic motivation.

Simply stated, there is a close relationship between perceived competence, self-determination, interest-excitement, and intrinsic motivation. Activities must be optimally challenging, and subjects' level of perceived competence must be a reflection on feelings of choice and feelings of control. The more competent a person perceives himself or herself to be at an activity, the more interest and enjoyment he or she will feel toward that activity, and therefore, the more intrinsically motivated he or she will be at practicing that activity.

Studies (e.g., Deci, 1971; Vallerand, 1983; Ryan, Koestner, & Deci, 1991) have explored the relationship between perceived competence and intrinsic motivation and the effects on intrinsic motivation by providing positive feedback on an activity. In many studies, a comparison of intrinsic motivation is made between subjects who receive positive feedback and those who do not. The experimental task is believed to be intrinsically motivating and optimally challenging so that subjects can feel a sense of self-determination with respect to the outcomes.

Deci (1971) conducted the first study using positive verbal feedback to determine its effects on intrinsic motivation. After positive feedback, SOMA puzzles became more intrinsically motivating to subjects during a free-choice period than to subjects who did not receive positive feedback. Ryan, Koestner, and Deci (1991) discovered that experiments that assess a subject's intrinsic motivation from their engagement in an activity during a free-choice period while external contingencies are present are no longer effective at estimating a subject's intrinsic motivation on that activity. Internally controlling regulation is different from intrinsic motivation and can negatively impact free-choice-period activities (Ryan, Koestner, & Deci, 1991).

Within cognitive evaluation theory, there have been inadequate explanations about constructs such as competition, perceived competence, and ego-task involvement and its effects on intrinsic motivation in sport. The study of intrinsic motivation in sport has received some attention from psychologists (e.g., Deci & Ryan, 1985; E. Ryan, 1980) and from contemporary sport psychologists (McAuley & Tammen, 1989; Halliwell, 1978, 1979). However, there has been much confusion about Deci's cognitive evaluation theory and its relevance to all populations and to competitive tasks and activities such as sport.

Although many studies have tried to evaluate competition and its effects on intrinsic motivation, there has been much indecision about the definitions and the validity of competition. For example, Deci, Betley, Kahle, Abrams, and Porac (1981)

implemented a puzzle solving task to assess competition and its effects on intrinsic motivation. Subjects competed either directly against one another or indirectly against a standard. "Competing" with someone on a puzzle solving task is not "hard" competition, nor can it be generalized to competition on the athletic playing field. Deci et al. is an example of most research which used non-sport activities yet claimed that the findings extended and applied to athletic arenas.

Competition within sport occurs at various levels such as amateur, intercollegiate, elementary school, high school, and professional. When conducting a study the level of competition should be specified as more mature subjects may have different meanings for competition than younger, less mature subjects. The higher the level of competition the more experience a subject will have with the activity and the more perceived competence a subject may feel toward that activity.

The construct of perceived competence also has been poorly assessed. In studies dealing with perceived competence, individual differences needed to be attended to more carefully for the various levels of sport as an athlete's psychological experience of optimal challenge and perceived competence may depend on his or her experience level, skill level, and ability level. For instance, previous studies have not pre-selected groups of subjects based on individual differences in competence, such as athletic, non-athletic, elite, non-elite, experienced, inexperienced. The effects of perceived competence on intrinsic motivation may not hold true for elite subject groups.

Cognitive evaluation theory states that feedback promoting or signifying competence within a context of self-determination will increase intrinsic motivation, while feedback leading to perceptions and feelings of incompetence will decrease intrinsic motivation so much as to possibly extend to amotivation for that activity. If a subject is already intrinsically motivated, as demonstrated by feelings of competence, feedback suggesting competence or incompetence is irrelevant. The experience and ability level of all participants must be further explored especially for the elite or

experienced groups who are more critical of their own performance and rely less on feedback from others.

A major source of performance feedback (information) in sport is contained in the verbal feedback that an athlete receives from his or her coaches and teammates. Experienced, elite, and high task-oriented athletes will not see feedback as having an effect on their perceived competence, because their perceived competence at their activity is already high. Most research (e.g., Deci et al. 1981; McAuley, 1985; Vallerand, 1983; Weinberg & Jackson, 1979; Weinberg & Ragan, 1979) has explored the impact of positive and negative performance feedback on perceived competence and intrinsic motivation using the general, non-collegiate, and non-elite athletic population. Perceived competence is related to intrinsic motivation, yet groups of people may already have a higher level of perceived competence. Vallerand and Reid (1984) presented subjects performing on a stabilometer, a novel task, with either positive feedback (e.g., "You're really good at this task") or negative feedback (e.g., "You're not doing very well on this task") after every fourth trial. Results showed that positive verbal feedback increased intrinsic motivation and negative verbal feedback decreased intrinsic motivation for the task.

Would the results of Vallerand and Reid's (1984) study be different if they used subjects who had a strong interest in performing better on the stabilometer? Did any of the subjects express a strong competence in a stabilometer activity? If interest were stronger, would subjects respond differently to negative verbal feedback? Deci (1975) and Deci and Ryan (1985) suggest that intrinsic motivation is related to perceived competence on activities that are optimally challenging. Tasks used in many studies have been uninteresting tasks which are not optimally challenging and which are irrelevant to sport and competition. Tasks that are boring or unrelated to one's area of competence may be a confounding factor in the persistence of subjects. For example, Deci et al. (1981) implemented a puzzle solving task to assess competition and its

effects on intrinsic motivation. The type of puzzle used may not be very interesting to subjects. On the other hand, tasks that are too exciting may cause everyone to persist. Sport related tasks should be used whenever possible to guarantee the sincerest and highest level of interest in the task. Also, tasks that are used to assess intrinsic motivation should be task-involved rather than ego-involved.

Another problem of cognitive evaluation theory and its relationship to sport is the area of task-ego involvement. Studies have forced subjects to be ego-involved instead of task-involved. For example, Weinberg and Jackson (1979) elicited an ego-involved condition when they used feedback to make a comparison with others. Subjects were told that performance on this task was a good predictor of future success in athletics. Decreases in intrinsic motivation were expressed through decrements of self-esteem. Producing ego-involving orientations in subjects must be controlled in future studies.

Although research on cognitive evaluation theory is prevalent in the psychology and sport psychology literature, inconsistencies, shortcomings, and limitations exist in the definitions, tasks, and measurements used in the research. In order to effectively examine, understand, and forecast the purpose of psychological constructs in human behavior, it is of extreme importance to be able to accurately measure that construct. Accurate measurement is often hindered by the deficiency of standard operational definitions resulting in obscure findings.

Some of the ambiguity and evasiveness in the intrinsic motivation literature is partially attributed to the inconsistent measurement of the construct. Deci et al. (1981) reported that subjects competing against an opponent showed considerably less intrinsic motivation for the task than subjects who did not compete. On the contrary, Weinberg and Ragan (1979) communicated that male subjects who engaged in a competitive task were more intrinsically motivated than subjects who engaged in a noncompetitive task. The incongruent results of the previous two studies can be related to the ambiguous measurement of intrinsic motivation (Ryan et al., 1984). In

the Weinberg and Ragan (1979) study, intrinsic motivation was operationally defined as the amount of future experimental time subjects would choose to volunteer given the same conditions under which they were currently tested. The subject's choice may have been tainted in that subjects would want to please the experimenter with their choice of continued competition and participation, especially if the experimenter was present in the room during the free-choice condition. The validity of the measurements used in previous experiments have been questionable. Others have chosen to measure intrinsic motivation by directly questioning their research participants and asking subjects how much they enjoyed the activity and how often they participate in the activity during their spare time (E. Ryan, 1977, 1980). Without looking at both direct and indirect measures, the validity of the overall measurement is weak.

In addition to behavioral measurements of intrinsic motivation, cognitive assessments have been used in attempts to assess levels of intrinsic motivation (Vallerand, 1983). Vallerand used a measure that was adapted for use in a sport setting, yet it was made solely to assess the motivation for performance on a stabilometer task. A multidimensional measure assessing the important constructs of a subject's levels of intrinsic motivation with regard to experimental tasks must be implemented, and the tasks used must be intrinsically motivating. Ryan (1982) along with researchers from the Rochester Motivation Research Group (Plant & Ryan, 1985; Ryan, Mims, & Koestner, 1983) have developed a multidimensional measure of intrinsic motivation in regards to an experimental task. The Intrinsic Motivation Inventory (IMI) is a flexible assessment tool which helps to determine a subject's level of intrinsic motivation as a function of interest-enjoyment, perceived competence, perceived choice, effort, and pressure-tension. "The IMI has not, as yet, been employed in the extant intrinsic motivation literature dealing with exercise and sport activities" (McAuley, Duncan, & Tammen, 1989, p. 49).

In summation, while intrinsic motivation in sport is affected by perceived competence, self-determination, feedback, and persistence, the magnitude and directionality of intrinsic motivation in sport need to be addressed in order to shed some light on the equivocal results found in past intrinsic motivation research. In studies dealing with perceived competence, individual differences need to be attended to more carefully as an athlete's psychological experience of optimal challenge and perceived competence may depend on his and her experience and ability levels.

E. Ryan (1977, 1980) assessed intrinsic motivation of athletes in an intercollegiate sport situation. Under the assumption of Deci's (1975) statement of cognitive evaluation theory, E. Ryan (1977) used a questionnaire to investigate athletes at two institutions to assess the impact of athletic scholarships on male undergraduate athletes' intrinsic motivation. It was expected that males receiving a scholarship would be less intrinsically motivated than their nonscholarship counterparts. Scholarship athletes reported more extrinsic reasons for participation in the activity than the nonscholarship athletes.

E. Ryan (1980) included female scholarship athletes in a follow-up study. During the time the study was performed, athletic scholarships for women were fairly new, so it was believed that scholarships would not undermine their intrinsic motivation for sport participation, since scholarships provided information about competency. The females reacted as predicted. The results for the male scholarship athletes varied according to the sport. Males saw the scholarship as controlling and took a "play for pay" attitude. These two real world studies did not take into account the levels of intrinsic motivation in the beginning for the athletes.

The studies done by E. Ryan (1977; 1980) may not hold true today. Today, regardless of gender, scholarships are prevalent for all good athletes, and males and females view scholarships differently, especially since they are more accessible. Another factor which was not assessed is an individual's motivation toward the activity.

Some individuals may be more motivated than other individuals. For instance, some athletes may not see competition or scholarships as effecting intrinsic motivation because they may already have a high interest in their activity.

Cognitive evaluation theory states that success feedback indicating competence will increase one's intrinsic motivation, while failure feedback leading to perceptions of incompetence will decrease one's motivation. Elite athletes whose competency level is already high will not see failure feedback as failure or indicating incompetence. Thus, it is believed that elite athletes do not see competition as controlling or negative feedback as amotivating.

Statement of the Problem

The purpose of this study will be to extend intrinsic motivation research, specifically that of Deci's (1975; & Deci & Ryan, 1985) cognitive evaluation theory, by examining feedback and perceived competence and its effects on intrinsic motivation as it relates to the elite athlete. This experiment will investigate Deci's assertion that increases in perceptions and feelings of competence produce an increase in intrinsic motivation while decreases in perceived competence lead to decreases in intrinsic motivation when the informational aspect of the situation is salient (Ryan, Vallerand, & Deci, 1984, p. 233). Elite athletes perceive random success and random failure feedback differently than non-elite athletes on a sport-related task. Elite athletes do not see failure feedback as producing feelings of incompetence and therefore, their intrinsic motivation will not decrease. Also, because elite athletes do not see failure feedback as a measure of incompetence, they will persist at a task for the intrinsic interest and also for a possibility to better their score, thus increasing their own level of competence for the task.

Hypotheses

The following hypotheses will be tested in this study:

1. No gender differences will occur between male and female athletes on the pretest perceived competence subscale of the IMI.
2. No gender differences will occur between male and female athletes on the persistence measure.
3. Elite athletes will have a higher score on the pretest perceived competence subscale of the Intrinsic Motivation Inventory (IMI) compared to non-elite athlete scores on the pretest perceived competence subscale of the IMI.
4. Athletes who experience random success feedback will score significantly higher on the posttest perceived competence subscale compared to the pretest perceived competence subscale of the IMI.
5. Elite athletes who experience random failure feedback will not exhibit any change in the posttest perceived competence subscale compared to the pretest perceived competence subscale of the IMI.
6. Non-elite athletes who experience random failure feedback will score significantly lower on the posttest perceived competence subscale compared to the pretest perceived competence subscale of the IMI.
7. Elite athletes will persist more (greater number of trials and more time spent on task during free-choice period) than non-elite athletes after random failure feedback.

Delimitations

It will be assumed that subjects will respond honestly to all items on the IMI and the questionnaire to check on the manipulation of feedback.

Definitions

The following definitions will be used in the study.

Elite athletes. To be considered elite, athletes must a) have an athletic scholarship and b) have been a recruited athlete--not a 'walk-on.' Redshirt and fifth year athletes will be included also.

Non-elite athletes. These will be athletes who have competed on an intramural sport team or have participated in an activity class but do not meet the criteria for elite athletes. Non-elite athletes are not coached by a professional and there are no organized practices. Non-elite athletes will have some prior interscholastic competitive experience in their intramural sport or activity prior to attending the university.

Perceived competence. An underlying construct of intrinsic motivation represents a person's belief about his or her performance. Cognitive evaluation theory (Deci, 1975; Deci & Ryan, 1985) states three important factors before competence can be understood: 1) the task must be optimally challenging, 2) immediate or spontaneous feedback or interpersonal feedback must be given; 3) action and feedback must be experienced as informational and not controlling (Deci & Ryan, 1985). This construct will be measured by a subscale on the IMI. Based on a 7-point Likert Scale ranging from (1) strongly disagree to (7) strongly agree, those who score in the higher (4-7) range on each item of the subscale will have high perceived competence.

Trial. A complete trial is for 30 seconds from start to finish. The athlete must touch at least one button on the Wayne Saccadic Fixator during this time to constitute a completed trial.

Persistence. This construct will be measured in two ways: 1) The number of trials the subject attempts on the task during the free-choice period, and 2) The amount of time out of the 6 minute free-choice period they spend on the task.

CHAPTER 2

REVIEW OF THE LITERATURE

Intrinsic motivation research is one of the longest lines of research in motivational psychology. Yet, despite almost 100 years as an empirical area, the understanding of perceived competence, self-determination, and ego-task involving conditions on an individual's intrinsic motivation remains unclear. Contemporary research into this field of study has showed some promise in unraveling the intricacies associated with determining the causes for the increases or decreases in one's intrinsic motivation. The use of cognitive models have had an important influence on the field of motivation by directing attention to the idea of choice. Motivational models used in examining individual and situational differences have provided an excellent framework in organizing cognitive, affective, and behavioral variables. These models also allow for the investigation between self-determined and non-self-determined processes and behaviors. The fact that individuals may perceive success and failure differently can result in more effective intervention strategies for those individuals responding to feedback in detrimental ways. Athletes, among others, would benefit from such advances in motivational psychology. However, in order to comprehend the conceptual underpinnings associated with contemporary motivational psychology research, a thorough review of the motivational psychology research, as well as the models, constructs, and their relationship to sport, must first be undertaken.

A classic document by White (1959) in effectance motivation argued that individuals are innately motivated to be effective in dealing with their environment. This intrinsic energy source motivates a wide variety of behaviors. The feelings following competent interactions with the environment is the reward in itself which is independent of any drive-based reinforcements.

Empirically, psychologists call the non-drive based motivation *intrinsic motivation*, suggesting that "energy is intrinsic to the nature of the organism" (Deci & Ryan, 1985, p. 5). Other theorists have conceptualized intrinsic motivation in terms of psychological needs and affects. Although these concerns are similar to White (1959), the central idea deals with the human need for free and effective interactions with the environment and to the feelings of interest and enjoyment associated with these needs.

Woodworth (1918, 1958) proposed that behavior is ongoing and is aimed at yielding an effect on its environment. Motivationally speaking, Woodworth's premise involves a need for having an effect, for being effective in an individual's interactions with the environment. White (1959) used competence as the basis under which effectance motivation functions. White believed that competence is developed by maturing. The need for competence allows for an energy for learning. Biologically, competence is "survival of the organism." Empirically, the feelings of competence are the results from effective action. The reward for competency motivated behaviors are the inherent feelings of competence resulting from effective functioning and stretching of one's own capacity level.

There is another important view on intrinsic motivation presented by theories focusing on affect and emotion. Interest-excitement can have an effect on fundamental human behaviors. Csikszentmihalyi (1975) believes that intrinsically motivated activities are determined by one's enjoyment level for those activities with the reward being the enjoyment in that activity. Csikszentmihalyi's beliefs (1975) apply to competence motivation in that people will be intrinsically motivated under conditions of optimal challenge.

Thus we see that competence and interest are important in intrinsically motivated behaviors. To be sincerely intrinsically motivated, individuals must be free from pressures and contingencies, and experience the action as autonomous. Controls and

reinforcements may cause functioning to become inoperable. Thus, the need for self-determination, freedom from control, is essential for intrinsic motivation to be operative.

Intrinsic motivation research began with a basic question of what happens to an individual's intrinsic motivation for an activity when the individual receives an extrinsic reward for doing the activity. Intrinsic motivation is either enhanced, diminished, or unchanged by the reward. Deci (1971) explored the effects of monetary rewards on intrinsic motivation. Results indicated that if there were no extrinsic reasons to participate in the activity, subjects were usually intrinsically motivated. Subjects who solved the interesting puzzles for money showed decreases in their intrinsic motivation.

Experimenters then looked to explore exactly where the undermining took place. Ross (1975) argued that in order for rewards to have an impact on intrinsic motivation, salience of these rewards must occur. If individuals expect rewards, expectancy can cause decrements in one's intrinsic motivation (Lepper, Greene, & Nisbett, 1973). Evaluation, the basis for determining whether individuals are complying with external demands, can also undermine intrinsic motivation as evaluations connote external control. Competition, if there is a pressure to win, can also undermine intrinsic motivation. Self-determination or choice has led people to become more interested in the activity, thereby increasing their intrinsic motivation.

Theoretical Models

Cognitive Evaluation Theory

Cognitive evaluation theory was first proposed by Deci (1975) in an attempt to integrate the earlier empirical exploration of the effects of external events on intrinsic motivation. Deci's theory has been extended to include four propositions and has become an integral theory used in the study of intrinsic motivation.

Proposition I. This proposition is related to people's intrinsic need to be self-determining. One process that is responsible for changes in intrinsic motivation is the perceived locus of causality. As Deci and Ryan (1985) state:

> *"External events relevant to the initiation or regulation of behavior will affect a person's intrinsic motivation to the extent that they influence the perceived locus of causality for that behavior. Events that promote a more external perceived locus of causality will undermine intrinsic motivation, whereas those that promote a more internal perceived locus of causality will enhance intrinsic motivation"* (p. 62).

The perceived locus of causality is representative of the degree to which one is self-determining with respect to one's actions and behaviors. Events which are controlling lead to an external perceived locus of causality and undermine intrinsic motivation, thereby denying an individual his or her self-determination. Conversely, events supporting autonomy, lead to an internal perceived locus of causality, enhance intrinsic motivation, and thereby facilitate one's self-determination. Controlling events stimulate individuals to comply or rebel. Controlling events may affect many motivational variables by decreasing psychological variables such as creativity, emotionality, and self-esteem.

When the perceived locus of causality process is "in operation," intrinsic motivation varies as a function of feelings of self-determination and perceptions (Ryan, 1982). Increases and decreases in perceptions and feelings of self-determination lead to increases and decreases respectively in intrinsic motivation.

Proposition II. People have an intrinsic need to be competent and to master optimal challenges. Deci and Ryan (1985) refer to this proposition as perceived competence and report the effects of challenge and feedback:

> *"External events will affect a person's intrinsic motivation for an optimally challenging activity to the extent that they influence the person's perceived competence, within the context of some self-determination. Events that promote greater perceived competence will enhance intrinsic motivation, whereas those that diminish perceived competence will decrease intrinsic motivation"* (p. 63).

According to cognitive evaluation theory, an individual's perceived competence is increased when positive feedback is given and decreased when negative feedback is given. Deci and Ryan (1980) are careful to add that an individual's perceived competence is increased with either positive or random success feedback so long as the individual feels some self-determination with respect to the activity. Furthermore, perceived incompetence tends to occur when activities are insurmountable as the individual is given persistent negative feedback or experiences continual failures. Increases in intrinsic motivation are associated with greater perceived competence while decreases in intrinsic motivation are associated with decreased perceived competence, and these changes in intrinsic motivation can occur only within the context of control as the individual must feel some level of self-determination with respect to the activity (Deci & Ryan, 1985).

Proposition III. Every event, relevant to the initiation and regulation of behavior, whether a reward, a structure, or a communication has three aspects that may be salient to individuals at different times. The three functional aspects are labeled the controlling, the informational, and the amotivating aspect. Deci and Ryan (1985) state:

> "Events relevant to the initiation and regulation of behavior have three potential aspects, each with a functional significance. The informational aspect facilitates an internal perceived locus of causality and perceived competence, thus enhancing intrinsic motivation. The controlling aspect facilitates an external perceived locus of causality, thus undermining intrinsic motivation and promoting extrinsic compliance or defiance. The amotivating aspect facilitates perceived incompetence, thus undermining intrinsic motivation and promoting amotivation. The relative salience of these three aspects to a person determines the functional significance of an event" (p. 64).

The controlling aspect of an event identifies people's need to experience self-determination and is one that pressures people to behave, think, or feel a particular way. If the level of control is high, people feel a low range of self-determination,

perceive an external locus of causality, and experience their behavior to be caused by the particular controlling event.

Fisher (1978) explored the relationship between competence and intrinsic motivation. She provided support for the hypothesis that positive-competence feedback enhances intrinsic motivation if the outcomes are self-determined. Her data revealed a strong positive correlation between competence level and intrinsic motivation when subjects felt that their performance level was self-determined, but there was no correlation between competence level and intrinsic motivation when their performances were not experienced as being self-determining.

The amotivational aspect signifies that effectance is not attainable, and therefore, promotes amotivated functioning or perceived incompetence is facilitated. The third proposition describes the relationship of self-determination to the perceived-competence process. The informational aspect of an event provides people with effectance-relevant feedback, and the information may be positive, implying or facilitating competence; or it may be negative, suggesting incompetence. The information is in the context of choice about what to do or how to do it. Cognitive evaluation theory suggests that when the informational aspect of the situation is salient, "intrinsic motivation will vary in line with perceptions and feelings of competence" (Ryan, Vallerand, & Deci, 1984). Increases in an individual's perceived competence produce an increase in intrinsic motivation while decreases in an individual's experienced perceived competence lead to diminished levels of intrinsic motivation (Deci & Ryan, 1985).

Proposition IV. This proposition includes the concept of internally amotivating events. Deci and Ryan (1985) state:

> *"Intrapersonal events differ in their qualitative aspects and, like external events, can have varied functional significances. Internally informational events facilitate self-determined functioning and maintain or enhance intrinsic motivation. Internally controlling events are experienced as*

> *pressure toward specific outcomes and undermine intrinsic motivation. Internally amotivating events make salient one's incompetence and also undermine intrinsic motivation"* (p. 107).

Ryan (1982) was the first to study the effects of internally informational versus internally controlling events on intrinsic motivation. Ryan (1982) extended cognitive evaluation theory to include ego involvement induction; initiating and regulatory events inside the person as well as those that are external and internally controlling. The concepts of ego involvement and task involvement were used as internally controlling and internally informational, respectively. Subjects worked on hidden-figure puzzles. This experiment focused on events inside the person. It was hypothesized that certain thoughts or feelings can also pressure people toward outcomes and undermine their self-determination. Ryan said that ego involvement "the state in which one's self-esteem is made contingent upon doing well" is internal, regulating, and controlling in nature. Two conditions were used, an ego-involved condition and a task-involved condition. Half the subjects were given the ego-involving induction and half of the subjects were given the task-involving induction. The results confirmed that ego-involved subjects were less intrinsically motivated by their activity in a free-choice period than task-involved subjects. Ego-involved subjects reported greater pressure and tension than task-involved subjects.

Findings in the above study have been replicated and extended. Ryan, Koestner, and Deci (1991) have discussed the difficulty of distinguishing intrinsically motivated activity from internally controlling behavior. In sum, information concerning cognitive evaluation theory is vast. The interaction between intrinsic motivation, perceived competence, and other extrinsic controls has been explained by cognitive evaluation theory and is directly relevant to the field of sports (Ryan, Vallerand, & Deci, 1984).

Intrinsic Motivation and Sport

Participation in sporting events seems to be largely self-determined while the perceived locus of causality is internal. Most people choose to participate in sporting activities for fun and for the opportunity to be free from extrinsic pressures. However, rewards and other extrinsic factors exist. Several studies have addressed cognitive evaluation theory and its relationship within the context of sport psychology.

Orlick and Mosher (1978) used a motor balancing activity to test the impact of rewards on intrinsic motivation. They pretested children ages 9 to 11 on a stabilometer task to assess their intrinsic motivation. Children continued to return for more of the activity in both the reward condition (those who received a trophy just for engaging in the activity) and the no reward condition (received no trophy). Four days later, subjects returned for a posttest- assessment of intrinsic motivation as again measured by a free-choice period. Subjects in the reward condition exhibited a decrease in free-choice time spent on the stabilometer task between the pre-and posttest- evaluation periods. Orlick and Mosher then summarized their data suggesting that a child's motivation for this interesting activity can be undermined through the introduction of extrinsic rewards.

Halliwell (1979) also recited results similar to those of Orlick and Mosher (1978). Halliwell reported that observers who are more than 7 or 8 years old tend to attribute less intrinsic motivation to rewarded athletes than to unrewarded ones. More specifically, Halliwell's findings indicate that causal reasoning appears to be a function of a child's maturity, in that younger children perceive the receipt of a reward for participation in an inherently interesting physical activity as a bonus while older children (10th grade) perceive the reward as a bribe.

As both the above studies do provide supporting evidence that intrinsic motivation for an interesting activity can be undermined through the introduction of extrinsic rewards, these results can only be generalized to a population of children ages 7 to 11. Also, both studies assumed that the physical and motor activity chosen were

intrinsically interesting for children, and that it was the reward that caused the children to exhibit decreases in their intrinsic motivation. Neither researcher considered the fact that the results obtained are only valid for the task used. Halliwell (1979) used a trampoline as the activity and repeated jumping on the trampoline for money. With or without the offer of money as a reward, the children would probably, after some time, choose a new activity that they would rather try. After all, a trampoline does get to be physically tiresome after jumping for some time. Halliwell (1979) indicated that the trampoline proved to be intrinsically motivating for young boys based on results from a previous study. Subjects consisted of males and females, yet, findings were generalized to young girls only. An assessment needed to be done to determine whether the trampoline was intrinsically motivating for girls. Girls may find other motor activities more intrinsically motivating, and those activities should have been used for the female subjects in the study. Although cognitive evaluation theory is a central model used in explaining intrinsic motivation, other explanations for intrinsic motivation models exist and should be discussed.

Harter's Model

Harter (1978), in an effort to extend White's (1959) theory of effectance motivation due to its lack of empirical testing, developed her own theory of competence motivation. Harter's model deals mostly with children. Harter (1981c) states that motivational orientation and perceived competence should be related. Children with an intrinsic orientation in a given achievement domain would have greater perceived competence in that domain. Children with an extrinsic orientation would have lesser feelings of perceived competence. Harter identified five dimensions of classroom learning that can be characterized as having both an extrinsic and intrinsic motivational pole: "(a) learning motivated by curiosity versus learning in order to please the teacher, (b) incentive to work for one's own satisfaction versus working to please the teacher and get good grades, (c) preference for challenging work versus preference for easy

work, (d) desire to work independently versus dependence on the teacher for help, and (e) internal criteria for success or failure versus external criteria (e.g., grades, teacher feedback) to determine success or failure" (p.301).

Harter (1981b) defined intrinsic motivation as an orientation toward learning and mastery in the classroom, with an existing extrinsic attitude. This definition differed from that of Deci (1975) where intrinsic motivation is concluded from activity level or interest level in a given task. Harter (1981b) argued that according to Deci (1975), the introduction of tangible rewards is found to weaken performance and to undermine intrinsic interest. She believed that approval conveying competence information does not have this attenuating effect. Harter (1981b) stated that a child's perceived competence is directly influenced by perceptions of performance control in particular achievement situations. A child given clear, consistent and realistic evaluation about his or her performance, will then develop consistent and realistic internalization structures and will believe that the source of performance control is internal. Conversely, unclear and inconsistent evaluation of performance will lead the child to believe that the source of performance control is external and lies within powerful others, thereby decreasing motivation.

Harter and her colleagues (Harter, 1978, 1981a, 1981b, 1981c; Harter & Connell, 1984) turned competence motivation theory into a testable and useful model. The polished model is sensitive to developmental changes and individual differences within developmental levels. It is also differentiated into multiple dimensions and a schematic refinement of White's competence motivation theory.

Harter viewed competence motivation as the result of a multiple dimension motive response to several influences of social and psychological factors. The components of this model are related to patterns of achievement behavior in sport and physical activity. The model allows a developmental perspective to be understood in a child's psychosocial growth through sport.

The components that are important to Harter's (1981a) multidimensional model of competence and effectance motivation are: a) the notion of domain-specific mastery attempts, b) the consequences of both success and failure experiences, c) success based on optimal challenges, d) influence from significant others, e) intrinsic/extrinsic motivational orientation, f) perceived competence, g) perceived control, and h) affective outcomes of mastery attempts.

Harter's (1981a) model differs quite drastically from Deci's cognitive evaluation theory and will not be used in this study. Although Harter does provide alternate definitions of intrinsic motivation and competence, her model is only one of many used in explaining and understanding outcomes of intrinsic motivation.

Proposition II of cognitive evaluation theory (Deci, 1975; Deci & Ryan, 1985) suggested that intrinsic motivation is related to perceived competency at an optimally challenging activity. Nicholls (1984) has taken a view similar to White (1959) in that all individuals have a need to exhibit competency within the environment. One is best able to develop feelings of competency by "maximizing the probability of attributing high ability to oneself while minimizing the probability of attributing low ability to oneself" (Nicholls, 1984).

Feedback promoting or signifying competence within a context of self-determination will increase intrinsic motivation, while feedback leading to perceptions and feelings of incompetence, will decrease intrinsic motivation so much as to possibly extend to amotivation for that activity. Several investigations have assessed the effects of performance information (feedback) on intrinsic motivation. A major source of performance feedback (information) in sport is contained in the verbal feedback that an athlete receives from his or her coaches and teammates. Vallerand and Reid (1984) studied the impact of positive and negative performance feedback on perceived competence and intrinsic motivation. The results revealed a main effect for feedback, such that positive verbal feedback increased intrinsic motivation for the stabilometer

task and negative verbal feedback decreased intrinsic motivation for the task. The specific propositions explored in this study were suggested by Deci and Ryan (1980). Specifically, changes in intrinsic motivation following feedback are due to changes in perceived competence. Vallerand and Reid (1984) identified 84 subjects with moderate interest in the stabilometer task and then assigned these subjects to the three conditions of positive, negative, or no verbal feedback. After a path analysis was performed with feedback, competence ratings, and intrinsic motivation, the researchers found that perceived competence was responsible for the changes in intrinsic motivation.

Vallerand (1983) also investigated whether the amount of positive feedback would affect subsequent intrinsic motivation. Fifty hockey players ranging in ages from 13 to 16 performed an interesting task-involving decision making in simulated hockey situations. There were 24 experimental trials, and subjects received either 0, 6, 12, 18, or 24 positive verbal statements regarding their performance. Results of this study revealed that for all groups of subjects receiving positive feedback, they were more intrinsically motivated than no-feedback subject groups, although the amount of feedback that was given had no effect. Vallerand (1983) suggested that in relation to the extent to which subjects perceive the feedback or perceive themselves as competent, intrinsic motivation will be increased despite the amount of feedback presented.

The work of Vallerand should be extended to more diverse groups. For example, his study employed male hockey players only. Would similar results be found for females? A replication of this study should be performed for females, maybe even female hockey players so situationally, and sport specifically, researchers can say that perceived competence is the mediating factor responsible for changes in intrinsic motivation.

Weinberg and Jackson (1979) supported cognitive evaluation theory and its proposed effects of feedback on intrinsic motivation. Subjects were asked to perform the stabilometer task under conditions of monetary rewards or no rewards, and subjects were given either random success feedback or random failure feedback. Random success feedback suggested that subjects did better than the 82nd percentile and random failure feedback based on normative information explained that subjects did better than the 18th percentile. Task interest, enjoyment, and excitement were assessed as measures of intrinsic motivation. An expected main effect for feedback indicated that individuals consistently demonstrated increased intrinsic motivation after success but not after failure.

Although these results supported the account of *proposition II* in understanding the effects of feedback and the related feelings and perceptions of competence on intrinsic motivation, the studies are only generalizable to a small population group. There have not been any studies done using highly competitive athletes in their sport related environment. As Weinberg and Jackson (1979) used feedback in comparison with others, they provided a weak account for competition according to most collegiate sport standards. Studies evaluating individual differences by pre-selecting groups of subjects on an individual difference variable and exploring the effects on these variables is limited in research in the field of sport psychology.

Other research has shown that competence information can be communicated without using the standard verbal or written feedback. Performance-contingent reward structures can enhance intrinsic motivation because they contain competence-relevant information. Information can be administered in either an informational or a controlling manner which can effect intrinsic motivation.

Harackiewicz (1979) found support for performance contingent reward structures providing evidence that controlling administered performance-contingent rewards decreased intrinsic motivation relative to task-contingent rewards with positive

feedback. Informational administered performance-contingent rewards did not differ significantly from task-contingent rewards with positive feedback.

Researchers in psychology, sport psychology, and social psychology have attempted to answer questions about achievement domains over the last decade in studies dealing with intrinsic motivation through competition. As competition is considered to be a pervasive aspect of sports participation, the attempt to understand the effects of competition and other external events on intrinsic motivation have been the focus of studies in the social and sport psychology literature.

Competition and Its Effects on Intrinsic Motivation

Competition is incorporated into, as well as inherent in, most sporting activities. Competition can be against one's own internal standard, direct with an opponent, as well as indirect.

Indirect Competition

Indirect competition may be a freely chosen activity which people use to improve their competence. Intrinsic motivation may be maintained or increased due to competency. Winning is expected to result in higher levels of intrinsic motivation than losing, since winning represents positive competence feedback (Deci & Ryan, 1985). Along the same lines, when an individual's performance in indirect competition is externally pressured from outside sources or from ego involvement, decreases in intrinsic motivation are expected. Therefore, it is crucial to determine if an individual is externally pressured and/or ego-involved.

Weinberg and Ragan (1979) explored the effects of an indirect competitive situation on intrinsic motivation. Subjects worked on a pursuit rotor and results indicated that in an indirect competition situation, the task was more enjoyable and more similar to a leisurely activity than their noncompetition subject counterparts. Also, the intrinsic motivation was enhanced for males in two of the competition conditions

while intrinsic motivation was left unchanged for females compared to the no competition condition.

Deci and Ryan (1980) suggested that the focus on winning can be experienced as extrinsic to the activity. The activity could be seen as an instrument to winning rather than something that is intrinsic or interesting in its own way. Deci argued that in practice and competition there sometimes are internal controlling processes where there are self-imposed pressures to achieve particular outcomes with feelings of tension, conflict, self-evaluation, self-criticism, and self-praise present. Deci claims that this internal controlling process proves to be the least self-determining, because one is working with standards that one has never accepted as one's own.

In sum, indirect competition can lead to either higher or lower levels of intrinsic motivation depending on how people experience the indirect competition. People can experience the indirect competition as an opportunity to gain competence feedback, which is the informational component of indirect competition, or people can experience indirect competition as a pressure to beat a standard (controlling indirect competition) (Deci & Ryan, 1985).

These claims by Deci and Ryan (1985) do not necessarily apply to elite athletes in that elite athletes or highly competitive athletes are driven most by self-determination, and standards that they believe are their own. As indirect competition is a freely chosen activity that can enhance competence, elite athletes already believe that they are in total control, and completely competent, and therefore choose this type of competition for the mere enjoyment of the challenge. Before these claims can be made, they need to be tested with various types and levels of competition to assess individual differences with the general population and other subgroups.

Direct Competition

A study by Deci, Betley, Kahle, Abrams, and Porac (1981) explored the effects of direct competition on intrinsic motivation. Subjects competed against each other in an

attempt to solve puzzles faster than their opponent, or subjects tried to solve them as fast as they could in the presence of another subject or competed against their own standard of excellence. Using a non-competitive free-will environment, results suggested that when competing against one another in face-to-face competition, decreases in intrinsic motivation were found. However, puzzle solving was not found to be intrinsically motivating and there were no pilot tests examining the levels of intrinsic motivation for that particular task. Deci et al. (1981) were quick to point out that the result stated above was particularly strong for females, but yet no reasons were given as to why this effect occurred.

Weinberg and Ragan (1979) also assessed whether subjects would continue to engage in the activity under the same conditions. They looked at the effects of direct competition on intrinsic motivation as assessed by asking subjects a question of how much time they would be willing to volunteer for a future experiment of the same type. The results showed that male subjects in direct competition chose to return for similar activity more than the males who did not compete. Males were said to have greater intrinsic motivation after competition.

Conceptual differences between the dependent measures are employed in the above two studies. In the Deci et al. (1981) study, the dependent measure for the competition and no-competition groups was future involvement with the activity in the absence of competition. But in the Weinberg and Ragan (1979) study, the dependent measure for the competition group was the willingness to return to the task with future competition. The dependent measure for the no-competition groups was in the willingness to return to the task in the absence of competition. These two studies assessed different things. In the Weinberg and Ragan (1979) study, the motivation to compete was assessed rather than intrinsic motivation for the task. This paradigm is similar to a study of the effects of rewards, contrasting that to the rewarded subjects' willingness to continue the activity for rewards with the nonrewarded subjects'

willingness to continue the activity for no rewards. This study is more of a measure of extrinsic motivation in competition than a measure of intrinsic motivation. Direct competition is extrinsically motivating and has the unintended ability of undermining intrinsic motivation of the activity itself.

Weinberg and Ragan (1979) and Deci et al. (1981) argued that competition can motivate in a similar way as extrinsic factors motivate. Also, when involved in direct competition, rewards need to be present in order to persist at the competitive activity. In the absence of the reward of winning, persistence shows a marked decline such that subjects who received negative feedback in the Weinberg and Ragan study were less willing to return than subjects who received positive feedback.

Ego Involvement, Task Involvement, and Competition

As the concept of ego involvement has been an important concept in the intrinsic motivation field for a long time, Nicholls (1984) defined ego involvement as a state in which an individual's goal is to derive a sense of competency from the self-knowledge that one is better or more able relative to others. Mastery of a task is seen as only a means to the end.

Ryan (1982) believed that ego involvement and competition are similar in that ego involvement represents an "internally controlling state in which one's self-esteem is contingent on certain outcomes." People can be motivated for extrinsic reasons which can undermine their intrinsic motivation. This may be due to competition being experienced as controlling and thereby undermining their intrinsic motivation. People become ego-involved in the competition rather than becoming or remaining task-involved in the competition. The outcome of the competition will affect the person's self-esteem. Therefore, people may continue to persist at an activity to feel the need to win (ego-involved) in order to maintain their self-esteem. When people win, they achieved their goal and will want to compete again, but if they see the activity as a means for winning, they will persist less at the activity without competition. If they lose

at the activity or the competition, ego-involved individuals may want to compete less yet persist at the activity to improve their skills or prove to themselves and others that they can do better in an effort to recover their self-esteem.

Ego involvement may have consequences on outcome and persistence at an activity. In Ryan's (1982) experiment, all subjects received positive feedback about their performance on a hidden-figure puzzle. A free-choice period displayed that subjects in the ego involvement condition (told that the task was a test of creative intelligence) were less intrinsically motivated for the puzzles than subjects in the task involvement condition. Many studies using the free-choice paradigm have shown that ego involvement can severely undermine intrinsic motivation in relation to task involvement (e.g., Koestner, Zuckerman, & Olssen, 1990; Plant & Ryan, 1985).

Ego Involvement and Performance Feedback

A subject's involvement or relationship to a task and the performance feedback affects intrinsic motivation. In Ryan's (1982) study, subjects were given positive feedback about their performance so that if they were ego-involved in the activity, they would be motivated to prove competence and self-worth in reaching the sought-after outcome. If the outcome was reached, they would be left with no motivation to continue working on the task and engage in the free-choice period. Ryan, Koestner, and Deci (1991) examined a similar situation giving subjects non-conforming feedback such as, "Your performance was about average." They believed that persistence during the free-choice period may be internally controlled for the ego-involved subjects rather than intrinsically motivating and researchers would code their persistence as intrinsic motivation (Ryan, Koestner, & Deci, 1991).

An attempt to tackle the process in which people feel competent in cognitive evaluation theory is in the construct of persistence after feedback during a free-choice period. Recently, Ryan, Koestner, and Deci (1991) looked at varied forms of persistence during a free-choice period in an effort to distinguish intrinsically motivating

behaviors from internally controlling behaviors. Ryan et al. conducted three experiments concerned with distinguishing intrinsically motivated persistence in situations where ego-involved versus task-involved subjects received positive and non-confirming feedback. Experiment 1 revealed that ego-involved subjects showed less free-choice persistence than task-involved subjects when receiving positive feedback. In experiment 2, subjects in the ego-involved condition displayed more free-choice persistence than task-involved subjects when they received non-confirming feedback. In experiment 3, ego-involved subjects displayed less free-choice persistence than task-involved subjects when receiving positive performance feedback but greater free-choice persistence than task-involved subjects when they received non-conforming feedback. Therefore, Ryan, Koestner, and Deci (1991) make it clear that it is important while administering a free-choice period to subjects, intrinsically motivated persistence needs to be distinguished from internally controlled persistence.

How would athletes or elite athletes behave in this situation? These experiments did not address the situation of negative feedback or even give reasons as to how these subjects may react. Studies need to address athletes in both task-involved and ego-involved conditions. Individuals choose tasks based on the belief that they can demonstrate competence on those tasks. It may be that athletes in general are ego-involved while still maintaining task involvement.

In summary, a competitive focus on winning and a state of ego involvement is believed to be motivating, although not intrinsically motivating. It is not intrinsically motivating, because both competition and ego involvement represent stable, persistent forms of motivation only for those who usually win and expect to meet certain standards. Self-esteem is hinged on winning for those ego-involved and on achieving for those task-involved. Eventually, persistence at an activity without competition, such as during a free-choice period will lead to a decrease in motivation if negative feedback and perceived incompetence are present.

Finally, Ryan (1982) and his peers from the Rochester Motivation Research Group (Plant & Ryan, 1985; Ryan, Mims, & Koestner, 1983) have developed The Intrinsic Motivation Inventory (IMI), a multidimensional measure of a subject's levels of intrinsic motivation with regard to experimental tasks. The IMI contains five dimensions: interest-enjoyment, perceived competence, effort, pressure-tension, and perceived choice. The benefit of a measure such as the IMI is that items can be easily modified to fit the activity or skill of the researcher's choice (Ryan, 1982). McAuley, Duncan, and Tammen (1989) conducted a confirmatory factor analysis to assess the tenability of the IMI model for the first-four order dimensions representing intrinsic motivation. The data suggested that sport data adequately fit the five factor model.

Tasks

One major concern with the research in intrinsic motivation has been the use of novel tasks. Several studies have used uninteresting tasks such as puzzle solving (Deci et al., 1981), performing a rotor pursuit task (Weinberg & Ragan, 1979), performing on a stabilometer (Orlick & Mosher, 1978; Vallerand & Reid, 1989; Weinberg & Jackson, 1979), which do not relate to competition or sport. Puzzle solving, as used by Deci et al. (1981) in deciding competition and its effects on intrinsic motivation, is not competitive in nature.

Sport tasks have been previously identified in the literature as the trampoline, the stabilometer, and the pursuit rotor only prove to be interesting for certain subjects and do not always take into consideration the sex of the subject. Only activities that are intrinsically motivating for all subjects should be used.

Conclusion

Studies have been done in the area of intrinsic motivation and perceived competence using the cognitive evaluation theory model have left many important and interesting questions unanswered. All too often, the data presented has proven to be inconclusive. Most people tend to think of "sport" as a "male" activity and most sporting

behaviors as masculine. The concern about how male and female behaviors differ is increasing steadily.

The investigation of the effects of competition on intrinsic motivation by Deci et al. (1981) revealed a "marginal interaction" between competition and the sex of the subject. The intrinsic motivation of women was more undermined than was the intrinsic motivation of men. Although, the interaction of sex and competition was not significant, Deci et al. (1981) did not explain why they think these results occurred. Deci and Ryan (1985) suggested that for this particular study, competition was congruent with a male orientation. They also believed that competition was found aversive by females. Given the growth in the number of female athletes, and the effects of Title IX, it is difficult to accept this explanation for the results found by Deci et al. (1981). Since women's sports are quite prevalent, recognized, and highly accepted by the NCAA, men and women should not perform differently on tasks with competition, especially on a novel task.

Weinberg and Ragan (1979) suggested there were sex differences noted in the degree to which subjects in the competition condition would volunteer to return for more competitive activity and the degree to which subjects in the no competition condition would volunteer to return for more non-competitive activities. It was found that males volunteered more in the competitive group than did males in the non-competitive group. There were no significant differences found for females, yet Weinberg and Ragan (1979) conclude that males prefer competition over no competition and females do not. How can they logically conclude this from the above data? The data suggest that the task used, a pursuit rotor task, did not prove to be intrinsically motivating or competitively motivating for the female subjects. As it has become more socially acceptable in today's society for females to be competitive, more aggressive, and more win-oriented, these studies may not hold true today.

As literature in the area of intrinsic motivation is quite vast, specific studies to be directed at perceived competence and competition in competitive settings may find different results than previously explored. An unanswered question in the intrinsic motivation literature arises from the findings of decreased motivation. Most studies do not include negative feedback and/or its effects on intrinsic motivation. Negative feedback may not always produce feelings of incompetence. It is believed that subjects will not always respond to negative feedback as cognitive evaluation theory suggests.

Cognitive evaluation theory has its limitations. It has not been applied to elite athletes or used in highly competitive sporting environments. The effects of verbal feedback on performance take place through the results of perceptions and feelings about competence. Performance feedback produces changes in perceptions and feelings of competence and in turn produces changes in intrinsic motivation. Some important variables need to be reexamined so cognitive evaluation theory can be made more valid.

All studies should be replicated in field settings with athletes of different ability and skill level. Secondly, as suggested by Harter's (1978) model and in Connolly's (1980) definition, a dimension needs to be added to assess differences between the evaluative component and the affective component of perceived competence in relation to intrinsic motivation. Thirdly, it is hypothesized that elite or successful people not only in athletics but in academics and other achievement spectrums, perceive success and failure differently than non-elite or the non-successful. Elite athletes are similar to high achievers in most fields, in that there are certain reasons why they are high achievers and elite in their field of expertise. This elite group is not affected by random failure feedback although Deci believes all are affected. It is believed that elite athletes see themselves as competent in their specific area of achievement such that random failure feedback will be discounted, and these subjects will try even harder. Therefore, no

change in intrinsic motivation should occur, and intrinsic motivation may even increase due to the fact that the random failure feedback may even increase self-determination for this subject group.

Another problem with cognitive evaluation theory is that it assumes that competence feedback affects intrinsic motivation by affecting one's ideas of perceptions and feelings of competence. The theory does not explain the procedure through which people come to feel competent after receiving performance information. The processes in which people feel competent in intrinsic motivation is unclear.

The measurement of the construct persistence after feedback is used often to decide if one is intrinsically motivated. Free-choice periods have traditionally been ego-involved instead of task-involved. Ryan (1982) believed that ego involvement would undermine intrinsic motivation. Elite athletes who are ego-involved may increase their intrinsic motivation due to the nature of athletics or their elite personality. According to Deci's (1975) cognitive evaluation theory, "people have an intrinsic need to feel competent and master optimal challenges." If this revelation is true, then all subjects should persist regardless of ego-involved or task-involved to feel positive affect and increase self-esteem and feel competent. Certain individuals have a higher level of internal competency level and the feedback that was given even if it was positive was seen as non-confirming. Elite athletes may fall into this category.

CHAPTER 3

METHODS

Subjects and Design

Ninety male and female undergraduates from a major midwestern university served as subjects and participated voluntarily in the study. Forty-seven subjects, 23 males and 24 females, were elite athletes from various varsity athletic teams (e.g., women's volleyball; men's and women's soccer; men's and women's basketball; men's and women's tennis; women's softball; men's ice hockey; men's lacrosse; men's and women's track and field/cross country) who were recruited from high school by their respective varsity coaches and had an athletic scholarship. The remaining set of 43 subjects, 25 males and 18 females, were non-elite athletes from 13 different sections of various activity classes at the university (e.g., basketball, soccer, aerobics, tennis, and powerwalking). These subjects had some prior competitive experience in intramural sports. The experimenter attended one practice session of each varsity athletic team and one class session for each activity class. Subjects were told that the experimenter needed athletes to test a new motor skill task. Subjects were randomly selected from the pool of athletes that met the criterion for their status group. The subjects ranged in age from 18 to 24 years.

The design was a 2 x 2 x 2 Athlete Status (elite or non-elite) x Sex (male or female) by Feedback (success or failure) factorial design with repeated measures on the dependent variables of perceived competence, interest-enjoyment, and perceived choice subscales of the Intrinsic Motivation Inventory. Twenty-four elite athletes were randomly assigned to the success feedback condition and 23 elite athletes were randomly assigned to the failure feedback condition. Twenty non-elite athletes were

randomly assigned to the success condition, and 23 non-elite athletes were randomly assigned to the failure condition. Figure 1 provides an overview of the design.

Figure 1

Description of Research Design

	Elite Athletes	Non-Elite Athletes
Success		
	M=12	M=11
	F=12	F=09
Type of Feedback		
Failure		
	M=11	M=14
	F=12	F=09

Task

The Wayne Saccadic Fixator was selected because of its high degree of intrinsic motivation, its previously successful testing in sport, and its relevance to sport. Subjects performed a reaction pro-action time eye-hand coordination test. Subjects were told, "When you see one of the lights turn on, press the button quickly using the tips of your fingers. Another light will come on automatically and, again, turn it off as quickly as you can. Your task is to turn off as many lights as you can in 30 seconds" (adapted from Beckerman, Thomas, Martin, Illinois College of Optometry, 1989). A trial lasted for 30 seconds. The number of trials performed were the same for each subject and the lights on the Fixator moved automatically at a minimum speed of 60 lights per minute to a new random position. There were no defined patterns, as the Fixator uses a random generator to randomize the appearance of the lights. A point was scored when the correct button was depressed. The sound function of the machine was turned off during the experimental testing. The Wayne Saccadic Fixator is computerized and capable of many combinations of activities such as timing, anticipation and reaction time, speed selection, patterns, and special sports vision training. The machine is a motor skill task used to test eye-hand coordination, reaction

time, and saccadic movement of the eyes. A built in computer is programmed into the Fixator storing up to 500 different activities, patterns, and directions for over 203 programs. There is a simple keyboard in which a large four digit counter displays each entry and the score or time. This keyboard was covered for purposes of the experiment, and subjects could see their score only if they removed the piece of taped paper which covered the 4 number digital readout. The maximum score that a subject could achieve was 10,000 meaning that every possible light was extinguished in the 30 second time period. This score represented a multiplicative function (The Gardner Product) of the number of lights extinguished by the final speed of lights per minute (Harry Wayne, personal communication, May 14, 1993). Figure 2 provides a picture of the Wayne Saccadic Fixator.

Figure 2

Photograph of the Wayne Saccadic Fixator

The test that was used for this experiment was the Jack Gardner Eye-Hand Coordination Athletic Test. This repeatable sports vision test measures eye-hand coordination by combining proaction and reaction measurements. The lights begin to "flash on" at an automatic rate of 60 lights per minute (one per second). A point is scored for each correct response. If all possible lights are extinguished, the speed can increase to 200 lights/min. Each time a light is missed, the speed is reduced. Norms for the eye-hand reaction task have been established. Gardner (1988) tested a group of 346 athletes consisting of high school students ages 15-18 years, and a select group of male college basketball players. Using the Wayne Saccadic Fixator to measure pro-action and reaction skills, it was found that the average number of correct hits was 32.4 with a total score average of 2518. The Fixator task was equally unfamiliar to all subjects, but as in many tasks, a learning effect can occur such that the more one has tried the task, the better one will subsequently become. Each subject received 3 practice trials to control for this learning effect. Previous tests with elite athletes found 2 trials to be sufficient (Dr. Phil Irion, personal communication, February 18, 1993).

Assessment Instruments

Screener-questionnaire. Subjects first signed a consent form (See Appendix D) and then were asked to fill out a background (screener) questionnaire. The screener questionnaire was used to identify a pool of males and females who met the definition of elite and non-elite athletes. This questionnaire served as background information which was used to determine the mean age, status, previous and current sport experience level, athletic participation and sport achievements of subjects. Questions about current interests and academic or outside related achievements were also included in this questionnaire. A separate questionnaire was given to elite athletes and to non-elite athletes (See Appendix E).

Intrinsic motivation inventory (IMI). This questionnaire (IMI-pretest/IMI posttest versions, See Appendix F) was designed as a multidimensional measurement to

assess overall intrinsic motivation as well as underlying dimensions such as interest-enjoyment (e.g., "I enjoyed this task very much"), perceived competence (e.g., "I think I am pretty good at this task"), effort-importance (e.g., "I put a lot of effort into this task"), tension-pressure (e.g., "I felt tense while performing this task"), and choice (e.g., "I did this activity because I wanted to"). The IMI items are scored on a Likert scale ranging from (1) strongly disagree to (7) strongly agree. The subscales used were interest-enjoyment, perceived competence, and choice. All subscales have been shown to be stable across a variety of tasks and used in a variety of conditions and settings (McAuley, Duncan, & Tammen, 1989; Ryan, 1982). Order effects are minimal, and the experimenter can eliminate factors on the inventory without affecting the validity of the measure (Ryan, 1982). McAuley, Duncan, and Tammen (1989) used the IMI in competitive sport situations and assessed the factor structure. They found reliability for the factors of intrinsic motivation. "Specifically, internal consistency for the four subscales was generally quite adequate with the alpha coefficient for each of the following scales shown in parentheses: interest enjoyment (α=.78); perceived competence (α=.80); effort (α=.84); and pressure tension (α=.68). The overall scale also appears to be internally consistent with an alpha coefficient of .85" (McAuley et al., 1989, p. 51).

The pretest interest-enjoyment subscale of the IMI was used as a manipulation check to assess the interest/enjoyment level for each participant on the reaction test on the Wayne Saccadic Fixator. There were 6 items scored on a Likert scale from (1) strongly disagree to (7) strongly agree. This check verified that the task was truly intrinsically motivating while assessing homogenous groups (for elite $\underline{M}$ = 35.89 $\underline{SD}$ = 6.10; for non-elite $\underline{M}$ = 36.60 $\underline{SD}$ = 6.08) with respect to the task.

Persistence measure (See Appendix I). When the experimenter left the room, the amount of time during the 6-minute period in which subjects spent working on the Fixator task was recorded. This persistence score was a measure of the total time

spent on the task as well as the number of trials attempted during this time. The time elapsed before the subject actually worked on the Fixator was also recorded. Any unusual events that may have taken place were noted at that time.

Procedures

Subjects were told prior to the experiment that each testing session would take less than 30 minutes. Only one subject was tested at a time, and only one subject was in the laboratory at a time. The subjects had already completed the consent form at the time of the screener questionnaire. As the subjects entered the laboratory, the experimenter adjusted the Fixator relative to the height of each subject. The experimenter then explained the procedure for the Fixator task which involved subjects extinguishing lights as they flash. (This test was selected because subjects had no direct competence feedback from completion of the task. They can only note improvement, not if they are doing well or poorly relative to a standard). To control for ego involvement on the task, subjects were introduced to a task-involving condition prior to performance on the Fixator. Subjects were read the following statement by the experimenter: "This task is a kind of game that you might find interesting. I am trying to get some idea of what people's reactions to it are and how well people can do. It is a new type of perceptual motor task being designed by psychologists" (adapted from Ryan et al., 1991). Subjects were then told that they would be given three practice trials, and they could begin a trial by pressing the green button each time. Subjects were encouraged to begin when ready and work at their own pace. After completion of the three practice trials, subjects answered the IMI-pretest. Subjects were then told, "Now you will perform 4 trials in which your performance will be scored and charted using a computer calculation." Subjects then performed 4 more trials each lasting again for a 30 second duration while being encouraged to begin when ready and work at their own pace. For each subject, the 4th performance trial score was recorded by the experimenter. Subjects were then told to take a seat back at the desk and that, "A

computer in the next room will provide the calculation and the read out for scores and performance results for your last 4 trials. I will now go into the next room and get the performance sheet." After the experimenter came back into the room, subjects were handed the performance feedback sheet which contained either random success or random failure feedback results. Minimal verbal results were given as subjects were told, "The sheet you have just received is to let you know how you did. You may read it now if you haven't already done so."

Manipulating the feedback variable. After the task was completed, subjects were given either success or failure feedback about their performance on the Fixator task. The performance feedback sheet for the failure feedback group read, "According to the norms established on the Fixator, you have performed in the 21st percentile. That is better than 21 percent of all people who have attempted this task." The performance feedback sheet for the success feedback group read, "According to the norms established on the Fixator, you have performed in the 79th percentile. That is better than 79 percent of all people who have attempted this task" (See Appendix G). After the random performance feedback results, the IMI-posttest was then given again to all subjects. Subjects then finished the success/failure feedback assessment questionnaire.

Success/failure feedback check (see Appendix H). To determine the efficacy of the success/failure manipulation, after completion of all task trials, subjects were asked questions pertaining to how well they thought they performed on the Fixator task. This questionnaire was quantified using a 4-point Likert Scale ranging from 1 (strongly disagree) to 4 (strongly agree). The experimenter then said "I need a few minutes to look over your tests to be sure everything is complete before you leave. I may have to go get another questionnaire depending on how these questionnaires are. You may continue to try the task until I return. I'll be back, but it's going to be a few minutes."

Free-choice period. All subjects were told that the experimenter would be a few minutes to check the remaining questionnaires and that they could continue to try the task until the experimenter returned. Subjects were instructed on how to use the machine only if they asked. The experimenter then walked about 10 steps to observe through a (two-way) mirror the number of trials and time the subject persisted during the free-choice period. This observation period lasted 6 minutes, and the experimenter recorded the amount of time elapsed before the subject began working on the task, the amount of time that was spent at the Fixator task, the number of attempts or trials, and the occurrence of any unusual events.

After the observation period, the experimenter came back into the room and told subjects that everything was fine, then the experimenter verbally asked the subjects if he or she tried the task again. Subjects were debriefed about the experiment they had just participated in as they were told, "First of all, the results that you received regarding your performance on the Fixator task were false and do not in any way reflect your actual performance on the task. In fact, your actual performance was never scored. The purpose of misleading you about how you performed was to try to determine how much one is influenced by feedback of success or failure. Also, why people persist is of interest." Subjects were then asked by the experimenter why they persisted or why they did not persist, and if they believed the feedback. Subjects were told by the experimenter, "I have predicted that some people who receive failure feedback will be less influenced by the failure feedback and show more interest in persisting on the task again. Some people who receive success feedback may also want to persist again at the task because they may feel good about repeating the task. Do you have any questions about this research or about the task that I can answer? Was there anything that you liked or didn't like?" Subjects were then told that it was extremely important that they not tell any of their friends, classmates, or teammates about the task or

questions that they completed during the experimental session, as this would bias the study. For a complete protocol, see Appendix J.

CHAPTER 4

RESULTS

This study was designed to address two main issues in relation to cognitive evaluation theory, namely, to examine feedback and perceived competence and its effects on intrinsic motivation as it relates to the elite athlete. First, this study investigated Deci's (1975; Deci & Ryan, 1985) assertion that increases in perceptions and feelings of competence (success) produce increases in intrinsic motivation while decreases in perceived competence (failure) lead to decreases in intrinsic motivation. Secondly, this study examined the construct of persistence in regards to its effects on intrinsic motivation. Hence, do elite athletes perceive random success and random failure feedback differently in relation to competence than non-elite athletes on a sport-related task? Furthermore, how does this construct of persistence relate to intrinsic motivation for the elite and non-elite athlete. The results of this study will be organized into three sections. The first section will be the results of the manipulation check demonstrating that feedback was successfully manipulated. Secondly, results relating to the hypotheses will be discussed. Lastly, non-hypothesized findings will be presented.

Manipulation Check

To confirm whether subjects believed the feedback they received, a questionnaire was employed after completion of all task trials and before the free-choice period. This questionnaire was quantified using a 4-point Likert Scale ranging from 1 (strongly disagree) to 4 (strongly agree). Subjects answered questions pertaining to how well they thought they performed on the Fixator task (see Appendix H). This questionnaire was used to determine the efficacy of the success/failure manipulation.

The items on the questionnaire were subjected to factor analysis to see if there was more than one view of the impact of the feedback on performance. A factor analysis using a varimax rotation found 3 factors with Eigenvalues over 1.0. All factor loadings $\geq$ .40 were considered in defining the construct. Table 1 presents the factor loadings for each item on each of the factors for the 90 participants who completed the manipulation check questionnaire. Also reported in Table 1 is the percent variance explained for each factor.

Table 1

Items with Factor Loadings Greater Than or Equal to .40 and Factors with Eigenvalues over 1.0.

Items	Physical	Perceptual	Experiential
I felt rushed while performing on the Fixator task.	-.86		
I was able to see all of the lights.	.73		
This task is related to my sport.		.76	
I performed well on the Fixator task.		.61	
I was able to focus on the Fixator task.		.56	
I implemented a strategy while performing on the Fixator task.		.43	
I have had experience with a similar task.			.82
I was able to respond as quickly as I wanted to on the Fixator task.	.47		-.67
Eigenvalues	2.28	1.31	1.19
Percent of Variance	28.6	16.3	14.8

It was determined that in order to be considered a true factor, factors needed to have 3 or more items loaded per subscale, because less than three indicators for a potential factor can produce problems with inappropriate solutions (Bollen, 1989). In Factor 1 labeled (Physical) and Factor 3 labeled (Experiential), 3 and 2 items respectively loaded. Since one item, "I was able to respond as quickly as I wanted to on the Fixator task," loaded on both factors, leaving each factor with only 2 and 1 items respectively, these factors were discounted. Therefore, neither will be considered in

subsequent analyses. Four items loaded on Factor 2, labeled (Perceptual), and will be used in subsequent assessments. Therefore, if feedback were believed, it would be expected that subjects who received success feedback would respond and perform differently than subjects who received failure feedback. It would also be expected that there would be no difference between the status of athlete and perceptions of feedback with performance.

A t-test to examine the effect of success and failure feedback on subsequent performance was found to be significant, t (88) = 3.06, p < .01. This expected finding meant that subjects responded differently due to the type of feedback that they received. The different responses indicated that subjects believed the success or failure feedback and answered questions according to the type of false random feedback they received. Table 2 provides the means and standard deviations for the success and failure feedback groups on the perceptual factor of the manipulation check questionnaire.

Table 2

Means and Standard Deviations for Success and Failure Feedback

Type of Feedback	n	M	SD
Success	44	11.50	1.46
Failure	46	10.48	1.70

A t-test was used to assess the status of athletes', elite and non-elite, perceptual levels and was found to be non-significant, t (88) = -.37, p > .05. This expected finding explains that there were no differences between elite and non-elite athletes in their perceptions of performance as related to their belief of the feedback on the manipulation check questionnaire. Table 3 gives the group means and standard deviations for this analysis.

Table 3

Means and Standard Deviations for Elite and Non-Elite Athletes

Status of Athlete	n	M	SD
Elite	47	10.91	1.80
Non-Elite	43	11.05	1.50

During the debriefing about the experiment, subjects were asked by the experimenter if they believed the feedback that they had received. This question was asked after subjects were told that the results regarding their performance were false, and did not reflect their actual performance on the task, and before subjects were told some expectations and predictions of the study by the experimenter. Subjects' answers concerning their belief of the feedback were recorded by giving a verbal yes, no, or an answer that revealed skepticism. Of the 90 subjects, 78.9% responded yes, they believed the feedback, 10.0% responded no, they did not believe the feedback, and 11.1% responded with answers indicating skepticism.

Therefore, the results of the statistical analyses along with the high percentage, approximately 80%, of subjects responding yes to the post debriefing question, confirmed the notion that the manipulation check was successful. These results also support the notion that subjects believed the performance feedback that they received and answered the questions in the experiment accordingly.

Hypotheses

Gender differences. To assess gender differences on the pretest perceived competence subscale of the IMI, a t-test was performed. Results showed no statistically significant differences between male and female athletes in responses to the pretest perceived competence subscale of the IMI, t (88) = .99, p > .05. In support of hypothesis 1, this expected finding stated that male and female athletes did not differ on the pretest perceived competence subscale of the IMI.

Gender differences were also examined in regards to the persistence measure. A t-test was done to investigate gender differences between males and females on the persistence measures. Persistence was measured two ways: First, as the total time spent out of the six minutes of free-choice time using the Fixator, and second, as the total number of trials performed during this free-choice period. It was predicted that males and females would not be different on the persistence measure. The hypothesis was supported as results were found to be non-significant for total number of trials, t (46) = .70, p > .05, and for total time out of six minutes, t (46) = .73, p > .05. Table 4 shows group means and standard deviations for scores on the pretest perceived competence subscale of the IMI and on the persistence measures. Therefore, of those subjects who persisted, males and females persisted equally during the free-choice period.

In summary, hypotheses were supported as no gender differences were found for scores on the pretest perceived competence subscale of the IMI or for the persistence measures. Therefore, gender was not a factor in assessing the feedback hypotheses.

Status of athlete. It was predicted that elite athletes would have a higher score on the pretest perceived competence subscale of the IMI when compared to non-elite athletes' scores. A t-test revealed no significant differences between status of athlete, elite or non-elite, and their score on the pretest perceived competence subscale score of the IMI, t (88) = .14, p > .05. Means and standard deviations are reported in Table 5. These results failed to support the hypothesis that elite athletes would have a higher pretest perceived competence subscale score than non-elite athletes.

Although no predictions were made, differences between elite athletes and non-elite athletes on the pretest interest-enjoyment subscale and on the pretest perceived choice subscale of the IMI were examined. T-tests revealed no significant differences between status of athlete, elite or non-elite, on the pretest interest-enjoyment subscale of the IMI, t (88) = -.55, p > .05. This result indicated that elite athletes did not have a

higher pretest interest-enjoyment score on the IMI compared to non-elite athletes. There were no group differences observed. There were also no significant differences between status of athlete, elite or non-elite, on the pretest perceived choice subscale of the IMI, t (88) = -.61, p > .05. Again, elite and non-elite athletes did not differ in the pretest perceived choice subscale scores on the IMI. Table 5 reports the group means and standard deviations for status of athlete and scores on the pretest perceived competence, interest-enjoyment, and perceived choice subscales of the IMI.

Table 4

The Group Means and Standard Deviations on the Pretest Perceived Competence Subscale of the IMI and on the Persistence Measures Between Sex of Athlete

	n	M	SD
Scores on the pretest perceived competence subscale of the IMI			
Males	48	28.38	4.63
Females	42	27.38	4.92
Total number of trials performed during the free choice period			
Males	26	4.38	3.21
Females	22	3.77	2.78
Total time in seconds during the six-minute free-choice period			
Males	26	170.2	127.6
Females	22	145.7	98.10

Table 5

The Group Means and Standard Deviations for the Pretest Perceived Competence, Interest-Enjoyment, and Perceived Choice Subscales of the IMI Between Status of Athlete

	n	M	SD
Perceived competence			
Elite	47	27.98	5.25
Non-Elite	43	27.84	4.23
Interest-enjoyment			
Elite	47	35.89	6.10
Non-Elite	43	36.60	6.08
Perceived choice subscale			
Elite	47	41.85	7.17
Non-Elite	43	42.74	6.79

In summary, the hypothesis was not supported as no differences between status of athlete, elite or non-elite, were found for scores on the pretest perceived competence subscale of the IMI or for the other measures of the IMI, i.e., interest-enjoyment and perceived choice. Therefore, all athletes began the experiment with similar pretest scores for the constructs of the IMI.

Feedback effects. To test the hypotheses about the effects of feedback on perceived competence and intrinsic motivation, two types of analyses, paired t-tests and a MANOVA, were performed. A paired t-test was done to examine the hypothesis that all athletes who experience random success feedback will have a higher posttest perceived competence subscale score on the IMI than their pretest perceived competence subscale score on the IMI. Results of this paired t-test were significant, $t(43) = -2.76$, $p < .01$. Results supported the hypothesis. All subjects receiving success

feedback (n=44) scored significantly higher on the posttest perceived competence subscale of the IMI than on the pretest perceived competence score of the IMI. This finding lends statistical support to previous research that success feedback indicating competence will increase one's intrinsic motivation toward a task or activity. Table 6 shows the group means and standard deviations for all athletes and their scores on the pretest perceived competence compared to their scores on the posttest perceived competence subscale of the IMI after receiving success feedback.

Therefore, results supported the hypothesis that all athletes receiving success feedback scored significantly higher on the posttest perceived competence subscale of the IMI compared to their pretest perceived competence subscale scores on the IMI.

Table 6

The Group Means and Standard Deviations Between Athletes' Scores on the Pretest Perceived Competence Subscale of the IMI and Their Posttest Scores after Success Feedback

	n	M	SD
Pretest perceived competence			
All Athletes	44	27.75	4.64
Elite Athletes	24	28.42	5.11
Non-Elite Athletes	20	26.95	3.99
Posttest perceived competence			
All Athletes	44	29.59	5.00
Elite Athletes	24	30.71	4.41
Non-Elite Athletes	20	28.25	5.43

To test hypotheses 5 and 6, a 2 x 2 (Status x Feedback) MANOVA with repeated measures on the perceived competence subscale of the IMI was performed. It was expected that elite athletes receiving failure feedback would not exhibit a change in their posttest perceived competence subscale score compared to their pretest perceived competence subscale score of the IMI, while non-elite athletes would experience a significant change after random failure feedback, as their posttest perceived competence subscale score would be lower than their pretest perceived competence subscale score of the IMI. The results revealed a significant main effect for feedback and for trial, i.e., pretest/posttest scores. The main effect for status of athlete was non-significant. A significant two-way interaction was found for feedback by trial. Results of the other two-way interactions were non-significant, and results of the three-way interaction were also non-significant. A summary of all the main effects and interactions are reported in Table 7.

Table 7

Summary Results of Multivariate Analysis of Variance for Status by Feedback by Trial (pretest/posttest) on the Perceived Competence Subscale of the IMI

Test of Between-Subjects Effects Source	df	MS	F
Within Cells	86	43.40	
Status	1	9.01	.21
Feedback (FDBC)	1	550.26	12.68**
Status By FDBC	1	102.64	2.36
Tests of Within-Subject Effect			
Source	**df**	**MS**	**F**
Within Cells	86	13.83	
Trial	1	195.86	14.17***
Status By Trial	1	3.00	.22
FDBC by Trial	1	676.69	48.94***
Status By FDBC By Trial	1	2.52	.18

**p < .01
***p < .001

The MANOVA results failed to support Hypotheses 5 and 6. The means and standard deviations for the main effect feedback are reported in Table 8. A discriminant function test served as a post-hoc test for the main effect for feedback. Results were significant, X^2 (2) = 42.14, p<.001. Both dependent variables, i.e., pretest and posttest perceived competence, entered the equation. Based on the means presented in Table 8, the subjects who received success feedback scored lower on the pretest perceived competence subscale and higher on the posttest perceived competence subscale of the IMI than those who received failure feedback. Perhaps the most dramatic difference was the decrease in perceived competence by those who received the failure feedback.

Table 8

Means and Standard Deviations for Groups Receiving Success and Failure Feedback on Perceived Competence Subscale Scores of the IMI

	n	M	SD
Scores for feedback on the pretest perceived competence subscale			
Success	44	27.75	4.64
Failure	46	28.07	4.93
Scores for feedback on the posttest perceived competence subscale			
Success	44	29.59	4.99
Failure	46	22.09	6.58

For the remaining results of hypotheses 5 and 6, paired t-tests were performed since the appropriate analysis, a planned contrast, was unable to be run with repeated measures. As an alternative, the paired t-test provided the means and standard deviations for these results.

It was hypothesized that elite athletes receiving failure feedback would not exhibit any change in the posttest perceived competence subscale score of the IMI compared to the pretest perceived competence subscale score of the IMI. This paired t-test, although significant, did not support the hypothesis. Elite athletes who received failure feedback scored lower on their posttest perceived competence subscale of the IMI than on their pretest, t (22) = 4.62, $p < .001$.

It was also hypothesized that non-elite athletes who experienced failure feedback would score lower on the posttest perceived competence subscale compared to the pretest perceived competence subscale of the IMI. A paired t-test was significant, t (22) = 5.08, $p < .001$. This expected result supported the predicted hypothesis that non-elite athletes who received failure feedback would score significantly lower on their posttest perceived competence subscale of the IMI than on the pretest perceived competence subscale. This finding lends statistical support to previous research that failure feedback indicating incompetence will decrease one's intrinsic motivation toward a task or activity. Table 9 provides the means and standard deviations for elite and non-elite athletes after receiving failure feedback.

Therefore, results supported the hypothesis that all non-elite athletes receiving failure feedback scored significantly lower on the posttest perceived competence subscale of the IMI compared to their pretest perceived competence subscale scores on the IMI. Results did not support the hypothesis that elite athletes would not have a change in their posttest perceived competence subscale score of the IMI compared to their pretest perceived competence score. In summary, both elite and non-elite athlete groups had dramatic decreases on their posttest perceived competence subscale of the IMI than on their pretest perceived competence subscale after failure feedback. No group differences were found.

Table 9

The Group Means and Standard Deviations for Scores on the Pretest Perceived Competence Subscale of the IMI and Posttest Scores for Elite Athletes and Non-Elite Athletes who Received Failure Feedback

	n	M	SD
Pretest perceived competence scores			
All Athletes	46	28.07	4.93
Elite Athletes	23	27.52	5.48
Non-Elite Athletes	23	28.61	4.37
Posttest perceived competence scores			
All Athletes	46	22.09	6.58
Elite Athletes	23	21.57	6.82
Non-Elite Athletes	23	22.61	6.43

Persistence. It was predicted that elite athletes would persist longer as measured by greater number of trials (trials) and more time spent on task (ttime), during the free-choice period than the non-elite athletes on the Wayne Saccadic Fixator after failure feedback was given. A 2 x 2 (Status x Feedback) MANOVA was used to test the main effects of status and feedback and the two-way interaction of status by feedback. There were no significant main effects for status of athletes, F (2,43) = 2.85, $p > .05$; or for feedback, F (2,43) = 1.57, $p > .05$. However, there was a trend for status of athlete ($p < .10$). The means showed that non-elite athletes had higher persistence scores than elite-athletes. According to the means, non-elite athletes had more trials and persisted for more minutes during the free-choice period, although it was concluded that the status of subject had no effect on one's persistence, and therefore, persistence may not be a good measure of intrinsic motivation. The two-way interaction of feedback by status was also nonsignificant, F (2,43) = .098, $p > .05$. The means and

standard deviations for all the non-significant findings are presented in Appendix K. These results did not support the persistence hypothesis.

Performance Results

For each subject, the fourth performance result was scored. A one-way analysis of variance (ANOVA) revealed no significant differences among the elite athletes of 12 sports on their fourth score of the Wayne Saccadic Fixator, F (11,35) = 1.32, p > .05. Therefore, there were no differences between the 12 sports and no participants from specific sports performed better than any other sport participants on their performance results. A t-test revealed no significant differences between elite and non-elite athlete performance scores on the recorded fourth performance of the Wayne Saccadic Fixator, t (88) = -.16, p > .05. A t-test also revealed no significant differences between males and females on their recorded fourth performance score on the Wayne Saccadic Fixator, t (88) = 1.68, p > .05. Appendix K provides us with the means and standard deviations for the non-significant results.

A 2 x 2 (status x feedback) MANOVA with repeated measures on perceived choice and interest-enjoyment subscales of the IMI were performed. Results revealed a significant main effect for feedback, F (1,86) = 6.44, p < .05, for the perceived choice subscale of the IMI while all other results were nonsignificant. Table 10 provides the means and standard deviations for the main effect feedback for the perceived choice subscale of the IMI. A summary of the main effects and the interaction are reported in Table 11.

The significant findings for feedback indicated that those who received failure feedback reported feelings of less choice than those who received success feedback. Although this result was significant, the means and standard deviations were quite similar. Interestingly enough, if subjects felt as though they had less choice, they may have indicated less interest after receiving feedback. Results were non-significant for the main effects and the interaction for the interest-enjoyment subscale of the IMI.

These results indicated that there were no differences between elite and non-elite athletes on the pretest and posttest interest enjoyment subscale of the IMI. Also, the type of feedback did not have any effect on the posttest interest-enjoyment subscale. In summary, there were no group differences on the interest-enjoyment subscale of the IMI. Table 10 reports the means and standard deviations.

Table 10

Means and Standard Deviations for the Pretest and Posttest Scores on the Perceived Choice and Interest-Enjoyment Subscales of the IMI for Subjects who Received Success and Failure Feedback

	n	M	SD
Pretest perceived choice			
Success	44	40.25	7.65
Failure	46	44.24	5.67
Posttest perceived choice			
Success	44	40.39	7.35
Failure	46	43.48	6.37
Pretest interest-enjoyment			
Success	44	35.91	5.52
Failure	46	36.59	6.63
Posttest interest-enjoyment			
Success	44	36.18	6.19
Failure	46	35.89	6.91

Table 11

Summary Results of Multivariate Analysis of Variance for Status by Feedback by Trial (pretest/posttest) on the Perceived Choice Subscale of the IMI

Test of Between-Subjects Effects			
Source	df	MS	F
Within Cells	86	87.12	
Status	1	58.42	.67
Feedback (FDBC)	1	561.24	6.44*
Status By FDBC	1	.65	.01

*p < .05

Summary

Analyses of the manipulation check were significant as results indicated that the performance feedback was believed by the subjects. Gender was not a significant factor in any of the analyses performed in this experiment. There were also no differences between status of athlete, elite or non-elite, and scores on the pretest perceived competence, perceived choice, and interest-enjoyment subscales of the IMI. Results for the pretest perceived competence subscale did not support the predicted hypothesis that elite athletes would have a higher pretest perceived competence subscale score than non-elite athletes.

Results supported the hypothesis for success feedback such that athletes receiving success feedback scored significantly higher on the posttest perceived competence subscale of the IMI as compared to their pretest perceived competence subscale scores. Results did not support the hypotheses for failure feedback that elite athletes receiving failure feedback would not exhibit any change in their posttest perceived competence subscale scores when compared to their pretest subscale scores. In fact, scores for the posttest were significantly lower than pretest scores for elite athletes on the perceived competence subscales of the IMI. However, results did support the hypothesis for failure feedback for non-elite athletes as they also scored

significantly lower on their posttest perceived competence subscale of the IMI as compared to the pretest.

There were no significant differences between status of athlete, sex, or feedback on the persistence measure of intrinsic motivation. Lastly, there were no differences between participants of various sports for performance results on the Wayne Saccadic Fixator. There were also no group differences for sex or status of athlete for performance on the Fixator.

CHAPTER 5

DISCUSSION

One purpose of this investigation was to use cognitive evaluation theory as a guide to investigate several constructs, specifically, that of feedback and perceived competence and its effects on intrinsic motivation in relation to athletes. Deci (1975; Deci & Ryan, 1985), claimed that increases in perceptions and feelings of competence produce increases in intrinsic motivation while decreases in perceived competence lead to decreases in intrinsic motivation. Success and failure feedback provide potent information concerning one's competency level toward a motor task or activity. This experiment was specifically designed to determine the effects that success and failure feedback have on the elite and non-elite athlete during a sport related task in relation to competence.

A two-folded question which directed this study was to see if elite athletes differed from non-elite athletes in their perceptions of success and failure feedback. First, for success feedback, it was hypothesized that all athletes who received success feedback would have a higher posttest perceived competence subscale score on the IMI than their pretest score. Secondly, for failure feedback, it was hypothesized that elite athletes would not see failure feedback as producing feelings of incompetence and, therefore, their intrinsic motivation would not decrease. Non-elite athletes would see failure feedback as indicating incompetence, and therefore, their intrinsic motivation toward a task, in which they are unable to perform successfully, would decrease.

The present study supported the hypothesis and Deci's (1975; Deci & Ryan, 1985) claims that success feedback can produce feelings of competence which can

increase one's intrinsic motivation. All athletes who received success feedback had significant increases in their posttest perceived competence subscale scores of the IMI. These results also supported other past research in the areas of success feedback, competency, and intrinsic motivation (Fisher, 1978; Vallerand, 1983; Vallerand & Reid, 1984).

On the other hand, this study did not support the hypothesis that elite athletes receiving failure feedback would not exhibit decremental changes in their posttest perceived competence subscale score of the IMI when compared to their pretest score. This study did support the hypothesis that non-elite athletes who experienced failure feedback would exhibit changes in their posttest perceived competence compared to their pretest perceived competence subscale score of the IMI. These results indicated that there are really no differences between elite and non-elite athletes in their reactions to failure feedback. Both groups showed significant decreases in their posttest scores after failure feedback. The difference between the means of the two groups was very small. One reason that elite athletes may not have reacted as predicted is because they realistically appraised what they had done on the Fixator, and they saw that they did not do as well as they would have liked to have done. It is possible that elite athletes responded more strongly psychologically and were more critical and more realistic than the non-elite athletes.

The main effect for feedback indicated that individuals consistently demonstrated increased intrinsic motivation after success but not after failure for the perceived competence subscale scores of the IMI. Elite athletes did not react as expected to failure feedback. One explanation for failing to find group differences between elite and non-elite athletes may be due to the fact that a large part of sport is based on social comparison. Athletes gain competence through means of comparing themselves with others. In this particular study, neither group had any basis for comparison against

others. Therefore, both groups only had the experimenter's feedback to lead to conclusions of competence or incompetence.

It was also believed that elite athletes would already have a high level of perceived competence, such that their pretest perceived competence subscale score on the IMI would be higher compared to the pretest perceived competence subscale score for non-elite athletes. No differences were found between elite and non-elite athletes on any of the measures of the IMI pretest subscales. Although these results did not support the hypothesis for purposes of the study, they did support several allegations of proposition II of cognitive evaluation theory made by Deci (1975) and Deci and Ryan (1985) such that changes in perceived competence following feedback entail changes in intrinsic motivation. It does seem clear that, in understanding the effects of feedback and perceptions of competence on intrinsic motivation, positive feedback increases perceived competence and negative feedback will cause decreases in perceived competence and ultimately intrinsic motivation. The findings of this study are in accord with previous findings of feedback studies dealing with perceived competence and intrinsic motivation. Although, these results may only prevail in settings where previous competency levels are limited and without means of social comparison and basis for self-evaluation. Therefore, although these results are in support of cognitive evaluation theory, these findings may not hold true in sport specific settings, and more research needs to be done to explore effects of feedback in settings where athletes may already have their own idea of competency toward a task or activity. Then to look at the effects of feedback on their competence level may be more justifiable.

One plausible explanation of why there were no differences as expected between elite and non-elite athletes in regards to pretest perceived competence scores is that elite athletes may not be different from their non-elite counterparts in their competency levels on novel unfamiliar sport-related tasks. A reason that they may be elite in their

sport is that their competency levels are higher only on sport-specific tasks. Thus, the proposed hypotheses may hold true for sport-specific tasks. Another possible explanation is that elite and non-elite athletes are no different in tasks where they have no previous competency feedback. For instance, one reason elite athletes are elite is due to prior 'success' and feedback which indicates to them that they are elite. This previous success enables them to expect success in future situations. For purposes of this study, elite athletes were in a situation where their previous success toward this novel Fixator task is similar and equal to that of the non-elite athletes. Their previous competency was very limited and may not provide help in assessing competence on the Fixator.

These results can also be explained by a unique achievement motivation model; i.e., Atkinson's (1964) concept of inertial tendencies. Probability of success is one's expectancy of achieving a goal derived from expectancy of a goal. A person's expectations toward reaching a goal is grounded in the information that is available, particularly his or her experience in similar situations in the past. There were no similar experiences for elite or for non-elite athletes in regards to this particular task. There was no prior feedback, so therefore, both groups should respond similarly.

Most sporting activities have origins of performance feedback built into them. There is a self-evaluation phase through which feedback is often obtained. Athletes in general are critical of their performance and usually know how well or how poorly they have performed. In a controlled laboratory setting, such as this one, neither elite nor non-elite athletes have had any prior performance feedback to serve as a basis for self-evaluation. Therefore, standards of success for the two groups, then in fact, should be the same. It may be that elite athletes are elite, only because they constantly had feedback which tells them that they are elite in their specific sport.

Atkinson's (1964) model relates more to the person and to the environment. It is important to discover the need to succeed for each person individually. Achievement

orientations may be different regardless of status of the athlete. The need to be better than others or the need to improve oneself may vary from person to person and from culture to culture. The issue of achievement motivation in association to intrinsic motivation has to do with a motivation to match an internal standard of excellence. Deci (1975) believes that this type of motivation is indeed a special type of intrinsic motivation. Those who are obsessed with achieving may not be intrinsically motivated, and/or not even self-determined. Behaviors may be due to other types of internal controls or extrinsic pressures. These types of internal controls and extrinsic pressures may be the result of ego-involved states. The above explanations attempted to address significant findings in intrinsic motivation for elite and non-elite athletes. However, the concepts of task and ego involvement may be another more plausible explanation for performance after feedback with elite and non-elite athletes.

Ryan (1982) studied the effects of informational versus controlling events on intrinsic motivation. He extended cognitive evaluation theory to include ego involvement and task involvement. It was hypothesized that feelings or thoughts can undermine one's self-determination as some feelings or thoughts can pressure people toward certain outcomes. Results found that ego-involved subjects were less intrinsically motivated by their task during a free-choice period than were task-involved subjects. It was believed that ego involvement could undermine intrinsic motivation. Ryan, Koestner, and Deci (1991) determined that in order to accurately measure intrinsic motivation during a free-choice period, a task-involving condition must be present rather than an ego-involved condition.

The present study made every attempt to produce a task-involving condition rather than an ego-involving one. Sport is an institution in which achievement and success are instilled into the participants from the beginning of one's development and growth in this arena. Due to the nature of sport in today's society, it is believed that in order for athletes to excel, they must see achievement as the means to an end,

especially if college athletics are a goal. In order to become an elite athlete at the college level, it is imperative that athletes perform in certain ways. Athletes are constantly reminded of what they need to do to succeed and to achieve, not only in their own personal goals, but also in team and in college goals. Sport, in general, can be considered an ego-involving environment, especially at the collegiate level. Ryan (1982) believed that people can be motivated for extrinsic reasons which can undermine their intrinsic motivation. If people become ego-involved and more concerned with the outcome of an event, instead of task-involved, the need to win and maintain self-esteem will inherently undermine motivation.

Persistence after feedback has been traditionally used as a measure of intrinsic motivation, especially during the standard free-choice paradigms. Another result which did not support the hypothesis was that of persistence. It was hypothesized that elite athletes would persist more (greater number of trials, and more time spent on the Fixator) than non-elite athletes after failure feedback. For those that persisted, there were no significant main effects for status of athlete or for feedback. However, a trend was found approaching significance for the status of the athlete. The means showed that non-elite athletes had higher persistence scores than elite athletes. One reason why non-elite athletes had more trials and spent more time on the Fixator during the free-choice period, was that perhaps these athletes did not need the competition and the feeling of being better than others in order to engage in a task such as this one. This difference in itself could be a reason why they are not elite athletes. Elite athletes may need the competition and extrinsic reasoning to persist. Also, maybe the simple notion of telling the non-elite athletes that they were solicited as athletes for the purposes of this study, was enough to encourage persistence and give them an ego-boost. In general, subjects who persisted did so more after failure than after success.

These results suggest that persistence may not be a good indicator or measure of intrinsic motivation, especially in the sport environment, and without ego-involving

conditions. For this particular study, no one really persisted. Perhaps fatigue may have been a factor. There may have been too many trials. Six minutes may have been too long. One reason that elite athletes did not persist as much as the non-elite athletes is that the elite athletes may have felt that they did not need to prove their competence to themselves or others. There was not a reason or motivation to do so. They already had a certain level of competence.

A better explanation for the trend approaching significance for why non-elite athletes persisted slightly more than elite athletes is that elite athletes knew that they were elite, and there was no need to prove competence or self-worth to anyone since they already know that they were elite. There seemed to be no reason to persist at a task when there was not external competition or comparative performance results. This result supports Ryan et al. (1991) in that persistence at a task without competition, such as during a free-choice period can lead to decreases in motivation, especially after failure feedback. There were no differences found for interest-enjoyment levels, and therefore, lack of persistence for all subjects must have been due to other factors. These results allow us to suggest that an ego-involving condition is necessary to get people to persist at a task. Maybe elite athletes are elite because they are ego-involved in their sport and persist to improve or maintain self-esteem and competence.

As seen earlier, involvement or connection to a task as well as the performance feedback associated with it can directly affect intrinsic motivation. Without an ego-involving condition present, subjects were not interested or motivated to prove competence and self-worth after the feedback.

Ryan (1982) claims that this ego involvement may be a reason that people continue to persist at an activity to feel the need to win, excel, and maintain their self-esteem (ego-involved). Ego-involving situations can lead to subsequent persistence during free-choice periods. Although results did not support the above hypothesis, they do provide support for Ryan (1982). Ryan found that positive feedback can confirm a

subject's competence and desired outcome, leaving these subjects without motivation to further engage in the task. If these subjects have already achieved their goal, why persist? They are satisfied with performance. For subjects that received failure feedback, it may be possible that this feedback was a threat to their self-worth and self-esteem, and therefore, persisting at the task to achieve their own standard level was desired.

It seems that ego involvement and intrinsic motivation at the collegiate level are not able to be mutually exclusive events. There is pressure to succeed and to do well. Athletes in general, especially at this level are ego-involved, such that without one, the other cannot occur. It is difficult to say whether ego-involved and task-involved can be conceptually separated with competition. Ego involvement may be the motivator or the intrinsic motivation for athletes. When the ego-involving conditions or the competition is taken away, joy or motivation is no longer present. Sport as an institution is an ego-involved environment.

Gender differences in relation to persistence and pretest perceived competence scores were also of interest in this study. Hypotheses were supported as no differences between male and female athletes occurred on either the persistence measure or on the pretest perceived competence subscale of the IMI. This finding is important to the study of intrinsic motivation, since past research has not attended to individual differences; whereas in the past, females were seen as displaying less intrinsic motivation toward a task than males. Weinberg and Jackson (1979) found that on all their intrinsic motivation questionnaires, males showed more intrinsic motivation than females after success, and females displayed more intrinsic motivation than males after failure. E Ryan (1977, 1980) examined this gender issue and intrinsic motivation for athletes in an intercollegiate sports situation. Using Deci's (1975) cognitive evaluation theory to lead the investigation of the impact scholarships had on male and female undergraduate athletes, it was found that scholarships undermined the intrinsic

motivation for males, while females were not affected by scholarships. Scholarships today are quite accessible for both males and females. As college athletics continues to grow, equal opportunities and gender equity prevail in making scholarships as common for women as they are to men. There were also no performance differences on the Wayne Saccadic Fixator between males and females. Therefore, in this study, there were no significant differences between males and females on any measures.

Another interesting result in this study which may help us to explain the lack of support for differences between elite and non-elite athletes was found for the performance results on the Wayne Saccadic Fixator. There were no significant differences between elite and non-elite athletes on their fourth performance score for the Fixator. The Fixator is a novel task to all subjects, and elite performers did not show any higher results on this athletically related Fixator task. In fact, the non-elite athletes scored somewhat higher when compared to the elite athletes. This result as well as the other results found in this study can lead to the conclusion that there really are very small differences between elite and non-elite athletes. Physical and mental ability and experiences in regard to their specific sport as well as task specific differences may be the only true measurable differences as to why this group is considered elite.

Specificity of task ability. Henry's specificity hypothesis, (cited in Schmidt, 1988) stating that motor abilities are specific to a particular task, provides a good explanation for the result that there were no real performance differences on this novel task. All subjects performed similarly on the fourth trial. From Henry's motor learning hypothesis, it is argued that abilities are independent, so that the strength of one particular ability is unrelated to the strength of another particular ability (Schmidt, 1988). Even if two tasks are similar, the grouping of shared abilities are quite distinct. Since these abilities are independent of each other, correlations among skills will be very low to almost zero. Transfer among skill should also be quite low. Therefore, regardless of

the task's relation to an athlete's sport, abilities are specific and independent. This information provides further support for the notion that experiments should be tested directly in sport specific settings.

Developmental issue of intrinsic motivation. Is intrinsic motivation a developmental process that may vary from time frame to time frame? Children starting out learning a task may persist for reasons of curiosity, optimal challenge, and natural fascination with novel tasks. It does take some initial intrinsic motivation to begin a task and whether or not it continues depends on how successful one is or is not. Are there shifts in cognitions in motor development? Does motivation change in regards to perceptions of feedback? How is feedback used relative to performance? This motivation may shift to something else. Success produces intrinsic motivation only to a point. For example, If an athlete is successful, then he or she realizes their potential at that activity. Motivation may then change, so that shifts in cognitions about motivation occur as growth and development naturally do. When ability, success, and potential get to a certain point, intrinsic motivation may shift dramatically. In sport, can intrinsic motivation be without other extrinsic factors? Elite athletes may be elite athletes only because they have taken their need to be self-determining and competent beyond a basic level of intrinsic motivation--to improve, to go further. In some cases, this motivation may level off. Future studies need to address development issues and intrinsic motivation in relation to sport.

Methodological considerations. Lastly, hypotheses may have failed to be supported due to the IMI instrument and improper assessment of the construct of intrinsic motivation. There are limited instruments available for testing constructs of perceived competence and intrinsic motivation. The IMI does not take into consideration prior competency levels in a particular task or activity. If the IMI is used during a sport specific task, then it may be a proficient measure. A pilot study indicated that the Fixator was an intrinsically motivating task. The pilot study was not done with

elite athletes. An intrinsically motivating task may still cause fatigue for all subjects. Fatigue may take place regardless of a subject's physical ability. This level of fatigue may in fact have caused subjects not to persist. Also, sample sizes in each cell may have been too small. A greater number of subjects may be desired.

Conclusions and Recommendations

Results indicated that there were no gender differences between males and females on either the persistence measure or on the pretest perceived competence subscale of the IMI. Gender was not a significant factor in any of the analyses performed in the experiment. All athletes were found to have similar pretest scores for all the pretest perceived competence, perceived choice, and interest-enjoyment constructs of the IMI. Results revealed a main effect for feedback. In other words, athletes who received success feedback had higher posttest perceived competence scores, than their pretest scores while those who received failure feedback, had lower posttest perceived competence scores than their pretest scores. There were no group differences between elite and non-elite athletes on the IMI perceived competence subscale after failure feedback as was originally predicted. Group differences were also not found on the persistence measure or for any other measures.

Several possible issues could have affected the results of this investigation. Some of these issues were methodological problems. Although this task proved to be intrinsically motivating in an earlier pilot study, there may have been too many trials. All athletes could be tired from participation on the Fixator, and/or may have become bored. Secondly, the 6-minute free-choice period may have been too long resulting in fatigue as well. Thirdly, the IMI may not be the best measurement of intrinsic motivation, and new scales constantly need to be developed. Measurement of intrinsic motivation needs to include a cognitive affective component. Fourth, a larger sample size in each cell is needed which may have resulted in more definite directional significant results. Lastly, the success feedback score (i.e., 79th percentile) that was

given may not have been high enough causing some subjects to persist because it was not seen as signifying success. On the other hand, the failure feedback may have been too low causing subjects to believe that it was impossible to do well. More research needs to be done with tasks that are commensurate with subject's physical and cognitive ability level to eliminate factors of fatigue and individual differences.

Although these results found support for Deci's proposition II of cognitive evaluation theory, this theory does have its limitations and needs to take into consideration other possible variables. The propositions of cognitive evaluation theory may not be relevant in sport. The propositions do not capture the context of sport, especially at the college level. Although all subjects reacted to the failure feedback as previously explored, it is still believed that negative or failure feedback may not always produce feelings of incompetence, especially for athletes in their sport specific environments. A problem with past research is its failure to test constructs in sport specific settings. Feedback may affect individuals the same, especially when tasks are novel and previous competence levels are undetermined by the subject. These results may only hold true for sport related tasks, and not sport specific tasks where previous competence exists.

More research needs to be done using elite athletes in their highly competitive sporting environments to give the findings of this study better external validity. This study should be replicated in field settings with athletes of different ability and skill level. Secondly, as recommended by Harter's (1978) model and Connolly's (1980) definition, an added dimension assessing differences between the evaluative component and the affective component of perceived competence in relation to intrinsic motivation may be necessary. The internal and individual competency level of all subjects must be assessed beforehand. Thirdly, more research on the effects that ego involvement and task involvement have on individuals is mandatory, as these hypotheses may have been confounded since sports on the collegiate level may contain a highly

contaminated group of ego-involved athletes. If sport on the college level is an ego-involving environment, can true intrinsic motivation really exist?

Although this study did support cognitive evaluation theory in that competence feedback was seen as affecting intrinsic motivation through one's ideas of perceptions and feelings of competence, there is no explanation for how people come to feel competent after receiving performance information. It is vague whether these people already have a higher perceived competence level, and the processes responsible for feeling competent or incompetent are not completely understood.

The construct of persistence after feedback has generally been used to determine one's intrinsic motivation of an activity. The results of this study would suggest that persistence is not a good or valid measure of intrinsic motivation. Subjects may already have an ego-involving orientation and may react accordingly. Lastly, it is believed that elite athletes are similar to successful people in other academic and achievement spectrums, but the true difference between these successful elite achievers, is due to ability, and not to perceived competence or persistence toward a certain task. Ability may only apply directly to their specific sport. It is recommended that in future studies sport specific tasks be used in sport specific environments, and elite subjects in their field are compared with non-elite subjects in the same field.

Future implications for coaches and physical educators. This study has important implications in the sport world. First, coaches and educators need to know if their athletes or students are ego-involved or task-involved in their activity. Every effort should be made to implement task-involving conditions whenever possible. This study and the history of intrinsic motivation has found feedback to have effects on intrinsic motivation. Educators need to understand what produces extrinsic pressures, the effects of feedback, and individual competence levels.

Wankel and his associates (Wankel & Kreisel, 1982; Wankel & Pabich, 1982) found that young amateurs involved in sport agreed that improvement of skills, excitement from the activity, and sense of personal accomplishment, influenced their sports interest and enjoyment and their participation. Extrinsic factors such as scholarship, rewards, uniforms, and winning were less important. However, this study may be confounded from the beginning due the nature of collegiate athletics. Although sport was originally designed for fun, enjoyment, and lack of external pressures, the same pressures have been brought into the college world. The winning attitude and controlling atmosphere can affect all involved, elite or non-elite.

Coaches and physical educators should make conditions as challenging and as fun as possible. Also, every effort should be made to maintain task-involved conditions, rather than ego-involved, for sporting activities. Coaches and educators need to assess individual's enjoyment for the task and enjoyment for sport as a whole. Sport is too ego-involved and too many extrinsic factors are incorporated. Results of this study indicate that persistence is not a good indicator of intrinsic motivation or effort, and coaches and educators need to be careful so as not to evaluate athletes or students as to how much time is spent at a task or at an activity. Too often, the individual who shows greater effort is rewarded and encouraged more so than those who give what is required. Coaches see those athletes who spend more time at the task as being more motivated to do well. The results of this study explain that this is not always the case. All individuals should be equally encouraged.

Feedback needs to be honest, positive, and instructional. From the results of this study, it is evident that people respond fairly similar to types of feedback. This study shows that negative or failure feedback decrease intrinsic motivation while success or positive feedback increases intrinsic motivation toward a task. There is an "umbrella philosophy" to feedback. Although people responded similarly, feedback can be quite individual. The context of a relationship between coaches and educators with their

students can make a difference in regards to feedback. The relationship with students or athletes before feedback is given is important. Feedback should not be ego-involved. How feedback is presented and how feedback is perceived specific to the task is crucial. Keep feedback as positive and success oriented as possible. Feedback should be specific and encouraging. Telling a student or athlete how he or she may improve is highly recommended.

Collegiate sports need to focus on the promotion of interest and participation with physical activity that will extend beyond the college years into a lifelong involvement and interest in constructive physical fitness and activity. It is crucial that physical educators and coaches enhance appreciation of sport and physical skills for all participants, not just the elite. The effects of feedback and its relation to perceived competence and intrinsic motivation are important to maintaining the goals of sport.

These goals will lead to better self-esteem for all participants and can only be achieved when self-determination and competence are factors that facilitate intrinsic motivation to participate in sports. The achievement of such a goal will allow all to enjoy sport and physical activity and to reap the benefits that activity can have on one's psychological well-being and overall health.

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APPENDICES

APPENDIX A

UNIVERSITY COMMITTEE ON RESEARCH INVOLVING HUMAN SUBJECTS

APPROVAL

University Committee on Research Involving Human Subjects Approval

MICHIGAN STATE UNIVERSITY

OFFICE OF VICE PRESIDENT FOR RESEARCH
AND DEAN OF THE GRADUATE SCHOOL

EAST LANSING • MICHIGAN • 48824-1046

April 5, 1993

TO: Ms. Natalie D. Beckerman
2701-3D Trappers Cove Trail
Lansing, MI 48910

RE:

IRB #:	93-144
TITLE:	THE EFFECTS OF RANDOM SUCCESS OR FAILURE FEEDBACK AND PERCEIVED COMPETENCE ON INTRINSIC MOTIVATION OF COLLEGIATE ELITE AND NON-ELITE ATHLETES
REVISION REQUESTED:	N/A
CATEGORY:	1-C
APPROVAL DATE:	03/31/1993

The University Committee on Research Involving Human Subjects' (UCRIHS) review of this project is complete. 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 including any revision listed above.

UCRIHS approval is valid for one calendar year, beginning with the approval date shown above. Investigators planning to continue a project beyond one year must seek updated certification. Request for renewed approval must be accompanied by all four of the following mandatory assurances.

1. The human subjects protocol is the same as in previous studies.
2. There have been no ill effects suffered by the subjects due to their participation in the study.
3. There have been no complaints by the subjects or their representatives related to their participation in the study.
4. There has not been a change in the research environment nor new information which would indicate greater risk to human subjects than that assumed when the protocol was initially reviewed and approved.

There is a maximum of four such expedited renewals possible. Investigators wishing to continue a project beyond that time need to submit it again for complete review.

UCRIHS must review any changes in procedures involving human subjects, prior to initiation of the change. Investigators must notify UCRIHS promptly of any problems (unexpected side effects, complaints, etc.) involving human subjects during the course of the work.

If we can be of any future help, please do not hesitate to contact us at (517) 355-2180 or FAX (517) 336-1171.

Sincerely,

David E. Wright, Ph.D.
UCRIHS Chair

DEW:pjm

cc: Dr. Martha E. Ewing

APPENDIX B

LETTER TO ASSOCIATE ATHLETIC DIRECTOR

Letter to Associate Athletic Director

2701-3D Trappers Cove Trail
Lansing, MI 48910
March 16, 1993

Dr. Clarence Underwood
Associate Athletic Director
214 Jenison Field House
East Lansing, MI 48824

Dear Dr. Underwood:

I am writing to you for your assistance of using athletes as voluntary subjects for my Master's Thesis investigation . I am planning to receive my M.A. in Sport Psychology in August 1993. My thesis investigation study dealing with intrinsic motivation and perceived competence is described in the enclosed materials.

Included is a copy of the University Committee on Research Involving Human Subjects (UCRIHS) form. UCRIHS is an Institutionalized Review Board (IRB) which must approve all university research projects involving human subjects. This form will summarize the procedures, subjects, and subject recruitment processes. Also enclosed is my methods section of my thesis which will describe the entire project.

As a former Division I field hockey athlete, All-American, United States Squad player, and most recently, Division I coach, I understand the importance of research involving elite athletes. I hope that you do to. I will be in contact with you in the next week to discuss my request of using athletes as voluntary subjects. Thank you for your time, interest, and consideration in this important matter. If you have any questions regarding my study, you may contact me at (517) 882-6705 or my project supervisor, Dr. Marty Ewing (517) 353-4652. Again, thank you for reviewing my proposal.

Sincerely,

Natalie Beckerman

Enclosures

APPENDIX C

LETTER TO COACHES

Letter to Coaches

March 31, 1993

Dear Coach:

I am writing to ask for your assistance with my Master's Thesis investigation. I am planning to receive my M.A. in Sport Psychology in August 1993. This experiment has been given approval from Dr. Clarence Underwood, Associate Athletic Director, my thesis committee, and the University Committee on Research Involving Human Subjects (UCRIHS). I am studying intrinsic motivation and perceived competence. Research involving elite athletes is sparse compared to the broad information for the intrinsic motivation of non-elite athletes and the non-athletic general population. I am working with Dr. Marty Ewing (353-4652), project supervisor and a professor in the Physical Education and Exercise Science department, in trying to assess differences between elite athletes and non-elite athletes in the areas of intrinsic motivation and perceived competence.

I am requesting that you allow your athletes to participate in the experiment, and also, that you ask them to fill out a screener questionnaire which I will bring either to them or to you directly at a practice session or some other time. The screener questionnaire is a background questionnaire used to assess if the athletes fit the elite athlete category I have defined.

I will be using a perceptual motor task called the Wayne Saccadic Fixator. This task is a reaction timing task that has actually been used by sport vision doctors throughout the United States and has been used to increase an athlete's eye-hand coordination, visual motor response, and reaction timing. The Fixator has been used to test many professional, Olympic, and amateur athletes. It is an important athletic vision tool. There is no danger to athletes either physical or psychological in performing this task. As a matter of fact, I think most athletes will enjoy the challenge of this task.

I will be contacting you to see when I may distribute my screener questionnaire to your team to determine if some athletes qualify for the experiment. After that, I will contact the student-athlete on my own to set up an experimental session. Each athlete selected is only required to participate in one experimental session lasting no longer than 35 minutes.

As a former Division I Field Hockey athlete, All-American, United States Squad Player, and most recently a coach, I understand the importance of research involving elite athletes. I hope that you do to. Lastly, it would be greatly appreciated that you do not tell the athletes what I am studying. You may however, tell your athletes that they will be asked to participate in a reaction time experiment.

I will be in touch with you to set up a time to meet with your student-athletes. Thank you for your time and consideration in this matter. If you have any questions regarding my study, you may contact me at (517) 882-6705 or my project supervisor.

Sincerely,

Natalie Beckerman

APPENDIX D

STATEMENT OF INFORMED CONSENT

Statement of Informed Consent

This is a study to gather information about differences between people on a new motor learning task. Your participation in this study will contribute to our knowledge about motor learning differences and concerns, and therefore, your participation in this experiment is extremely important as well as valuable to research. As a subject, you will also be learning more about psychological experimental research. The procedures included in this study are: 1) four questionnaires that you will be asked to answer and 2) performance on a motor learning task.

Data obtained during the experimental session will be strictly confidential and your identity will remain anonymous in any report about this study. Only group data will be reported and individual data will not be reported by name or by subject number. The entire procedure should take no more than 35 minutes. If at any time after starting participation, and for any reason, you can withdraw from the experiment. You can also refuse to answer any question, if you so choose. If you have any questions, or if there is something that you do not understand, you can ask at any time.

If you have questions or concerns later about your participation, you may call Natalie Beckerman (882-6705), principal investigator or Dr. Marty Ewing (353-4652), project supervisor with any later concerns or questions.

In order to be a part of this experiment, your consent to participate is needed. Please read the rights you have as a participant in this experiment and indicate your willingness to participate by signing below.

INFORMED CONSENT

As a subject, I understand my rights as a participant. The purpose of this experiment has been defined and explained to me and I understand the explanation. Participation in this experiment does not guarantee any beneficial results to me. I understand that my data and answers to the questions will remain anonymous and confidential. I also understand that I can discontinue my participation at any time without penalty or prejudice. I voluntarily consent to participate in the described project.

Signature:_____Date:_____

Print full name:_____

APPENDIX E

ELITE ATHLETE AND NON-ELITE ATHLETE SCREENER QUESTIONNAIRES

Elite Athlete Screener Questionnaire

SPORT_____

MALE OR FEMALE--Please circle one

AGE_____

FRESHMAN, SOPHOMORE, JUNIOR, SENIOR-----Please circle one

Name:_____

Address:_____

_____

Phone Number:_____

1. Are you currently an active member of a Division I varsity team here at Michigan State University?

   Yes_____ No_____

2. Were you recruited to play for Michigan State?

   Yes_____ No_____

3. Do you currently have an athletic scholarship at Michigan State?

   Yes_____ No_____

4. How many years have you been a starter for your team at Michigan State?

   1 year_____

   2 years_____

   3 years_____

   4 years_____

5. Have you ever been injured seriously or forced to stop competing while at MSU?

   Yes_____ No_____

   If you answered yes, please explain._____

6. Please list any athletic awards that you have received during your collegiate experience? (player of the year, all tournament, all Big-Ten first team, Regional All-American, National All-American, etc.)

   _____

   _____

7. How many years have you been competing at your sport?_____(including youth, jr & sr. high)

8. Are you currently on another type of scholarship while attending MSU (such as a member of an academic club, honors club, Blue Key, Motor Board, drama, science, music, etc.)?

   Yes_____Please explain_____No_____

9. Please list any other hobbies, interests, sports in which you participate in regularly, or other talents you have?

_____

_____

Non-Elite Athlete Screener Questionnaire

SPORT_____

MALE OR FEMALE--Please circle one

AGE_____

FRESHMAN, SOPHOMORE, JUNIOR, SENIOR-----Please circle one

Name:_____

Address:_____

_____

Phone Number:_____

1. Are you currently an active participant on an Intramural sport team or activity class here at Michigan State University?

   Yes_____ No_____

2. How many years have you been a participant in intramural sports activity class at Michigan State?

   1 year_____ 3 years_____

   2 years_____ 4 years_____

3. Did you participate in your sport or compete in your sport in high school?

   Yes_____ No_____

   If **yes**, how many years?

   1 year_____ 3 years_____

   2 years_____ 4 years_____

4. Outside of Michigan State, do you or did you compete or participate on any competitive sport teams? Yes_____ No_____

   If yes, please explain_____

5. Do you exercise regularly at Michigan State?

   Yes_____ No_____

6. Have you ever been injured seriously or forced to stop participating in your sport?

   Yes_____ No_____

   If you answered yes, please explain._____

7. Are you currently on another type of scholarship while attending MSU (i.e. a member of an academic club, honors club, Blue Key, Motor Board, drama, science, music, athletic, etc.)?

   Yes_____ No_____

If yes, please explain_____

9. Please list any other hobbies, interests, sports in which you participate in regularly, or other talents you have?

_____

_____

10. Have you ever been a member of an intercollegiate Division I sport team?

    Yes_____ No_____

If yes, where?_____

APPENDIX F

INTRINSIC MOTIVATION INVENTORY PRETEST AND POSTTEST QUESTIONNAIRES

Intrinsic Motivation Inventory Pretest

For each of the following statements, please circle the number that best indicates how strongly you agree or disagree with the sentence, using the following scale as a guide:

1	2	3	4	5	6	7
strongly disagree	**disagree**	**somewhat disagree**	**neutral**	**somewhat agree**	**agree**	**strongly agree**

---

1. I didn't really have a choice about doing this task.

   1 2 3 4 5 6 7

2. I did this task because I wanted to.

   1 2 3 4 5 6 7

3. This task did not hold my attention at all.

   1 2 3 4 5 6 7

4. I think I am pretty good at this task.

   1 2 3 4 5 6 7

5. I thought this task was quite enjoyable.

   1 2 3 4 5 6 7

6. I was pretty skilled at this task.

   1 2 3 4 5 6 7

7. I believe I had some choice about doing this task.

   1 2 3 4 5 6 7

8. I would describe this task as very interesting.

   1 2 3 4 5 6 7

9. After working at this task for awhile, I felt pretty competent.

   1 2 3 4 5 6 7

10. I felt like it was not my own choice to do this task.

    1 2 3 4 5 6 7

11. I thought this was a boring task.

    1 2 3 4 5 6 7

12. I think I did pretty well at this task, compared to other students.

    1 2 3 4 5 6 7

13. This task was fun to do.

    1 2 3 4 5 6 7

1	2	3	4	5	6	7
strongly disagree	disagree	somewhat disagree	neutral	somewhat agree	agree	strongly agree

14. I did this task because I had to.

    1 2 3 4 5 6 7

15. I did this task because I had no choice.

    1 2 3 4 5 6 7

16. This was a task that I couldn't do very well.

    1 2 3 4 5 6 7

17. While I was doing this task, I was thinking about how much I enjoyed it.

    1 2 3 4 5 6 7

18. I enjoyed doing this task very much.

    1 2 3 4 5 6 7

19. I am satisfied with my performance at this task.

    1 2 3 4 5 6 7

20. I felt like I had to do this.

    1 2 3 4 5 6 7

Intrinsic Motivation Inventory Posttest

For each of the following statements, please circle the number that best indicates how strongly you agree or disagree with the sentence, using the following scale as a guide:

1	2	3	4	5	6	7
strongly disagree	**disagree**	**somewhat disagree**	**neutral**	**somewhat agree**	**agree**	**strongly agree**

---

1. I did this task because I had to.

   1 2 3 4 5 6 7

2. After working at this task for awhile, I felt pretty competent.

   1 2 3 4 5 6 7

3. I thought this task was quite enjoyable.

   1 2 3 4 5 6 7

4. This task was fun to do.

   1 2 3 4 5 6 7

5. I didn't really have a choice about doing this task.

   1 2 3 4 5 6 7

6. I would describe this task as very interesting.

   1 2 3 4 5 6 7

7. I felt like I had to do this.

   1 2 3 4 5 6 7

8. I think I am pretty good at this task.

   1 2 3 4 5 6 7

9. I did this task because I wanted to.

   1 2 3 4 5 6 7

10. I was pretty skilled at this task.

    1 2 3 4 5 6 7

11. I felt like it was not my own choice to do this task.

    1 2 3 4 5 6 7

12. I am satisfied with my performance at this task.

    1 2 3 4 5 6 7

13. I did this task because I had no choice.

    1 2 3 4 5 6 7

1	2	3	4	5	6	7
strongly disagree	**disagree**	**somewhat disagree**	**neutral**	**somewhat agree**	**agree**	**strongly agree**

14. I thought this was a boring task.

    1 2 3 4 5 6 7

15. I enjoyed doing this task very much.

    1 2 3 4 5 6 7

16. This was a task that I couldn't do very well.

    1 2 3 4 5 6 7

17. I think I did pretty well at this task, compared to other students.

    1 2 3 4 5 6 7

18. I believe I had some choice about doing this task.

    1 2 3 4 5 6 7

19. While I was doing this task, I was thinking about how much I enjoyed it.

    1 2 3 4 5 6 7

20. This task did not hold my attention at all.

    1 2 3 4 5 6 7

APPENDIX G

SUCCESS AND FAILURE PERFORMANCE FEEDBACK SHEETS

Failure Performance Feedback Sheet

Fixator Computer Printout

According to the norms established for the Fixator, you have performed in the 21ST **percentile. That is better than** 21 **percent of all people who have attempted this task.**

APPENDIX H

SUCCESS/FAILURE FEEDBACK CHECK

Success/Failure Feedback Check

(Please circle the best response)

1. I performed well on the fixator task.

1	2	3	4
strongly disagree	disagree	agree	strongly agree

2. I was able to focus on the fixator task.

1	2	3	4
strongly disagree	disagree	agree	strongly agree

3. I felt rushed while performing on the fixator task.

1	2	3	4
strongly disagree	disagree	agree	strongly agree

4. I was able to respond as quickly as I wanted to on the fixator task.

1	2	3	4
strongly disagree	disagree	agree	strongly agree

5. I implemented a strategy while performing on the fixator task.

1	2	3	4
strongly disagree	disagree	agree	strongly agree

6. This task is related to my sport.

1	2	3	4
strongly disagree	disagree	agree	strongly agree

7. I have had experience with a similar task.

1	2	3	4
strongly disagree	disagree	agree	strongly agree

8. I was able to see all of the lights.

1	2	3	4
strongly disagree	disagree	agree	strongly agree

9. I was able to move my hands freely while performing the fixator task.

1	2	3	4
strongly disagree	disagree	agree	strongly agree

APPENDIX I

PERSISTENCE MEASURE

Persistence Measure

1. Subject participated on task when experimenter left the room during the free-choice period?

   YES_____ NO_____

2. Time elapsed before the subject began task?_____

3.. Number of trials performed on the task?_____

4. Time spent out of 6 min. on task?_____

5. Any unusual events_____

_____

_____

APPENDIX J

EXPERIMENTAL PROTOCOL

Experimental Protocol

Experiment: IM
Protocol

Beginning: Spring 1993

Time: Various Times

Principal Investigator: Natalie Beckerman (882-6705)

Project Supervisor: Dr. Marty E. Ewing (353-4652)

Subjects: Michigan State University undergraduate elite and non-elite athletes

Number of Sessions: 1 per subject

Length of Session: 30 minutes

ORDER OF FORMS:

Form Name	Numbered	Facing	Special Notes
Stop	No	Up	
IMI (pre)	Yes	Up	
Stop	No	Up	
Man. of Feedback	Yes		Not included in packet
IMI (post)	Yes	Up	
Stop	No	Up	
Success/Failure	Yes	Up	
Feedback Check	Yes	Up	
Persistence Measure	Yes		Not included in packet

GREET SUBJECT BY DOOR OF LAB OR HALLWAY
"Thank you for coming here for the experiment. There are some forms on the desk inside the room. I'll give you instructions about when to use the forms. Go ahead and take a pencil from the box on the desk."

(Wait until subject is seated.)

"I will be reading these instructions to you, because it is important that we treat all of our participants alike. I am studying differences between people on a new motor learning task. This experiment should take approximately 30 minutes. As you can see, this *(pointing to the fixator)* task is a kind of game that you might find interesting. I am trying to get some idea of what people's reactions to it are and how well people can do. It is a new type of perceptual motor task being designed by psychologists."

*(**TASK 921:** I will show subject manually how the fixator works, letting fixator go through 1 trial by itself. I will explain what is happening and what the subject needs to do on the task. I will extinguish only 4 lights. Let subject start fixator themselves.)*

"When you see one of the lights turn on, press the button quickly using the tips of your fingers. Another light will come on automatically and, again, turn it off as quickly as you can. Your task is to turn off as many lights as you can in 30 seconds." You will now be given 3 practice trials. Wait until this trial ends and then begin by pressing the green button each time. Whenever you're ready, you can begin. Work at your own pace.

(Questions will be answered.)

"Please sit back down at the desk and turn over the page saying 'STOP.' Please answer all of the questions using the scale shown on the top of each page. Work at your own pace, take your time, and try to answer all questions truthfully. There are NO right or wrong answers. Do not write your name on any of the sheets. When you finish a form, place it to the side. If you have questions feel free to ask."

(The IMI-pre is randomly organized. Wait until subject has completed.)

"Now you will perform 4 trials in which your performance will be scored and charted using a computer calculation. Again, each trial will last for a 30 second duration. You can begin whenever you're ready."

(Subject is now given 4 trials. Subjects 4th trial score will be recorded and put in folder.) (After completion of the 4 trials, subject will be told:)

"Please take a seat back at the desk. A computer in the next room will provide the calculation and the read out for scores and performance results for your last 4 trials. I will now go into the next room and get the performance sheet."

(After I get the performance sheet, I will give it to the subject. The subject's scores will be recorded and falsely scored. The subject will then be given random success or random failure feedback.)

"The sheet you have just received is to let you know **how you did**. You may read it now if you haven't already done so."

(These are already pre-filled out sheets, and each subject is randomly assigned to a random success or random failure experimental condition. The failure group will be handed a paper which reads, 'According to the norms established on the Fixator, you have performed in the 21st percentile. That is better than 21 percent of all people who have attempted this task.' The success group will be handed a paper which reads, According to the norms established on the Fixator, you have performed in the 79th percentile. That is better than 79 percent of all people who have attempted this task.)

"Please turn over the sheet that says 'STOP.' You will now see another questionnaire. Please fill it out now. Answer all questions truthfully, and remember there are NO right or wrong answers."

(The IMI-post is randomly organized. Wait until subject have completed.)

"Turn over the page saying, 'Stop,' you will see another questionnaire. Begin working on it. Work at your own pace. If you have questions, please feel free to ask."

(Wait until subject has completed the Feedback Check.)

"I need a few minutes to look over your tests to be sure everything is complete before you leave. I may have to go get another questionnaire depending on how these questionnaires are. You may continue to try the task until I return. I'll be back, but its going to be a few minutes.

(Take all forms with except leave performance feedback sheet on desk with subject. The subject will be reinstructed on how to use the machine only if they ask. The experimenter will be gone for a 6-minute period in which the experimenter will observe through a (two-way) mirror the number of trials and time the subject persists during the free-choice period. Start stop watch as soon as experimenter leaves room. After the 6-minute period, the subject will then be debriefed.)

"Okay, everything is fine. First, all of the results that you received regarding your performance on the Fixator task were false and do not in any way reflect your actual performance on that task. In fact, your actual performance was never scored. The purpose of misleading you about how you performed was to try to determine how much one is influenced by feedback of success or failure. Also, why people persist is an interest. I have predicted that some people who receive failure feedback will be less influenced by the failure feedback and show more interest in persisting on the task again. Some people who receive success feedback may also want to persist again at the task because they may feel good about repeating the task. Do you have any questions about this research or about the task that I can answer?" Was there anything that you liked or that you didn't like? Why did you or didn't you persist?

"It is extremely important that you do not tell any of your friends, classmates, or teammates about the task or questions that we have asked during this experimental session; it may bias our study. Thank you very much for participating in this study.

(See subject to the door. Thank subject again.)

APPENDIX K

MEANS AND STANDARD DEVIATIONS FOR NONSIGNIFICANT MAIN EFFECTS, INTERACTION, AND FOURTH SCORE PERFORMANCE

Means and Standard Deviations for Main Effect Feedback

Means and Standard Deviations for Success and Failure Feedback

	n	M	SD
Scores for the number of trials			
Success	26	3.61	2.90
Failure	22	4.73	2.86
Scores for the total time for 6 minutes			
Success	26	144.7	113.6
Failure	22	176.6	117.5

Means and Standard Deviations for Main Effect Status

Means and Standard Deviations for Status of Athlete

	n	M	SD
Scores for the number of trials			
Elite	24	3.49	2.23
Non-elite	24	4.83	3.53
Scores on the total time for 6 minutes			
Elite	24	143.4	105.4
Non-Elite	24	178.0	125.6

Means and Standard Deviations for Interaction

Means and Standard Deviations for Status of Athlete by Type of Feedback

	n	M	SD
Scores for Type by Feedback on the number of trials			
Elite			
Success	14	2.79	1.89
Failure	10	4.20	2.58
Non-Elite			
Success	12	4.42	3.92
Failure	12	5.25	3.14
Scores for Type by Feedback on the total time for 6 minutes			
Elite			
Success	14	123.2	95.83
Failure	10	163.5	115.0
Non-Elite			
Success	12	166.3	131.3
Failure	12	189.7	120.0

Means and Standard Deviations for Fourth Score Performance

The Group Means and Standard Deviations for Scores on the Performance Results Between Types of Sport

	n	M	SD
Men's Ice Hockey	7	3416	1149
Women's Track/CC	2	3251	201.5
Women's Tennis	4	2941	620.2
Women's Basketball	5	2934	357.8
Men's Basketball	2	2915	481.5
Men's Lacrosse	4	2847	883.7
Men's Track/CC	2	2807	188.8
Women's Softball	5	2672	403.9
Men's Soccer	4	2480	604.2
Men's Tennis	4	2469	406.2
Women's Volleyball	4	2315	483.5
Women's Soccer	4	2248	223.8
Total	47	2789	686.6

The Group Means and Standard Deviations for Scores on the Performance Results for Elite and Non-Elite Athletes

	n	M	SD
Non-Elite Athletes	43	2813	780.4
Elite Athletes	47	2789	686.6

The Group Means and Standard Deviations for Scores on the Performance Results for Males and Females

	n	M	SD
Males	48	2920	755.5
Females	42	2664	680.6

APPENDIX L

DATA CODING DIRECTORY

Data Coding Directory

VarCode	Variable Name	ValuesCode	Column Numbers
ID	ID Number		1-2
SEX	Sex of Subject	1 = male 2 = female	3
TYPE	Type of Subject	1 = elite 2 = nonelite	4
SPORT	Sport	1 = Lacrosse 2 = Soccer-M 3 = B-Ball-M 4 = Tennis-M 5 = Ice Hockey 6 = TrackCC-M 7 = Softball 8 = Soccer-W 9 = B-Ball-W 10 = Tennis-W 11 = Volleyball 12 = TrackCC-W	5-6
ACTIV	Activity	1 = B-Ball 2 = Soccer 3 = Aerobics 4 = Tennis 5 = Powerwalking	7
AGE	Age of Subject	1 = 17 2 = 18 3 = 19 4 = 20 5 = 21 6 = 22 7 = 23 8 = 24	8
CLASS	Class of Subject	1 = Freshman 2 = Sophomore 3 = Junior 4 = Senior	9
ACTCLAS	Member Act Class	1 = Yes 2 = No	10
ACTCLYR	Yrs Participating in	1 = 1 2 = 2 3 = 3 4 = 4	11
PARTHS	Participate HS	1 = Yes 2 = No	12

HSYRS	Years Play in HS	1 = 1 2 = 2 3 = 3 4 = 4	13
COPETSP	Comptitive Sport	1 = Yes 2 = No	14
EXEREG	Exercise Regular	1 = Yes 2 = No	15
INJURY	Serious injury	1 = Yes 2 = No	16
OTHER	Other Scholarship	1 = Yes 2 = No	17
VARTEM	Act Membr Var Tm	1 = Yes 2 = No	18
RECRUT	Recruited for MSU	1 = Yes 2 = No	19
SCHSHP	Scholarship MSU	1 = Yes 2 = No	20
STARTR	Years Starter	0 = 0 1 = 1 2 = 2 3 = 3 4 = 4	21
AWARDS	Athletic Awards	1 = Yes 2 = No	22
YEARS	Years compete sport		23-24
DIDNT	Didnt have choice (IMIPRE)	1 = strongly disagree 2 = disagree 3 = somewhat disagree 4 = neutral 5 = somewhat agree 6 = agree 7 = strongly agree	25
WANTTO	Did task bc want	same	26
NOTHOD	Didnt hold attent	same	27
GOOD	Am pretty good	same	28
QTENJY	Was quite enjoy	same	29
SKILLD	Pretty skill at task	same	30

CHOICE	Had some choice	same	31
VRYINT	Dscrbe vry intrestng	same	32
AWHILE	Aftr awhile compet	same	33
NOTOWN	Not own choice	same	34
BORING	Was a boring task	same	35
WELL	Well compared	same	36
FUN	Was fun to do	same	37
HADTO	Did b/c had to	same	38
NOCHCE	I had no choice	same	39
CULDNT	I couldnt do well	same	40
THNKN	Was think how mch	same	41
VRYMUC	Enjoy very much	same	42
SATSFD	Satisfied wperfom	same	43
FHADTO	Felt like had to	same	44
FHADTOP	Felt like had to (IMIPOST)	1 = strongly disagree 2 = disagree 3 = somewhat disagree 4 = neutral 5 = somewhat agree 6 = agree 7 = strongly agree	45
AWHILEP	Aftr awhile compet	same	46
QUENJYP	Was quite enjoyable	same	47
FUNP	Was fun to do	same	48
DIDNTP	Didnt have choice	same	49
VRYINTP	Dscrbe vry intrestng	same	50
HADTOP	Did bc had to	same	51
GOODP	Am pretty good	same	52
WANTTOP	Did task bc want	same	53
SKILLDP	Pretty skill at task	same	54
NOTOWNP	Not own choice	same	55

SATSFDP	Satisfied wperfom	same	56
NOCHCEP	I had no choice	same	57
BORINGP	Was a boring task	same	58
VRYMUCP	Enjoy very much	same	59
CULDNTP	I couldnt do well	same	60
WELLP	Well compared	same	61
CHOICEP	Had some choice	same	62
THNKNP	Was think how mch	same	63
NOTHODP	Didnt hold attent	same	64
PERFORM	Performed well on	1 = strongly disagree 2 = disagree 3 = agree 4 = strongly agree	65
FOCUS	Able to focus on	same	66
RUSH	Felt rushed while on	same	67
QUICK	Able to respond quickly	same	68
STRATGY	Implement stratgy	same	69
RELATE	Task related to sport	same	70
EXPSIM	Had exp. with similar	same	71
LIGHTS	Able see all lights	same	72
FREE	Move hands freely	same	1
PERSIST	Persist dur. free/choice	1 = yes 2 = no	2
ELASP	Time elasped b4	0-359sec	3-5
TRIALS	Total Number of Trials	1-15	6-7
TTIME	Total time out of 6 min	1-360 sec	8-10
FDBC	Type of Feedback	1 = success 2 = failure	11
FOURTH	4th trial score	0-6000	12-15
MANCHK	Manipulation CHK	1 = yes 2 = no 3 = skepticism	16

APPENDIX M

RAW DATA

Raw Data

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