A COMPARISON BETWEEN CHILDREN WITH COGNITIVE DISABILITIES
AND NON-DISABLED PEERS IN RELATION TO ATTRIBUTIONAL BELIEFS
AND PERSISTENCE IN GROSS AND FINE MOTOR TASKS

DISSERTATION

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By

Francis M. Kozub, M.S.

The Ohio State University

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Dissertation Committee:

David L. Porretta (Advisor)
Samuel Hodge
Joseph Hatcher
Deborah Tannehill

Approved by

Adviser
College of Education
ABSTRACT

This study investigates attributional beliefs and task persistence in children with cognitive disabilities (CD). The central purpose is to establish criterion validity of the Physical Activity Attribution Questionnaire (PAAQ); a pictorial scale designed to measure beliefs relative to physical activity in children with CD. Group differences in attributional beliefs and task persistence were also studied by including two comparison groups, one made up of same age peers (CA) and one made up of developmental age peers (DA).

PAAQ scores were compared with Modified Individual Achievement Responsibility Scale (MIARS) (an established instrument for non-disabled children) responses from 91 subjects (25 CD, 33 DA, 33 CA) to establish concurrent validity. Following the establishment of concurrent validity and attributional analyses, subsets of subjects (total n =61) were identified from each study group to complete task persistence testing.

Correlational results determined that the PAAQ is a criterion valid measure of attributional beliefs in the present sample. Multiple regression analysis determined that PAAQ scores were explained by a linear combination of group affiliation, gender, and age ($R^2 = .36; F = 12.07; p < .0001$).
Furthermore, CA group affiliation emerged as the only significant contributor to the regression equation (p < .0001) (holding other variables constant). A one way ANOVA determined that significant (p < .0001; F = 36.9) group differences were present relative to MIARS scores. A Scheffe Post hoc analysis indicated that these differences were between the CA group and the other two study groups.

Multiple regression analysis determined that task persistence scores were explained by a linear combination of PAAQ scores, group affiliation, gender, and age (R² = .44; F = 8.53; p < .0001). In explaining motor persistence, both CA and DA group affiliation accounted for a significant portion of the variance (holding other variables constant) (p < .01). In summary of these findings, attributional scores for the CD group were highly external (similar to the DA group) compared to the CA group. However, persistence scores for the CD group were significantly less than the two non-disabled comparison groups. These findings suggest that subjects from the CD group display a unique attributional profile (highly external) that is significantly related to less persistence at the challenging motor tasks.
To Mary, Patrick, & Jesse
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VITA

April 26, 1963 ........................................ Regensburg, Germany

1983 ......................................................... A.S. Jamestown C.C., Jamestown, NY

1985 ......................................................... B.S. SUNY Brockport, Brockport, NY

1986 ......................................................... M.S. SUNY Brockport, Brockport, NY

1987-1994 .................................................. Teacher of PE/ APE
Hancock Central School, NY
Dana Lyon Elementary Bath, NY
Wellsville Central Schools, NY

1994-Present ............................................ The Ohio State University

PUBLICATIONS


FIELDS OF STUDY

Major Field: College of Education
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CHAPTER 1

INTRODUCTION

Attributional beliefs refer to a person's perception of the causes associated with outcomes (Cox, Qiu, & Liu, 1993), while task persistence is the amount of time engaged in a motor activity in an attempt to master the task (Martinek & Griffith, 1995). Limited research in the area of attributional beliefs relative to motor performance has resulted in a lack of instrumentation to measure the construct in children with low IQ scores. For this reason, part of the present study is an attempt to establish criterion validity for the Physical Activity Attribution Questionnaire (PAAQ) - a recently developed pictorial scale. The PAAQ is specifically designed to measure the attributional beliefs associated with gross motor abilities in children with cognitive disabilities (CD) (ages 9-13). CD includes children with IQ scores (less than 80) that are more than one standard deviation below the norm. Also included in this study are analytical procedures designed to compare children with CD to non-disabled peers of similar developmental and chronological ages in relation to internal and external beliefs. Furthermore, the present researcher used a correlational
design to investigate relationships between attributional beliefs and task persistence in the area of physical activity.

**Background**

Locus of Control refers to the elements associated with the locus of causality model described by Weiner (1986). The model categorizes attributional elements as either internal or external in orientation. External elements are those outside of the individual’s control (luck and task difficulty). Internal elements on the other hand are those within the individual (ability and effort) (Biddle, 1993; Weiner). Attribution theory indicates that an external locus of control can hamper performance. A profile which is entrenched in the belief that failure is inevitable due to uncontrollable forces is known as “learned helplessness.” A “mastery oriented” profile, however, is associated with an internal locus of control, where failure stimulates the self-regulatory skills of a learner (Martinek & Griffith, 1995).

Persons with CD, and specifically those with mental retardation (MR), may possess a unique attributional profile which hampers success in achievement situations (Bogie & Buckhalt, 1987; Turner, Hale, & Borkowski, 1996; Turner, Pickering, & Matherne, 1994; Wehmeyer, 1994). This relationship has also been suggested to exist in children with Learning Disabilities (LD) (Borkowski, Weyhing, & Turner, 1986; Dudley-Marling, Snider, & Tarver, 1982; Licht, Kistner, Ozkaragoz, Shapiro, & Clausen, 1985). A unique profile may exist in persons with CD due to an external locus of control associated with outcomes. For example, Turner et al. (1994) found that
children with MR were more likely to attribute academic success to luck or unknown factors; whereas, non-disabled peers attributed academic success to effort.

Relatedly, low levels of motor performance are found to exist in children with MR that are not explainable based on specific underlying physical or neurological causes (Porretta, 1990; Francis & Rarick, 1959; Schmidt, 1988). Attributional beliefs are proposed as a variable responsible for some of the motor deficits found in children with CD. External attributions for noncompetent situations may result in a low number of trials or attempts during the learning of a motor task. Since the number of trials or attempts is a critical variable in motor learning (Schmidt), the child with CD may be deficient in motor skill due to attributional processes. Furthermore, an external orientation for competent outcomes can lead to a poorly developed self-esteem associated with motor performance since the attribution is related to elements outside of the individual’s direct control (Weiss, Ebbeck, McAuley, & Wiese, 1990).

Importance

Attributional beliefs have also been associated with the concept of self-determination by Wehmeyer (1994), who indicates that a unique socialization history may hamper adults with disabilities from becoming fully empowered to affect the outcomes of daily living. In Wehmeyer’s study, locus of control for persons with MR was found to be highly external compared to normative data from (non-disabled) peers.
The use of attribution theory as a possible avenue to improve the learning and performance of persons with CD has been limited. The few studies which have been conducted demonstrate the existence of a unique attributional profile in persons with MR (Turner et al., 1996; Turner et al., 1994; Wehmeyer, 1994) as well as those with LD (Borkowski et al., 1986; Dudley-Marling et al., 1982; Licht et al., 1985). Furthermore, attributional beliefs may be task specific (Turner et al., 1996) and, therefore, inquiries into all domains associated with the education of the child with CD are important. However, these studies have not addressed attributional beliefs in persons with CD in the motor performance area.

How attributional beliefs factor into the learning of children with CD in motor performance is of considerable consequence since all children are entitled to an educational experience that includes physical education (Individuals with Disabilities Act, 1990). Deficits that are found to occur in children with CD (such as motor performance) make considerations such as attributional beliefs important variables in need of investigation. One additional reason for concern, specific to motor functioning, is the potential to improve independent adult living skills since a large portion of jobs available to persons with disabilities may require gross motor tasks. This is specifically true for adults with mental retardation. The present study is composed of inquiries into the relationship between attributional beliefs (as measured by a recently developed pictorial scale) in children with CD and the persistence at two motor tasks.
Problem Statement

The purpose of this study is to investigate the relationship between scores on the PAAQ and task persistence (in motor tasks) of students with CD (ages 10 - 12). By establishing the PAAQ as a predictor of task persistence (in motor skills), valid instrumentation will make future research possible in motor performance aimed at improving attributional profiles in persons with CD. Also, included in the present study is a comparison between those with and without disabilities to determine if differences exist (based on cognitive functioning) in attributional beliefs and task persistence.

Research Questions

1. Does the PAAQ serve as an accurate predictor of task persistence for children with CD (ages 10-12)?

2. How does the PAAQ compare to the Modified Individual Achievement Responsibility Scale (MIARS) in relation to concurrent validity for persons with and without disabilities (ages 10 & 12)?

3. Does the presence of a cognitive disability in children (ages 10 -12) explain variability in relation to attributional scores?

4. Does the presence of a cognitive disability in children (ages 10-12) explain variability in task persistence at select motor tasks?

5. Does developmental age explain variability relative to attributional beliefs and task persistence in children with CD, and non-disabled children of similar chronological or developmental age?
6. Does the PAAQ serve as a specific measure of attributional beliefs in physical activity for children with CD, and is the scale generalizable to a fine motor task?

**Definition of Terms**

Definitions of key terms will be presented in a constitutive and operational form. Operational definitions are the accepted definitions found in educational and psychological literature. Constitutive definitions include how the term will be used for the present study. Key terms that require clarification are: cognitive disability, attributional beliefs, locus of control, and task persistence.

**Cognitive Disability (Mental Retardation & Learning Disabilities)**

*Constitutive* - the definition for Mental Retardation is typically referred to as sub-average cognitive functioning (with an intelligence score below 75), with marked deficits in adaptive behavior, and all deficits must be manifested before the eighteenth birthday (American Association on Mental Retardation, 1992).

Learning Disabilities in the state of New York (were the target sample was selected) includes students who have a severe discrepancy between ability and achievement. This includes those students who have trouble in academic areas such as reading, spelling, arithmetic, and writing (Frankenberger & Fronzaglio, 1991).

*Operational* - for the purpose of the present study, CD is defined as students (from the participating schools without any known physical
impairments) who have an educational label (MR or LD) and are placed in an option 1 or 2 self-contained special education classrooms. Option 1 refers to a segregated placement of 15 students with one teacher; while option 2 refers to a segregated placement of 12 students with one teacher and one aid. These students must have recorded IQ battery scores that are below 80 in all areas of a standardized intelligence test. Also, these students do not have any communication deficits that prevent them from independently completing attributional testing (with the investigator reading the items).

Attributional Beliefs

Constitutive - the broad term referring to a person’s specific perceptions of why something happened, which in turn is related to how a person views self in regard to ability to exert control over the environment (Cox et al., 1993).

Operational - attributional beliefs refer to the total score on the PAAQ and total score on the MIARS.

Locus of Control

Constitutive - based on Deci and Ryan (1985), “. . . locus of control is concerned with what controls a person’s outcomes. . .” (p. 166). This has been associated with the elements of the locus of causality model constructed by Weiner (1986) that place a person’s perception of causation as either internal or external in orientation (Biddle, 1993).
Operational - scores on the PAAQ and MIARS in relation to the selection of external and internal attributional statements that are categorized based on the locus of causality model (Weiner, 1986).

Task Persistence

Constitutive - the effects of an attributional belief system, where a person chooses to either persist or quit when confronted with a challenging task (Berk, 1994).

Operational - task persistence is defined as the mean time engaged (over three ten minute sessions) after initial failure in the two motor tasks.

Motor Performance:

Constitutive - motor performance is the observable behavior relative to the completion of a sport or game that can be plotted on a graph along trials and performance (Schmidt, 1988).

Operational - for the present study motor performance is the successful or unsuccessful performance related to the novel gross motor task.

Limitations of the Study

Several issues create limitations for the present study. First, educational labeling in the districts used for this study have created situations where some children with IQ scores who fall in the mental retardation range are labeled as LD. These students are placed in segregated classrooms with those students who are labeled MR. Educational records give no indication that these students with LD have needs and abilities that are different from the
students labeled MR. For this reason, the two educational labels are treated as one group, namely, children with CD. However, the researcher had no way of testing the assumption that these children with the LD label were actually identical in academic and motor abilities to those labeled MR. Therefore, the generalization of results to all students with LD or all students with MR are not possible based on these results.

In addition, any relationships found in this study are confined to situations created by the research setting. Generalization of tasks and outcomes to an actual “real life” physical education (PE) classroom or any group setting are not possible based on the conditions employed during the current study. The impact of peers and an actual educational setting cannot be measured given the isolated setting for the completion of the motor tasks. Also, tasks used for this study were deliberately selected to be novel or new, and therefore may not be part of a traditional PE curriculum. As a result, generalization to other motor tasks can not be possible.

A final issue is related to the PE placement of subjects in the present study. Many students with MR and LD are provided PE instruction in a general education setting. However, control for PE instructional settings for all subjects for the purpose of comparisons was problematic. Each school varied in relation to how instruction in PE was given. In some cases, the classroom teacher provided instruction while in others a physical education specialist provided instruction. Also in relation to instructional histories, issues concerning past physical education instruction placements for subjects were
not controlled. Possible influences of these PE placement issues on attributional beliefs and task persistence for the present sample cannot be analyzed.

**Basic Assumptions**

The study assumes that attributional elements may exist in persons with cognitive deficits (in the motor performance area) in a similar manner as has been identified in other areas of achievement. Also, task persistence is related to the potential for improved motor performance in the target population. Finally, all subjects with disabilities participating in the present study were functioning at a comparable level in regard to motor ability based on the standardized IQ scores regardless of educational label (LD or MR). Therefore, the researcher assumed that the CD group (composed of students with IQ scores below 80) function between two to four years behind same age peers in motor performance (Francis & Rarick, 1959).
CHAPTER 2

REVIEW OF LITERATURE

Generally, children with low IQ scores (and specifically those labeled MR) typically exhibit lower levels of performance when compared to same age peers in both motor and cognitive abilities (Rarick, 1980). The association between cognitive and motor variables may be intertwined with a lack of persistence in those with disabilities which results from an external attributional profile. This review contains discussion relative to motor performance in those with MR, attribution theory, attributions and motor performance, categorical variables affecting attributional beliefs, cognitive and metacognitive processes, cognition and mental retardation, the unique attributional profile in persons with MR, learning disabilities and IQ scores, and issues related to measuring attributional beliefs. Finally, a summary is provided.

Motor Performance of Persons with MR

In summarizing information concerning motor performance abilities in persons with MR, it has been documented that these abilities, though varied, are inferior to those persons without disabilities. The motor deficits tend to
range between two and four years behind non-disabled peers (Francis & Rarick, 1959). Poor motor performance may be a direct influence of lower cognitive functions; however, not all motor deficits in persons with MR (compared to non-disabled) are explainable by known underlying physiological causes (Rarick, 1980; Porretta, 1990; Schmidt, 1988). Porretta reviewed research in the area of motor performance and learning of persons with MR and found that even though deficits are noted in relation to non-disabled peers, learning does occur in many tasks where adequate acquisition trials are provided.

Factors responsible for motor deficits in persons with CD compared to non-disabled peers could be numerous. Instructional influences may be partially responsible for motor deficits due to the general inadequacy of the adapted physical education programs in many school systems (Loovis, 1986). Also, variables involving self-concept could help explain performance deficits in motor skills (Ellis, 1979). This in turn may affect motivation; such as in the attributional beliefs of persons displaying mental retardation. These attributional beliefs may be antecedents in the processes associated with various areas of learning (Wehmeyer, 1994), including motor abilities.

**Attribution Theory**

Attribution theory states that people attach meaning to the outcomes of daily life (Andrews & Debus, 1978). In attribution theory, this meaning can be categorized as personal or environmental (internal or external) (Biddle, 1993).
Biddle and Fox (1988) believe that how children view success and failure within the construct of attributional beliefs is relevant to motor performance.

**Attributions.** Attributional processes can be viewed in a circular manner in which beliefs can affect and be affected by decisions and experiences of daily life (Appendix A) (Biddle, 1993). Psychological research on attribution theory has produced "attributional elements" that are used in describing the dimensions associated with outcome causes (Biddle). Figure 1 represents the original model proposed by Weiner in 1972, which cross references outcomes as internal or external, and stable or unstable (Biddle; Buss, 1978; Russell, 1982; Weiner, 1986). Stable refers to elements that do not change from trial

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*Figure 1. Original Locus of Causality model (Weiner, 1986).*
to trial such as ability, whereas unstable refers to changeable attributes (effort).

The original Weiner model was later reshaped to include "controllability," that could be internal but not under a person's direct control (Appendix B). An example of an uncontrollable element would be one related to genetic attributes (Biddle, 1993; Weiss et al., 1990; Weisz, Yeates, Robertson, & Beckham, 1982).

**Achievement Motivation.** Attributional beliefs are related to the processes of achievement motivation which is portrayed in Berk (1994) as the "tendency to persist at challenging tasks" (Berk, 1994, p. 444). In relation to motor performance, Biddle and Fox (1988) refer similarly to the term in that achievement motivation also involves "... approach and avoidance behaviors in situations where some form of evaluation of a task is taking place" (p. 184).

In relation to achievement motivation, attributional beliefs may not remain constant for a person throughout daily experiences. Attributional beliefs may vary in a specific individual depending on the person's perceptions of the environment or the task (Russell, 1982). A person who perceives one situation as controllable, may view a different setting as uncontrollable (Turner et al., 1996).

Researchers have also viewed attributional profiles as potentially pervasive. The inferior profile may generalize across learning domains in some individuals. The problem has been investigated in non-disabled persons by Martinek and Griffith (1995), who found that mastery oriented students
tended to view tasks across contexts differently than persons displaying a learned helpless profile. The term mastery oriented refers to one who attributes success to ability, and failure to poor effort; whereas one displaying a learned helpless profile looks at success as a result of luck, and failure as attributed to low ability (Martinek & Griffith).

**Locus of Control and Locus of Causality.** Distinctions between terms related to attribution theory are important since references to locus of control or locus of causality may change the meaning of a statement to some researchers. In the present study reference is made to the term locus of control in conjunction with the locus of causality model (Figure 1). Deci and Ryan (1985) make the distinction by indicating: "... locus of control is concerned with what controls a person's outcomes; locus of causality is concerned with why a person behaves as he or she does" (p. 166). For the purpose of the present study, a clear definition of how the terms such as locus of control and attributional beliefs are used will be important for the clarity of later findings (See definition of terms).

Wehmeyer (1994) studied persons with MR, and used the term "locus of control" to refer to the internal and external perceptions associated with contingency relationships. This traditional interpretation is concerned with reinforcers as inherent in the locus of control definition (Deci & Ryan, 1985). Biddle (1993) refers to attributions as classified along the dimensions of "locus of causality," and indicates that these dimensions were previously referred to as locus of control. In general, the distinction is not clearly separated in
Biddle's use of terms in reference to physical activity. Perhaps some of the overlap in the use of terms referring to physical activity is due to the inherent reinforcers in sports, such as winning or success at completing a motor task. Based on Dauer & Pangrazi (1986), there seems to be an inherent pleasure associated with physical activity for young children and adolescents, and this could be considered a reinforcer.

Another concern related to terminology is that a large portion of the tests used to measure constructs related to attribution theory have utilized the term locus of control (Nowicki & Strickland, 1973; Wehmeyer, 1993). Current researchers in the motor area have also used modifications of instruments, such as the Modified Individual Achievement Responsibility Scale (e.g., MIARS), to measure attributional beliefs. The original Intellectual Achievement Responsibility Scale (IARS) (used to create the MIARS) was constructed to measure locus of control. However, Martinek and Griffith (1994) refer to attributions as "causal," but do not refer directly to locus of control.

Rather than debate the reference or lack of reference to terms such as "locus of control" or "causal attributions," the present research will address common themes inherent in elements related to attributional beliefs. One key feature in the interpretation of locus of control is the reference to the external attribute of "powerful others" or authority figures (Deci & Ryan, 1985; Wehmeyer, 1993). Powerful others relates to those being in control of the outcomes and is an issue described in Wehmeyer (1994) specifically for persons with MR. Based on current trends in research, the term locus of
control and attributional beliefs will be used to describe the external attribute of "powerful others," as well as the other internal and external attributions for outcomes related to motor tasks (Figure 1).

Task Persistence. Low task persistence may be a criterion of a poor attributional profile. Specifically, persons with superior attributional profiles may persist longer at a task than persons who are displaying beliefs that attribute outcomes to external and unstable categories (Kurtz & Borkowski, 1984; Martinek & Griffith, 1994). Those who place cause of failure with low effort simply feel that increased effort will change the future outcome (Diener & Dweck, 1980).

Attributions and Motor Performance

The relationship between task persistence and attributional beliefs was observed in a motor setting by Martinek and Griffith (1994) who compared mastery oriented students to those displaying learned helplessness (based on the authors operational definition of mastery and learned helpless). Middle school adolescents were identified as mastery oriented by selecting a higher number of mastery responses on the MIARS; whereas, those who selected fewer mastery responses were classified as learned helpless. Results demonstrated that those students who attributed outcomes to internal attributes (as measured by the MIARS) persisted longer than those displaying a poor attributional profile (Martinek & Griffith).

Martinek and Griffith (1994) did not find a significant relationship between primary age (second and third grade) students’ scores on the MIARS.
and task persistence. As was the case for the adolescent age participants, Martinek and Griffith divided the younger subjects into mastery oriented and learned helpless categories (using MIARS scores) and compared the groups on task persistence variables. Similar levels of task persistence resulted in the two younger groups, despite the different attributional profiles (categories) noted prior to treatment. The findings may indicate that as children get older, the effects of a poor attributional profile may be more pronounced (Martinek & Griffith). Support for the authors’ contention of this minimized affect of attributional profile (for second and third graders) is that younger children regardless of profile persisted similarly when compared to older adolescents (mastery oriented). A rival hypothesis (not posed by the authors) is that the instrumentation could have affected the results since the same modification of the IARS was used for both the younger and older groups.

A follow-up study by Martinek and Griffith (1995) which illustrated the pervasive nature of attributional profiles (in middle school age adolescents) support the notion that students who display a mastery oriented profile persist longer than students who display an external oriented profile (“learned helplessness”). Reasons for the persistent behavior appear to permeate from the willingness to continue after initial failure. Persons who are mastery oriented tend to use failure to stimulate the self-regulatory process so that subsequent attempts can increase the likelihood of success. However, the child displaying the poor attributional profile focuses on the lack of ability associated with the outcome (Martinek & Griffith).
Johnson and Biddle (1988) used task persistence as a variable in their study on the effects of "helplessness" during a balance board task. In this study, they found that participants who persisted longer displayed a positive attributional profile. A positive profile was identified by the researchers in those subjects who made strategy related responses as opposed to negative self-ability statements following the task. The strategy response is under the participant's direct control whereas ability can be a fixed attribute. The positive profile relates to a future outlook that includes improved effort to complete the task as opposed to simply feeling inadequate. Johnson and Biddle also examined the feeling of inadequacy or "helplessness" as either universal or personal. Universal refers to "no one" being able to complete the task and personal refers to control of the task not being possible for the individual. Universal helplessness has the potential of saving one's self-esteem, whereas the personal "helplessness" refers to a lowered sense of self-worth (Johnson & Biddle). The end result is that persons who consider failure as an inability to match the strategy with the task or a lack of effort, may persist longer and have an increased chance of success over the person displaying an unwillingness to persist after initial failure (Diener & Dweck, 1980).

Categorical Variables and Attributional Beliefs

Researchers have investigated numerous categorical variables that potentially affect attributional processes. These variables include age, gender, socioeconomic status, race, cognitive abilities, and physical disabilities.
**Age.** Research on attributional beliefs and locus of control appear to point towards a developmental pattern, where persons become more internal in attributional beliefs with age (Lawrence & Winschel, 1975; Martinek & Griffith, 1994; Nicholls, 1978; Nowicki & Strickland, 1973). However, the nature of the change is of concern for this present study since persons with CD (specifically those with MR) may progress along motor related developmental milestones more slowly than non-disabled peers (Sherrill, 1993). How these developmental delays are related to attributional beliefs is of concern for the present study.

Changes that occur in children relative to attributional beliefs appear to be related to the distinction between "ability" and "effort" (Nicholls, 1978). It is not until approximately age nine that most children make the "ability" versus "effort" distinction; and, how this relates to developmental age versus chronological age is of concern along with other perceptions of internal versus external attribution. However, the concern in the present study is the internal versus external elements contained in the locus of causation models by Weiner (1986) (Figure 1 & Appendix B) since the attributional instruments (specifically the PAAQ) do not differentiate between effort and ability responses.

**Gender.** Gender as a variable in attribution related studies has shown mixed results. Biddle (1993) in review of sport related studies concluded that differences in males and females in relation to attributional beliefs is, for the most part, unsupported. In relation to persons with MR, research on
attributitional beliefs (analyzing gender) outside of motor performance has shown a similar trend (Bogie & Buckhalt, 1987; Wehmeyer, 1994).

Differences were found based on gender in attribution related research conducted by Deaux and Emswiller (1974) who found that while male competence was more often associated with ability, female competence was associated with luck. Although the research is more than 20 years old (and changes may have occurred in the perceptions of female competence in society since then), the perceptions of the child with CD may be unique and more prone to subtle societal messages that still exist in relation to physical activity. While, many segments of the media still portray male athletic competence as highly valued, female competence is still associated with more passive types of activities.

Nowicki and Strickland (1973) found differences between respondents based on gender. However, these differences in relation to internal versus external locus of control were inconsistent across age groups. Also, significant differences were found in research by Bird and Williams (1980) where male athletic competence was more likely to be associated with ability and female outcomes related to external reasoning. Finally, research by Kozub and Porretta (1996) demonstrated that no differences existed in the overall selection of internal and external attributions using a pictorial scale to measure the perceptions of children (ages 9-12) with MR.

Gender differences relative to attributions were also noted in children with LD by Licht et al. (1985). While males attributed failures more often to
external factors, females tended to select a lack of ability. However, the study by Licht et al. focused mainly on failure attributions. In relation to gender differences, the authors concluded that females, more so than males, appeared to be at risk to develop a cycle counter productive to persistence based on attributional profile.

Further research is needed to investigate any potential gender differences in attributional scores that may exist in physical activity for persons with CD given the occasional perception that competence in sport is a male trait. Also, the focus of the attributional research review by Biddle (1993) was related to high profile athletic competition. Studies that investigate attributional beliefs related to general physical activity and low level performers have received little attention.

**Socioeconomic Status and Race.** Study of attributional beliefs related to persons of different races is limited. Research that has been conducted has failed to take into account socio-economic status (Nowicki & Strickland, 1973). Because of this, findings that place minority ethnic groups at risk for an external attributional profile are inconclusive (Berk, 1994; Nowicki & Strickland).

**Cognitive Abilities.** Bogie and Buckhalt (1987) measured the relationship of task persistence in persons who were labeled in the "typical", "gifted", and "developmentally delayed" categories. The results indicated that 10-12 year old children who were labeled as "gifted" persisted significantly longer than students of the same age with MR (mean IQ = 66.7). Also, in the
same study, though not found to be statistically significant, persons of average intellectual functioning out persisted those with MR. Reasons for the longer persistence are inconclusive. However, the authors cited the importance of not attributing failure to low ability. Also, Bogie and Buckhalt identified the need to develop valid and reliable instrumentation to measure children's reactions to failure and success.

**Physical Disabilities.** Research that links attributional beliefs in school age children to orthopedic disabilities is limited. However, White and Duda (1993) have shown that adolescents with physical disabilities (in a sport related context) are at risk to develop task goal-belief dimensions that place outcomes in external categories. The external categories that emerged include equipment and coaches' expectations. However, equipment and coaching are identified as legitimate concerns for wheelchair athletes and, therefore, may not lead to motivational issues (White and Duda). The present study holds disability constant by not including students with known physical disabilities.

**Cognitive and Metacognitive Processes**

Cognitive and metacognitive processes are key factors to review when studying psychological constructs in children with CD. Cognition refers to memory and problem solving abilities. Metacognition is knowledge as it pertains to strategies. Motivation is related to self-concept and attributional styles (Short, 1992).

**Cognitive Processes and Attributional Beliefs.** In understanding motivational relationships as they pertain to persons with CD, it is necessary to
be aware of cognitive and metacognitive processes and how these factors may be interlinked. The mental processes associated with attributional beliefs are important in the understanding of cognitive and motivational aspects that are inherent during developmental periods. This is necessary in order to better understand the older adolescent who may be chronologically advanced in age, but fixed at a significantly immature level of cognitive function (Short, 1992).

In relation to attributional beliefs, young children would be expected to exhibit little perceived control over outcomes. However, as Weisz, Yeates, Robertson, and Beckham (1982) have noted, young children in fact inaccurately attribute all outcomes to ability, an internal and stable attribute (Figure 1), regardless of the activity. To a child, a person who wins at a coin toss is thought to have high ability; when in reality, the person is simply lucky. The inaccurate attributions tend to diminish as children develop. Most persons from early adolescence to adulthood correctly identify the causes of simple activities relative to ability and luck (Weisz, Yeates, Robertson, and Beckham).

For perceived control, a person attributes outcomes to effort and ability as opposed to luck or task ease. Attributions to internal elements are critical in the development of self-concept (Biddle, 1993; Bandura, 1989). The situation can also work in the other direction in that self-perceptions may influence attributional beliefs. The exact flow of beliefs is unclear, however the relationship has been documented to exist (Weiss et al., 1990). Children's attributions for success or failure can be predictive of how they will respond to
rejection (Dweck, 1986). To a child with desirable attributional beliefs, failure will result in increased effort for the next attempt. A child with negative attributional beliefs will find alternative solutions to the problem such as "quitting" (Andrews & Debus, 1978; Kurtz & Borkowski, 1984).

**Attributions and Failure.** The relationship between outcomes and beliefs can be related to a person's perceptions of success versus failure. Clifford (1984) has suggested that failure be defined as:

"... a performance-goal ratio of less than one, or as an event in which a goal exceeds its matched performance; and that success, its counter, be defined as performance-goal ratio equal to or greater than one, or an event which a goal is attained or surpassed" (p. 108).

An example of failure would occur when a child practices jumping rope at home and fails at the activity in a class setting. Success would occur if this same child practiced the deficient jump rope skill and subsequently was able to complete the jump rope task in the class setting. In both cases the goal was the same. However, the outcome becomes success or failure due to its compatibility with the individual's desires. Also described is the idea of "constructive failure" or the type of failure that results in a heightened interest or persistence in a task (Clifford).

Unconstructive failure is of interest in the present research study since this unconstructive failure is, in many instances, coupled with an attributional
belief system that attributes inadequacies to uncontrollable forces. The end result is a condition (similar to "learned helplessness") where a child ceases to persist at a challenging task. Using the above example, the child with CD may feel a sense of "learned helplessness" if the perception exists that no matter what was done, success will not be attained due to the fact that prior experiences in similar activities led to failure. The profile becomes a negative cycle of poor performance followed by poor effort due to the external or uncontrollable attribution of the outcome. The end result is a child who has no ability to accurately match performance with task demands, for whom subsequent challenges are met with low expectations for success (Clifford 1984; Diener, & Dweck, 1986).

Cognition and Mental Retardation

Limited cognitive abilities may affect motor performance. However, Rarick (1980) describes cognitive factors as not being responsible for all motor deficits in persons with MR compared to non-disabled peers, since not all motor tasks require extensive cognitive demands. This is supported by Schmidt (1988) where motor learning specialists have discovered that many motor reactions occur too quickly to be processed at the higher cognitive levels (e.g., a child running in a straight line does not have to "think about" jumping over an object that has been suddenly thrust into her path, however, this child is able to avoid falling). Though many motor responses are the result of reflexes, research in motor performance must be sensitive to the cognitive characteristics of the learner since past correlational research indicates that
high intelligence scores are positively related to most motor tests (Francis & Rarick, 1959; Schmidt, 1988).

Two major theoretical frameworks are at odds in relation to the cognitive development of persons with MR. This is referred to in Weisz, Yeates, and Ziegler (1982) as the “developmental-differences controversy.” Here, characteristics of persons with MR can be explained in relation to cognitive deficits using either a “developmental” or “differential” approach.

**Developmental Approach.** The developmental approach states that persons with MR pass through the same cognitive stages as persons without disabilities, only at a slower rate. In relation to attributional beliefs, cognition would affect the “ability versus effort” distinction described in the development of attributional beliefs of non-disabled children by Nicholls (1978). In this distinction, a child does not differentiate effort from ability until about age nine. In the child with MR, this would not occur until much later, based on Nicholls’ developmental study of non-disabled children. However, the developmental perspective is not supported by the findings of Wehmeyer (1994). While results by Wehmeyer demonstrate that scores on the Adult Nowicki-Strickland Internal-External Scale (ANS-IE) for persons with MR (ages 13-20) remained consistently external, the tendency for non-disabled persons of the same age is to become more internal.

**Difference Theory.** A second approach refers to the differences in the underlying cognitive structure in the person with MR. “Difference theories” describe the person with MR in comparison to same age peers as dissimilar in
formal processing and problem solving (Weisz, Yeates, Robertson, & Beckham, 1982). Differences in problem solving is not totally supported in research on persons with MR by Belmont, Ferretti, and Mitchell (1982) who indicate that problem solving is not a function of intelligence. Persons with MR are similar to those without disabilities in that they are either “solvers” or “non-solvers.”

The explanation of the cognitive deficits, whether “developmental” or “differential”, goes beyond the scope of the present study since internal cognitive variables were not directly measured during the motor tasks. What is under study, however, are the relationships between cognitive function (as measured by IQ scores in the study sample), attributional beliefs, and task persistence. These correlational comparisons will warrant later inferences to the developmental-differential controversy.

**Unique Attributional Profile in Persons with MR**

For a person to feel in control of the environment, he or she must possess a self-portrait that is associated with positive feelings of the ability to make decisions. Wehmeyer (1994) infers that since persons with MR are typically placed in situations where decisions are made for them, they may not hold realistic understandings of what causal agents affect specific outcomes. The person with MR may display a unique attributional profile which may in fact hinder success (Turner et al., 1996; Turner et al., 1994). The issue of empowerment is directly related to the self-concept of persons with MR. Lack of control, coupled with the label of being intellectually inferior to peers may
manifest itself in a way that leads to a poor attributional belief system. This profile can affect the educational processes (Wehmeyer, 1994; Ellis, 1979) in all types of learning environments.

Preponderance of research that supports the unique attributional profile in persons with MR has been associated with traditional academic areas. Specifically, Lawrence and Wunschel (1975), in their review of locus of control issues of students enrolled in special education programs, concluded that locus of control must be taken into account when considering programming and placement for children with MR. Later research by Turner et al. (1994) found differences between student perceptions of control, where the child with MR rated "effort" as a less important strategy for academic success than non-disabled peers. Furthermore, Turner et al. also demonstrated that students with MR are more likely to attribute academic success to powerful others, luck, and unknown factors when compared to children without disabilities.

The culminating support for a distinct attributional profile, comes from Wehmeyer's (1994) study of 282 (13 to 20 year old) students with MR. Results demonstrated significantly lower scores on the ANS-IE for persons with MR than would be expected using the same scale on non-disabled peers (based on past normative data). Lower scores on the ANS-IE refer to a more external attributional profile in relation to outcomes.

Learning Disabilities and IQ Scores

An overlap appears in many study samples relative to attributional beliefs in persons with mild mental retardation and those with learning
disabilities (Bogie & Buckhalt, 1987; Licht et. al., 1985; Turner et. al., 1996; Turner et. al., 1994). Though actual overlap may not be present in the samples based on respective state classification, overlap does exist if IQ scores are used as a criterion cut-off for LD classification. This is based on reported mean IQ scores, standard deviations, and the potential definitions used for classification of LD (Frankenberger & Fronzaglio, 1991). A preliminary study by Kozub and Porretta (1996) reflect this overlap, where students are being studied with IQ scores of 75 and greater who are labeled MR. The assumption of overlap is relative to the definition of mental retardation presented by the American Association on Mental Retardation (1992) where persons with IQ scores of 50-75 are considered for mental retardation classification.

The study by Kozub and Porretta (1996) was completed on Ohio children where a cut-off IQ score of 80 is one criteria used to differentiate between those placed in self-contained LD classrooms and those educated in self-contained MR classrooms. Depending on the states where the studies were conducted and the date of the research, many students who have IQ scores above 65 could, in all likelihood, change educational label without changing educational needs (Algozzine & Korinek, 1985; Frankenberger & Fronzaglio, 1991).

The learning disabled classification is typically associated with a disorder in psychological processes involving the use of language (written, spoken, and etc) (Frankenberger & Fronzaglio, 1991). Central to this
classification is the use of what constitutes a discrepancy between the level a child is currently achieving and the level the child should be attaining. The discrepancy formula again is a function of a state's classification scheme and a source of considerable debate since the early 1980's (Frankenberger & Fronzaglio). There are two reasons why the differentiation between LD, MR, or even "slow learner" may be a moot point.

First, the preliminary study on the PAAQ was conducted on children from MR classrooms in a large urban school district. The range of IQ scores was between 49 - 79. This range would undoubtedly include some children, who if classified by a particular state that does not use IQ scores as a criterion for cut-off (such as New York), would be as eligible (holding other factors constant) for the LD label as the MR label given the IQ scores reported. However, this statement is qualified by the need to analyze other factors, such as adaptive behavior (American Association on Mental Retardation, 1992).

The key point is not that students may be misclassified as much as an inference that prior students studied using the PAAQ have common characteristics similar to the present sample. Common characteristics include IQ scores below 80 and a segregated educational placement (self-contained classroom).

A contention by Frankenberger and Fronzaglio (1991) is that many low achieving students who were at one time classified as MR are now being classified LD. This may be a reflection of whether a state has a criteria cut-off for IQ score. It is of interest to note that the sample secured for the present
study is from a state that does not use an IQ criteria cut-off score for labeling students LD (Frankenberger & Fronzaglio). The implication is that the present sample of students with disabilities are potentially heterogeneous in many key factors (though within group differences exist in educational label).

The issue of labeling goes beyond the present discussion since Borkowski et al. (1986) infer that those students with LD and MR who are from segregated (self-contained) classrooms may be at risk for a profile that is closely aligned with “learned helplessness” (Borkowski et al.). This leads to the second reason for studying students with low IQ scores (regardless of MR or LD label) as a single group. Completed research indicates that those with LD may also be at risk of repeated failures and a decreased expectation for future success (Borkowski et. al; Dudley-Marling et. al., 1982; Licht et. al., 1985).

Persons with LD appear to be at risk to develop attributional beliefs that are externally located for successful outcomes in a similar manner as those with MR. This includes a predisposition to failure that is coupled with the potential to attribute outcomes to uncontrollable attributes such as a lack of ability (Licht, 1983). Though educational labeling has potential implications relative to the target sample makeup, Licht et al. (1985) found that persistence in students with LD is related to attributional beliefs. And, research by Licht et al. also found that children with LD are less persistent (in a similar manner as those with MR) than non-disabled peers.
Measuring Attributional Beliefs

The lack of reliable and valid instruments to test psychological variables in children with low IQ (specifically those with MR) is an obstacle that needs to be overcome (Gibbons & Bushakra, 1989). Simply using instruments designed for children without disabilities on those with CD (specifically those with MR) may not be appropriate (Silon & Harter, 1985). The lack of suitable instrumentation, coupled with the limited amount of research specific to the motor performance area, makes instrumentation a major obstacle in attributional physical activity research. Only a few instruments exist relative to the motor performance area. These are described below.

MIARS. Research by Martinek and Griffith (1994) produced a modified version of the Intellectual Achievement Responsibility scale (IAR). The original IAR scale was designed to measure the attributional beliefs of a persons without disabilities in various achievement situations, but did not offer any items specific to motor performance (Crandall, Katkovsky, & Crandall, 1965). The MIARS by Martinek and Griffith (1994) was constructed from the IARS by making the questions specific to the physical education environment (Martinek, 1992a). The scale includes 20 physical education specific questions that are read to the respondents.

In pilot testing (Martinek, 1992b) of the MIARS on non-disabled subjects, correlations were highest for older middle school age subjects (.61) with regard to concurrent validity between the questionnaire and the Nowicki-Strickland locus of control questionnaire. Low correlations (.31) resulted for
younger subjects (elementary age) and, therefore, may limit the test's validity to subjects functioning at or above the fifth grade developmental level.

**Effort Ability Scale.** Martinek and Griffith (1995) followed-up their original study using a further modification of the IAR scale. The study was designed to focus on learned helplessness, a pervasive condition that generalizes across learning tasks. The Effort/Ability Scale was constructed to measure attributional profiles in physical education, reading, and mathematics (Martinek, 1995). The modifications for the follow-up study included restoring a large portion of the original IARS questions, without discarding the portion relating specifically to physical education. While the IARS and the MIARS gave the subjects two choices of either internal or external attributions, the Effort/Ability Scale added a third choice relating to the distinction between effort and ability (Martinek & Griffith).

Two points make the Effort/Ability Scale unsuitable for the present study. First as indicated earlier, the ability versus effort distinction may be problematic in persons functioning at or below the developmental age of nine (Nicholls, 1978). Second, it is important to note that the differences between "pervasive" learned-helplessness and "task specific" learned helplessness may not be as distinct in students with IQ scores below 80 depending on educational history. The idea of pervasive helplessness may be a "given" with respect to children with MR.

**Task Specific Attributions.** The need for task specific items stems from research by Martinek and Griffith (1994) and Turner et al. (1996) who cite the
need to provide questions that focus a particular interest domain. Specifically, Turner et al. cited a lack of question similarity to the task as possibly affecting data on subjects with MR. In order to use an attributional scale to measure a person's responses to a task, the questions must refer to perceptions related to the domain in which the researcher is investigating. Persons with CD may be at a disadvantage using a test that attempts to elicit response from hypothetical situations. The implication is that a non-specific attributional instrument may confound the data by forcing the respondent to think about why something happened as well as where it could happen.

**Pictorial Representations.** In reviewing the literature, pictorial representations have emerged as a possible avenue for improving psychological testing in persons with low IQ scores. In a study of Special Olympics athletes, Gibbons and Bushakra (1989) found that pictorial representations were appropriate for children (ages 9-13) with MR (IQ scores between 48-70). Ulrich and Collier (1990) found that the suitability of a pictorial format is related to minimal reading proficiency required for understanding.

The interesting nature of pictorial representations may also help facilitate concentration skills of the child with MR (Harter & Pike, 1984). This relates to a final note which indicates the problematic nature of attempting to elicit self-perceptions in all children below age eight. It may not be until age nine that most children can make social comparisons based on personal
perceptions of ability (Silon & Harter, 1985). How age and development may affect the child with CD is in need of investigation.

The lack of suitable instrumentation for measuring psychological constructs in children with MR (Silon & Harter, 1985; Ulrich & Collier, 1990) has led to the need for construction of an instrument for measuring attributional beliefs of children with CD within a movement context. A new instrument was designed to test attributional beliefs in children with IQ scores below 80 (ages 8-12) (Kozub & Porretta, 1996). Although the MIARS and Effort/Ability Scale provide options for testing students with CD, the researcher believes that the use of the PAAQ pictorial representations (modified from Ulrich, 1988) in a manner similar to Ulrich and Collier is needed to assure understandability of test items when attempting to measure attributional beliefs in children with CD.

**Summary**

The review of literature provides tentative answers to some of the research questions of interest. The specific attributional profile of persons with CD is addressed in several studies, specifically Turner et. al. (1996) and Wehmeyer (1994) who indicate that persons with MR may bring a unique profile into the learning situation which in turn hinders the potential for success. Also, researchers such as Licht et. al (1985) indicate that the child with LD are also at risk to develop an external profile.

Success for the those with low IQ scores is hampered by limited task persistence following repeated failure on a task, which in turn may be a direct result of subjects viewing successful participation as luck or task ease. The
assumptions for the present study are further supported by a relationship between attributional profiles and task persistence found by Martinek and Griffith (1994), who demonstrated the consequence of decreased task persistence in non-disabled adolescents in the motor performance area. However, a key question of interest is the ability of the PAAQ to accurately predict task persistence so that future experimental designs can more accurately address attributional variables in persons with CD.
CHAPTER 3

METHODS

The purpose of this study is to investigate attributional beliefs and task persistence in children from three study groups. The first group is composed of children with cognitive disabilities (CD) who have IQ scores below 80. Also included in this study are two non disabled comparison groups made up of developmental age (6-8 year olds) peers (DA), and chronological age (10-12 year olds) peers (CA) without disabilities. The following chapter is divided into four sections. These sections include: sample, procedures, data analyses, and summary.

Sample

The target population consisted of children (with IQ scores below 80) educated in self contained special education classes from two Northeastern school districts. The study sample included a group of students with cognitive disabilities (CD) between nine years six months to twelve years six months of age. The target age range selected for the study was determined based on a preliminary investigation by Kozub and Porretta (1996). The study sample excluded any children with known physical disabilities or speech impairments.
The CD group was made up of children educated in self-contained placement options, and included those with IQ scores of approximately 40 to 79 points on a standardized intelligence test. Based on the Diagnostic and Statistical Manual of Mental Disorders IV (DSM IV) definition, most subjects from the self-contained classes include those with IQ scores that would make them eligible for classification as Mildly Mentally Retarded if deficits in adaptive behavior were also present (American Psychiatric Association, 1994). However, adaptive behavior scales were not found in many of the subjects' academic files so verification of classification was not possible in all cases.

Two comparison groups were selected. One comparison group included subjects of similar developmental age. This group is referred to as the DA group. Subjects in the DA group were between six and eight years of age and selected based on Francis and Rarick (1959) who indicate that those with MR are typically two to four years behind same age peers in motor development. A second comparison group was composed of subjects of similar chronological age. This group is referred to as the CA group. The selection pool of the two comparison groups came from the general education classrooms housed in the same buildings as subjects from the CD group.

Subjects for the study were selected using a convenience sampling method as described in Frankel and Wallen (1993). Subjects were drawn from the school districts until the desired number were identified (providing an equal proportion of males and females for each study group).
Attempts to equate groups by matching individual subjects was ruled out since attempts to match on categorical variables was problematic given that the initial pool of subjects with CD was not as large or heterogenous as the pool of those without disabilities. Therefore, no attempt was made to equate subjects from each group based on categorical variables. However, for each of the three groups, a stratification by gender was used so that each group approximated an equal number of males and females.

Written approval was secured from school building level administrators and teachers from the two target districts (Appendices C & D). Identification of the CD group and the two comparison groups were conducted simultaneously in an attempt to secure equal numbers for the three groups from the same schools. However, in the final sample, groups of equal numbers from each school were not possible given the reluctance of many parents of those with disabilities to allow their children to participate in the study. Participant consent forms (Appendix E) were distributed by teachers in their respective classes. Teachers sent consent forms home on two consecutive days and prompted potential subjects to return them over a 5 day period.

The sampling methods resulted in 91 suitable subjects (33 for the CA group, 33 for the DA group, & 25 for the CD group). Following attributional testing, approximately 20 subjects were identified from each group for the two motor tasks (total n = 61). The identification of those subjects for motor testing from the CA and DA groups was conducted using random selection (with stratification occurring by gender). For the CD group, a purposeful method of
selection was employed to identify suitable candidates for motor testing given the low number who fit study criteria. Figure 2 outlines the total sampling plan for the study.

Procedures

Attributional testing was conducted as subjects agreed to participate. Group identification was conducted as demographic data became available on subjects. Following sampling, a testing schedule was formulate by coordinating teacher schedules between districts so that each participant could be tested during three motor sessions on three successive days.

Two study designs were utilized to address the six research questions. First, a correlation design investigated criterion validity. Next, an Ex post facto design was utilized to investigate key variables for the three study groups. The grouping included participants with CD, participants of similar chronological age (without disabilities), and participants of similar developmental age (without disabilities). The variables that were investigated included attributional beliefs and task persistence to determine if group affiliation predicted higher scores. Finally, providing a sample that included equal proportions of male and female subjects and two comparison groups that differed in chronological age allowed for analyses into the relationship between these demographic variables and attributional beliefs.
Figure 2. Sampling plan for study.
Outcome Measures

The outcome measures consisted of instruments designed to measure attributional profiles, and two motor tasks to study persistence in persons with and without cognitive disabilities. The PAAQ (Appendices F & G) and the MIARS (Appendix H) were administered to all three groups prior to measuring task persistence. The reason for administering both scales to all subjects was to determine concurrent validity through correlational analyses. Task persistence was measured relative to the amount of time engaged in two motor tasks (gross and fine).

Attributional Beliefs

Two attributional scales were used in the present study. The attributional measures administered to the three study groups included the PAAQ and the MIARS. The following section addresses the reliability, validity, and suitability of these measures for the 91 subjects. Also included in the following section are the scoring procedures for each measure.

PAAQ. The PAAQ is designed to measure attributional beliefs in children with IQ scores below 80 (ages 8-13), while taking into account pitfalls that may have affected prior studies conducted by Turner et al. (1996) and Martinek (1992a) using the personal causality scores and the MIARS. The new instrument was designed to take into account the understandability of the items, as well as to include task specific physical activity items.

The Pictorial Scale of Perceived Physical Competence for Children with Mild Mental Retardation, constructed by Ulrich (1988) to test the construct of
perceived competence in children with MR (ages 8-12), was used as a basis to develop the PAAQ (see Appendix I for author's permission). Construction of the PAAQ began by using the 10 items plus the sample item from the perceived competence scale constructed by Ulrich and Collier (1990). These 11 illustrations were combined with 5 new items. Following preliminary study, 14 of the 16 PAAQ items were retained for further study (see Appendix J for item coefficients). These items include competent and noncompetent scenarios for batting, bike riding, jumping, jump rope, swimming, running, dribbling, shooting, throwing, picking teams, games, catching, swinging, and winning.

In constructing the PAAQ, introductions were also used from the perceived competence scale that began with the question: "Which (boy/girl) are you most like?." The child was then asked to select one of the two pictures as is the case for the perceived competence scale (Ulrich & Collier, 1990). The PAAQ differs from the perceived competence scale by asking the subject to select from two statements following the question: "You are like the boy in the picture because . . . " (see Appendices F & G for attributional statements). The attributional statements for the levels of competence depicted an internal and external rationale for personal level of achievement of the task. The statements were constructed to anticipate possible responses or rationales for the outcomes based on age of the respondent, as well as cognitive levels. For example in the bike riding item, competence could be attributed to adequate "practice" or having "a good bike to ride."
statements used to depict internal control in the PAAQ represent the concept of adequate practice or effort when completing the task. This was done in order to take into account the lack of distinction between effort and ability for persons below the mental age of nine (Nicholls, 1978).

PAAQ directions were read to each subject from a script (Appendix F & G). The PAAQ testing was presented to the participant as a "game." Flash cards (Appendix K), part of the PAAQ protocol, allowed the tester to show the representation to the subject without exposing attributional statements. The subject was asked to pick the picture which is "most like you," and then asked to choose between two attributional statements. The directions included a prompt for the subject to choose only after both responses were read.

Presentation of the 14 PAAQ items was done in a scripted order, with a subject receiving only the responses on the back of the chosen card. Following selection, the card not chosen was placed out of view. The subject was not allowed time to deliberate between responses, and only the first selection was used for scoring. Scoring for the PAAQ is outlined in the "Scoring of Questionnaire" section of Appendices F & G.

Face validity was established in construction of the PAAQ. This component of content validity was established via a panel of experts as suggested by Kerlinger (1973). The panel consisted of five professionals. First; Dr. Ulrich, from Indiana University was selected based on his development of the original perceived competence scale (modified for construction of the PAAQ). Second; Dr. Lisa Turner, University of South
Alabama was selected given her extensive study of attributional beliefs and strategy training in individuals MR. Three Adapted Physical Education (APE) specialists, teaching in the field, were selected based on the criteria of teaching experience and background. One panel expert taught in the Mental Retardation/Developmental Disability program in the city of Canton, Ohio and the other two experts were from a local school district in Columbus, Ohio. The two experts from the local school district taught APE to children with MR. These three practitioners were selected to determine whether or not the test items were understandable by children with CD. The day-by-day contact that these experts had with children possessing MR provided the insight needed to critique the verbal and pictorial representations.

Preliminary testing on 86 children with low IQ scores (below 80) resulted in a test-retest reliability coefficient of .76 (Kozub & Porretta, 1996). These results (for the 14 retained items of the PAAQ) indicated a “very strong association” (Davis, 1971) between testing sessions. The coefficient for the PAAQ was found to be higher than the 40 item Nowicki-Strickland measure of locus of control for children without disabilities of the same age group (Nowicki & Strickland, 1973). Also, the test-retest coefficient obtained for the PAAQ was comparable to the .77 reliability estimate attained for the perceived competence scale used by Ulrich and Collier (1990) on students of similar age and characteristics to the preliminary study sample.

Also included in the preliminary study by Kozub and Porretta (1996) was an attempt to further establish the validity of the PAAQ by examining the
underlying structure of these data. A principal components analysis of PAAQ scores from a preliminary study are included in Appendix L. The analysis demonstrates an underlying structure consistent with identifiable attributional elements (Kozub & Porretta, 1996).

Suitability of the PAAQ for children with low IQ scores (ages 8-13) was established in the preliminary study by Kozub and Porretta (1996) since all 86 subjects who were tested understood the scale protocol. The generalization of factors related to test appropriateness of the PAAQ for the DA group is based on similar cognitive and motor functioning between persons ages 10-12 with mild MR to those without disabilities between the ages six to eight (Rarick, 1980).

**Modified Individual Achievement Responsibility Scale.** The Modified Individual Achievement Responsibility Scale (MIARS) (Appendix H) is an attributional scale developed by Martinek (1992b) and was used in a similar study. However, the Martinek and Griffith (1994) sample included only students without disabilities from two age groups. The scale was selected given the task specific content related to physical activity.

The MIARS was constructed by Martinek (1992a) by modifying the Intellectual Achievement Responsibility Scale (IARS) developed by Crandall et al. (1965). The MIARS contains 20 items that are categorized as either success or failure. Each item has two forced responses that are read to the subject along with item statements. High scores (or internal attributions) are determined by selecting statements that reflect a mastery-oriented profile;
where the respondent takes responsibility, not blame for the outcome
(Martinek & Griffith, 1994).

Scoring for the MIARS is similar to the PAAQ in that internal responses
are awarded higher point values than external responses. However, the
MIARS does not provide different levels of competence for each item as is the
case for the PAAQ. For the MIARS, subjects who select a response that
reflects a mastery oriented profile are awarded one point for the particular item
(Martinek & Griffith, 1994). Appendix H indicates the mastery oriented choices
in bold and italic for each item. A maximum score of twenty possible points
can be attained for the selection of all mastery oriented responses on the
twenty items.

Martinek (1992b) established reliability in the MIARS by demonstrating
internal consistency for three age groups (second, fourth, and sixth grade
subjects). Alpha scores were .82, .88, and .89 for three groups, respectively.
The obtained alpha coefficients indicate that each of the items are correlated
with the others and therefore subjects selected responses reliably across items
during testing.

The study by Martinek and Griffith (1994) indicates that the MIARS is a
valid predictor of task persistence for older (middle school age) non-disabled
students. However, younger age participants could not be differentiated by
profile in relation to persistence at motor tasks by the MIARS. Martinek and
Griffith suggest that the external profile in the younger subjects may not have
the same effect (low persistence) as on the older adolescents. Martinek and
Griffith indicated that "... learned-helplessness may become more crystallized by the time students enter their middle school years" (p. 119). This would explain why the older subjects could be identified by the MIARS, while the younger subjects could not. A rival hypothesis for the results could be the lack of understanding of the questions by the younger subjects, and for this reason the PAAQ was constructed using a pictorial format.

**Task Persistence**

Task persistence was measured by having subjects perform two motor tasks. The gross motor task consisted of a game referred to as "Stabiball," manufactured by Palos Sports Inc. (12235 South Harlem Ave. Palos Heights, IL 60463) (Appendix M), while the fine motor task was a stationary game referred to as "Labyrinth," manufactured by "Back to Basic Toys' (Agoura Rd., Westlake Village, CA 91361-4639) (Appendix N).

**Gross Motor Task.** Stabiball (balancing task) was administered to 61 select subjects (who completed attributional testing). This included 20 DA, 21 CD, and 20 CA subjects. Stabiball consists of a board with a maze imbedded on the top section in view of the subject. The goal of the activity is to stand on the game and attempt to maneuver a ping pong size balls through the maze to a spot in the center of the board. A target age of seven and older is identified by the manufacture for the Stabiball apparatus.

**Fine Motor Task.** A fine motor task was also administered to each of the 61 subjects. The fine motor task is a game found in many hobby shops and is referred to as "Labyrinth." The object of "Labyrinth" is to use two levers
to rotate an 18" square board to move a marble through a maze (Appendix N). Holes are placed in the board to allow the marble to drop through the top. Subjects can attain a maximum score by maneuvering the ball along the maze path, without allowing the ball to drop through the holes.

**Conditions of Testing**

The conditions of testing refer to the contexts for administration of the attributional scales (PAAQ & MIARS) and the motor tasks (Stabiball & Labyrinth). Attributional data where collected on all subjects first, and motor testing followed using a select group of subjects.

**Attributional Testing**

All testing was conducted at each subject's respective school. Attributional measures were administered individually to all 91 subjects on two separate sessions, with the PAAQ administered first. The PAAQ and the MIARS were both read to participants by the investigator, and administered as outlined earlier in this report. Reading the items to the respondents is consistent with procedures outlined by Martinek and Griffith (1994; 1995) and Kozub and Porretta (1996). The attributional testing involved 10 minutes per test for each subject. Directions for the administration of the PAAQ are included in Appendices F & G, and for the MIARS in Appendix H.

**Motor Tasks**

The two motor tasks were administered on an individual basis in a quiet area (e.g., classroom or stage area). Availability of space in each school dictated the site for the administration of both motor tasks. Given the potential
variability in performance of many subjects with CD, three sessions were conducted for each participant (Rarick, 1980). The researcher randomly administered one of the two tasks on session one using a set protocol. The two motor tasks were then counterbalanced for each successive session to account for any reactive arrangements of the tasks using the protocol contained in Appendix O.

Principal data collection and pilot study for the two motor tasks were video taped. A camcorder was set up in the testing area in plain view of subjects. The recording was able to capture the entire data collection session without the researcher having to maneuver the camera. This was accomplished using a tripod and a wide angle lens. The position used for video recording allowed for viewing the ball in both tasks, and allowed for audio recording of the subjects’ comments. Other than the researcher and the subject no one else was present during the data collection.

**Pilot Study.** Pilot work was conducted for the two motor tasks following attributional testing. Two subjects were children labeled LD (age 10). The four remaining subjects consisted of non disabled children (two age 10, and two age 6). A pilot study was used to ascertain which measure (number of trials per session or time on task) would provide the most suitable indicator of task persistence. Based on the data included in Appendix P, total time engaged in the task was the best measure for the six subjects tested during pilot study.
Following pilot work, a decision was made to alter the Stabiball task by drilling holes into the board to allow the ball to drop through and, therefore, end the trial. The reason for this stemmed from the subjects being able to balance on the board but not move the ball closer to the center and subsequently prolong the task without completing the game. This prolonged participation was felt to contaminate the trial since some subjects appeared to be attempting to solve the task; while others appeared to be off task, and simply watching the ball roll without trying to complete the maze. The modification made the task more difficult (since subjects now had to avoid the holes), and also helped standardize the difficulty level so that subjects could not readily complete the modified game.

**Scoring and Length of Sessions.** Each subject was given a maximum of 10 minutes per task on three separate sessions. The 10 minute time limit per task was decided on following pilot study on a select group of six participants (two from each study group). Instructions were given to each subject prior to the task as outlined in Appendix O. Participants were allowed to move on to the next task at anytime during the 10 minute session.

For scoring of task persistence (time engaged), the investigator began the timed session by telling the participant “go.” The timed session ended upon the completion of the last trial prior to the subject’s request to end the session. If the subject did not end the session before 10 minutes, the investigator ended the session and a score of 600 seconds was recorded.
The mean number of seconds for the three trials was recorded as the persistence score for each task.

**Prompting During Motor Testing.** At no time during any of the motor tasks did the investigator provide any type of positive feedback for task completion. However, general feedback relative to the task rules were needed to help lower functioning subjects from erroneously perceiving success at the task due to not following the rules. In some instances, when subjects did not follow the rules it made tasks easier and increased the likelihood that a trial would result in a form of success. Since the intent of this research is to study attempts after failure, any situation that made the task easier (such as changing the rules of the game) was prevented by prompting the child to follow the objective of the game within the rules. If the child was to forget the rules and perceive success (even though the game protocol was not adhered to), this may confound the data. This was especially true for the Stabiball task since “popping” the ball in the air and not following the maze made the task attainable to even the lowest skilled subjects. Following the rules was a factor for the children with low IQ scores especially, since remembering the rules may not be as easy for these participants with disabilities.

At the five minute mark all participants were given a repeat of the prompt which stated: “Remember, it is OK to stop when you don’t want to play anymore.” This prompt was added following the pilot study, which indicated that a number of subjects were unclear as to how to terminate the session. The younger subjects and those with disabilities especially appeared to have
difficulty understanding the initial prompt (describing how to end the session). This was supported by questions (by subjects) during pilot work such as: “do I have to play till I finish.” Quitting without penalty was a key factor in this present study since students with disabilities (especially those with low IQ) are more susceptible to the perceived expectations of the program leader (Silon & Harter, 1985). Also, if students had the perception that the task must be completed to attain a reward or avoid a consequence, a potential contaminant is present in the results. The students’ perceptions of what would lead to negative or positive reinforcement from the experimenter was alleviated by reinforcing who controlled the amount of persistence (the subject).

**Procedural Checks and Inter-Observer Agreement.** Final scoring for task persistence and adherence to study protocol was examined using an independent observer. A random number of five cases (n = 15) were selected from each group for procedural checks. All three motor sessions were rated and scored for these 15 cases. The independent observer was not given any information on research questions in an attempt to maintain objectivity. However, the observer was trained relative to the timing procedures and the testing protocol. Appendix Q outlines the procedural checks for the present study. Procedural checks examined the reliability of scores, and the integrity of administration of motor sessions. Intra scorer reliability was set at .80 (Pearson r) as an acceptable minimum criteria for the seconds engaged. Also, 90 percent agreement was the level of acceptable adherence to the protocol for the present study relative to the procedural checks.
Data Analyses

Analysis of data to answer the research questions included preliminary examination relative to the means and frequency distributions of scores. Concurrent validity and reliability of the PAAQ were examined using correlational techniques. Group differences in attributional beliefs were analyzed using multiple regression (PAAQ scores) and a one way ANOVA (MIARS scores). Further multiple regression analyses were used to analyze task persistence on both fine and gross motor tasks.

Preliminary Data Analyses

All data were analyzed using SPSS software. SPSS software equipped with a command (EXPLORE) allows for initial descriptive data to be analyzed relative to means, standard deviations, frequencies, and probability plots. The "EXPLORE" command was utilized on attributional testing and persistence data for the present study. Also, included in the preliminary analysis was an intra group analysis of the CD group relative to IQ scores of those labeled MR compared to those labeled LD. Finally, the gender composition of the sample was analyzed using Chi Square.

Concurrent Validity and Reliability

Concurrent validity was determined by comparing scores obtained on the PAAQ to the MIARS, using a Pearson r correlation. The analyses were conducted for each group (CA, DA, & CD) and for the entire sample of 91 subjects. Chronbach's alpha was used to confirm reliability in the 14 item PAAQ for the 91 subjects used for attributional testing.
Group Differences

Group differences in attributional scores were determined using two statistical techniques. The first technique consisted of multiple regression. The second was a one way ANOVA calculated on MIARS scores. For the PAAQ scores, a hierarchical regression model was used. Group affiliation was entered first using two dummy coded variables. Two variables were constructed as recommended by Hair et al. (1995) where the number of variables equal the total number of groups minus one. A decision was made prior to analysis to construct the dummy coded variables using the CA and DA affiliation as the groups receiving "one" for the variables. The decision to place CD group affiliation in the constant was made based on attributional study that places those with low IQ scores at risk to develop a highly external profile (Turner et al., 1994; Turner et. al., 1996; Wehmeyer, 1994).

MIARS scores were analyzed using a one way ANOVA (group X scores). A Sheffe post hoc analysis was then used to determine which groups differed significantly from each other. Level of significance was set at $p \leq .05$ for the ANOVA analysis. The decision to use an ANOVA to analyze MIARS scores separate from PAAQ scores was to help validate results that place those with CD at risk to display an external profile when compared to non-disabled peers.

Predictive validity for the PAAQ and group differences in task persistence were determined by using a hierarchical three step multiple regression model. Separate multiple regression analyses were calculated from
the Labyrinth and the Stabiball scores to determine if the results relative to persistence remained constant across tasks.

Summary

The methods identified in chapter three are proposed to answer the research questions stated in chapter one. The descriptive techniques helped explore and describe attributional profiles and task persistence for the three study groups as well as determine the criterion validity of the PAAQ for the present sample. Furthermore, multiple regression and analysis of variance determined if group affiliation was related to attributional beliefs in the present sample. Finally, multiple regression analyses determined the amount of variance explained in task persistence (gross and fine motor) by group affiliation.
CHAPTER 4

RESULTS AND DISCUSSION

Chapter four focuses on the presentation of results and discussion. The results section is divided into the following areas: demographic data, procedural integrity and inter-observer agreement, plotting key variables, attributional testing, and task persistence. The discussion section addresses PAAQ reliability, validity, group differences in attributional beliefs, generalization of PAAQ results, unique profile in the motor area, and rival hypotheses. Finally, a summary of the chapter is presented.

Results

Demographic Data

Demographic data were obtained on all 91 subjects and consisted of age, gender, and IQ scores (CA & CD only). Also, included in the demographic data are educational labels for all CD subjects and adaptive behavior scores (for a portion of the CD group).

Tables 1 and 2 show that the CD group had a mean age that was within one year of the CA group. Differences in chronological age between the DA group and the other two groups ensured that the DA group was significantly
different from the CA group relative to developmental age. These differences were part of the study design which allowed for inferences relative to the developmental profile of subjects in the CD group.

Attempts to match groups based on gender were only partially successful since the gender composition in Tables 1 and 2 indicated that fewer females were assigned to the CD group. However, a Chi Square analysis indicated that the proportionate differences in the gender composition of the three groups were not significant (Chi square = p > .05) for attributional or task persistence testing.

**Chronological Age Peers.** The 33 CA subjects who completed attributional testing had a mean age of ten years nine months (Table 1); and the subgroup from this sample who completed the motor tasks had a mean age of ten years eight months (Table 2). Further descriptive data indicated that a mean IQ of 111.7 was found in those subjects who were used for attributional testing (Table 1); and, a mean IQ of 108.9 (Table 2) was found in the subgroup of CA subjects who completed both attributional testing and the two motor tasks (n = 20). Also, IQ data were missing for several CA subjects due to these students recently having arrived in the school district from outside the state of New York. Females and the males did not differ significantly on age or IQ for the CA study group (p > .05).

Missing data were a problem for the CA group relative to IQ scores. To compensate for missing IQ data, teacher appraisals were used relative to the academic functioning of subjects. Only one general education subject was
<table>
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<th>CA Group</th>
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</tr>
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<td>53</td>
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</tbody>
</table>

CD = cognitive disability, DA = developmental age peers, and CA = chronological age peers, SD = standard deviation

Note. IQ scores were not available for the DA group and five CA subjects.

Table 1: Descriptive data for all three groups (CA, DA, CD) of subjects who completed attributional testing: age, gender, and IQ scores (n = 91).
<table>
<thead>
<tr>
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<th>CD Group</th>
<th>DA Group</th>
<th>CA Group</th>
<th>Total</th>
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</tr>
</tbody>
</table>

CD = cognitive disability, DA = developmental age peers, and CA = chronological age peers, SD = standard deviation

**Note.** IQ scores were not available for the DA group and three CA subjects.

Table 2: Descriptive data for all three groups (CA, DA, CD) of subjects selected for motor testing: age, gender, and IQ scores (n = 61).
eliminated from the CA group based on academic profile. Subject 259 was dissimilar from all other CA subjects [i.e., in that he was a new student in the school district (this year), displayed low achievement in class, and attended special remedial reading classes]. Appendix R indicates the identification number, group, and rationale for elimination of subjects.

Six subjects identified for the CA group were involved in gifted programs and had IQ scores that were above 120. Stratification (based on IQ) was conducted for the selection of subjects for motor tasks. Although all subjects were included in attributional testing only two of these six (identified as high IQ subjects) were selected (one male and one female) for motor testing. This ensured that a disproportionate number of high IQ subjects did not pose a rival hypothesis to the final results. Bogie and Buckhalt (1987) did not find significant differences across attributional responses between those labeled “gifted,” “typical,” and MR. For this reason, stratification was only conducted for motor testing. Random selection was used to identify 18 subjects from the remaining 27 CA participants (not included in gifted programs). The stratification by intelligence scores accounts for the differences in IQ for the two phases of the study.

Developmental Age Peers. IQ scores were not available for the DA group since New York State does not conduct intelligence testing on children until the end of the 2nd grade. Table 1 indicates the gender composition of the sample that completed the attributional testing for the DA group. Table 2 depicts the gender composition of the subgroup selected for the motor testing
from the developmental age peers who completed attributional testing (n = 33). The mean age of the DA (Table 1) group was seven years one month for the attributional testing and seven years two months for the subgroup selected for motor testing (Table 2). A final note on the DA comparison group is that following motor testing, data from one female subject was discarded (rationale included in Appendix R).

**Cognitive Disability Group.** From the 28 subjects with disabilities who completed attributional testing, data from three of these subjects were removed prior to attributional analyses due to LD labels and an IQ composite score that indicated near “average” intelligence (above 80). The criteria level of 80 was identified based on the use of this level by many states as the cut-off point for those who are eligible for the LD classification as opposed to the MR classification. Demographic data on the remaining 25 CD subjects (selected for attributional testing) is presented in Appendix S.

As was outlined in the methods section of this report, a subgroup of 21 CD subjects were used for the task persistence analyses. The selection of subjects to complete the motor tasks was purposeful. Initially, all suitable CD subjects (based on educational label, placement, and IQ) were to be tested to control for educational label (LD or MR). However following a pilot study, only 23 subjects remained for motor testing. In addition, two subjects (a male and a female) were absent from school over a two week period due to illness which left 21 suitable CD subjects for task persistence testing.
The gender composition of the CD group, as indicated in Tables 1 and 2, favored male participants. The over representation of male subjects is indicative of the higher percentage of boys enrolled in special education programs (Frankenberger & Fronzaglio, 1991).

Subjects for the CD group possessed IQ scores of 40 - 79 (Appendix S). This included six subjects classified as LD and fifteen classified as MR. A t-test analysis indicated that no significant differences were present between the LD sub group classified by the school district from those classified as MR relative to IQ scores ($t = -1.57; p = > .05$). A final note in relation to IQ scores is that not all subjects were measured on intelligence using the same instrument due to differences in testing between the two districts from which the sample was drawn (Appendix S). Also, three subjects had no IQ scores in their files. Instead, achievement test scores (Koffman Teacher Achievement Test) were substituted for missing IQ data. These missing data were a reflection of the school district's reluctance to allow the researcher access to district level files. Building level files were used exclusively to access demographic data on CD subjects. A meeting with the school psychologist revealed that the achievement test scores for those subjects with missing data were similar (in her opinion) to the actual IQ scores for the particular child in question.

Procedural Integrity and Inter-Observer Agreement

Procedural integrity was assessed by having a trained observer view a random sample of the video taped task persistence sessions. This included a
random sample of five subjects from each study group (selected from the total
n = 61 who completed all phases of the study). Inter-observer agreement was
established using a Pearson r correlation between the investigator’s scores
and those recorded by the independent observer relative to task persistence.

A checklist was used to assess procedural integrity, and can be found
in Appendix Q. Along with the rating sheet and 12 hours of video tape from
the random group of subjects (n = 15), the independent observer was provided
training in reference to the tasks and the format of data collection. However,
no information was provided to the independent observer relative to the study
groups and the research questions. The procedural checks of investigator
objectivity ranged from 93% to 100%. Specific results from the procedural
integrity analyses are included in Appendix Q.

The analysis of inter-observer agreement included a Pearson r
coefficient calculated from the mean motor persistence scores (gross and fine)
of the investigator and independent observer. A Pearson r coefficient of .99
was recorded for gross motor task persistence scores and a Pearson r
coefficient of .95 was recorded for fine motor task persistence scores. The
results of the procedural checks and subsequent analyses demonstrated that
these data are free of bias relative to the scoring/timing procedures and
protocol used by the experimenter (as reflected in the questions found in
Appendix Q).
Plotting Key Variables

The key variables included PAAQ scores, MIARS scores, gross motor task persistence, and fine motor task persistence. For each of these variables, normal probability plots were generated using SPSS software (Appendix T). The probability plots of PAAQ and MIARS scores demonstrate that for the 91 subjects used for attributional testing, data approximated a normal distribution. Probability plots on task persistence were generated on data from 61 subjects who completed the motor tasks. These plots also approximated a normal distribution (Appendix T).

Attributional Testing

Attributional testing was examined relative to four areas. These included initial scale totals (for the PAAQ & MIARS) and item means for the PAAQ, reliability analysis of PAAQ, concurrent validity, and group differences (in PAAQ & MIARS scores).

Attributional Scores. Mean PAAQ and MIARS demonstrate similar findings. For both attributional measures, the CA group scored higher than either the DA or CD groups. However, as indicated in Table 3, the relative position of the CD and DA groups changed with respect to the two attributional measures. For the PAAQ, the CD group selected the lowest number of internal statements relative to the 14 items. In relation to the MIARS, the CA and CD groups scored higher than the DA group.

PAAQ item means and standard deviations are included in Table 4. These item means reflect the subject’s selection of not only attributional
<table>
<thead>
<tr>
<th></th>
<th>CD Group</th>
<th>DA Group</th>
<th>CA Group</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PAAQ</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mean</strong></td>
<td>2.83</td>
<td>2.96</td>
<td>3.50</td>
<td>3.10</td>
</tr>
<tr>
<td><strong>SD</strong></td>
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<td>.37</td>
<td>.39</td>
<td>.47</td>
</tr>
<tr>
<td><strong>n</strong></td>
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<td>33</td>
<td>33</td>
<td>91</td>
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<tr>
<td><strong>MIARS</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>10.2</td>
<td>14.6</td>
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</tr>
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<td><strong>n</strong></td>
<td>25</td>
<td>33</td>
<td>33</td>
<td>91</td>
</tr>
</tbody>
</table>

CD = cognitive disability, DA = developmental age peers, and CA = chronological age peers, SD = standard deviation

**Note.** PAAQ score is computed by dividing the sum of all 14 items (1 - 4 points), while the MIARS mean score is computed by the sum total of all mastery choices (out of 20 items) selected. In both cases higher scores indicate superior attributional profiles.

Table 3: Mean scores by group affiliation using the PAAQ and MIARS.
statements (Appendices F & G), but also level of competence. Each item is scored using the following point values: 1 (external/ noncompetent), 2 (internal/ noncompetent), 3 (external/ noncompetent), and 4 (internal/ competent).

**Reliability Analysis of PAAQ.** A Chronbach's alpha was calculated on 91 retained subjects for the 14 item PAAQ. This resulted in a significant Alpha coefficient of .73 (p < .0001). The Alpha coefficient indicated that the 14 item PAAQ has internal consistency for the sample.

**Concurrent Validity.** Table 5 demonstrates significant correlation coefficients relative to scores on the PAAQ and MIARS (r = .66) for the entire sample (n = 91) as well as for subjects in each of the three groups. Appendix U contains a scatter plot of the total sample scores relative to the PAAQ and the MIARS. The scatter plot demonstrates that a linear relationship exists between the two scales, and satisfies the assumption for using Pearson r on interval data (Hopkins et al., 1987).

**Group Differences.** A multiple regression analysis was performed to determine if group affiliation and gender explained variance in PAAQ scores. Inspection of plots associated with the residuals provided no evidence that the assumptions of normal distribution, auto correlation, and constant variance were being violated (Appendix V). Also, the Durbin Watson statistic (2.06) indicates that residuals were independent of error associated with observations. Tolerance and VIF statistics indicate that multicollinearity may be a problem relative to the variables of age (VIF = 8.1) and DA (VIF = 10.1).
<table>
<thead>
<tr>
<th>Item</th>
<th>CD</th>
<th>DA</th>
<th>CA</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Item 1</td>
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<td>3.10</td>
<td>3.50</td>
<td>3.10</td>
</tr>
<tr>
<td></td>
<td>1.60</td>
<td>1.10</td>
<td>.87</td>
<td>1.70</td>
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<td>2.60</td>
<td>2.40</td>
<td>2.90</td>
</tr>
<tr>
<td></td>
<td>.96</td>
<td>.97</td>
<td>1.00</td>
<td>1.10</td>
</tr>
<tr>
<td>Item 3</td>
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<tr>
<td></td>
<td>.70</td>
<td>.91</td>
<td>1.00</td>
<td>.94</td>
</tr>
<tr>
<td>Item 4</td>
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<td>2.80</td>
<td>2.90</td>
<td>3.10</td>
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<td>3.70</td>
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<td>.86</td>
<td>.74</td>
<td>.80</td>
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<tr>
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<td>1.10</td>
<td>1.30</td>
<td>1.10</td>
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<tr>
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<td>3.70</td>
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</tr>
<tr>
<td></td>
<td>1.40</td>
<td>1.20</td>
<td>.90</td>
<td>1.20</td>
</tr>
<tr>
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<td>3.70</td>
<td>3.60</td>
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<tr>
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<td>1.00</td>
<td>.91</td>
<td>.98</td>
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<td></td>
<td>1.30</td>
<td>1.10</td>
<td>.93</td>
<td>1.10</td>
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<td>3.90</td>
<td>3.70</td>
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<tr>
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<td>.67</td>
<td>.54</td>
<td>.76</td>
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<td></td>
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<td>1.00</td>
<td>1.10</td>
<td>1.10</td>
</tr>
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<td>3.40</td>
<td>2.90</td>
</tr>
<tr>
<td></td>
<td>1.00</td>
<td>1.10</td>
<td>.93</td>
<td>1.10</td>
</tr>
</tbody>
</table>

SD = standard deviation, CD = cognitive disability, DA = developmental age peers, and CA = chronological age peers

Table 4: Means and standard deviations of all fourteen PAAQ items across the three groups (CD, DA, CA) (n = 91).
<table>
<thead>
<tr>
<th></th>
<th>MIARS Total (n = 91)</th>
<th>MIARS CD (n = 25)</th>
<th>MIARS DA (n = 33)</th>
<th>MIARS CA (n = 33)</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAAQ Total (n = 91)</td>
<td>.66 (p &lt; .001)</td>
<td>------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>PAAQ CD (n = 25)</td>
<td>------</td>
<td>.45 (p = .01)</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>PAAQ DA (n = 33)</td>
<td>------</td>
<td>------</td>
<td>.38 (p = .01)</td>
<td>------</td>
</tr>
<tr>
<td>PAAQ CA (n = 33)</td>
<td>------</td>
<td>------</td>
<td>------</td>
<td>.52 (p &lt; .001)</td>
</tr>
</tbody>
</table>

CD = cognitive disability, DA = developmental age peers, and CA = chronological age peers

Table 5: Correlation coefficients depicting the relationship between the MIARS & PAAQ for all 91 subjects as well as for subjects in each of the three groups.

Removal of age as a variable in the model eliminated the problem of multicollinearity. However, removal of age as a predictor variable did not affect the overall regression model relative to R². Since the elimination of age did not change the results (and to avoid specification error), the decision was made to keep “age in months” as a variable in the overall equation (Hair et. al., 1995). Summary data for the criterion and predictor variables are included in Table 6.

The regression of PAAQ scores on select independent variables is included in Table 7. A two step hierarchical multiple regression model was used with group affiliation (dummy coded as CA and DA) entered first followed
<table>
<thead>
<tr>
<th>Variables</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
<th>Y</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA (X1)a</td>
<td>1.0</td>
<td>-.57</td>
<td>-.12</td>
<td>.40</td>
<td>.58</td>
<td>.36</td>
<td>.48</td>
</tr>
<tr>
<td>DA (X2)a</td>
<td>1.0</td>
<td>.02</td>
<td>-.92</td>
<td>-.24</td>
<td>.36</td>
<td>.48</td>
<td></td>
</tr>
<tr>
<td>Gender (X3)a</td>
<td>1.0</td>
<td>-.005</td>
<td>.026</td>
<td>.50</td>
<td>.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age (X4)</td>
<td>1.0</td>
<td>.16</td>
<td></td>
<td></td>
<td>114.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>PAAQ (Y)</td>
<td>1.0</td>
<td></td>
<td></td>
<td></td>
<td>3.1</td>
<td>.48</td>
<td></td>
</tr>
</tbody>
</table>

**Note.** CA, CD, and gender were entered into the equation using dummy coding. For CA, chronological age peers = 1 and other subjects = 0. For DA, subjects from developmental age peer group = 1 and others = 0. For gender males = 1 and females = 0.

Table 6: Summary data for regression of PAAQ scores on group affiliation, gender, and age (n = 91).
by gender and age. The multiple regression analysis demonstrated that a linear combination of group affiliation, gender, and age accounted for 36% (p < .0001) of the variance in the data set (Table 7).

MIARS scores resulted in significant group differences for the three study groups (F = 36.9; p < .001) (Appendix W). A Scheffe post hoc analysis demonstrated that those subjects from the CA group outscored the other two groups. For MIARS scores, those subjects that make up the CD group outscored the DA group. However, the differences were not significant.

**Task Persistence**

Separate multiple regression analyses were conducted on gross motor persistence (Stabiball) and fine motor persistence (Labyrinth). Task persistence results for the sample as well as group means are presented in Table 8.

**Gross Motor Persistence Scores.** The results in Table 8 demonstrate that the CA and DA groups had higher mean scores than the CD group relative to time engaged in the Stabiball task over the three ten minute sessions. The significance of these results were tested using a hierarchical three step regression model. PAAQ scores were entered first, followed by group affiliation. Finally, in step three, gender and age were entered. A multiple regression analysis was calculated with the raw scores of mean seconds engaged as the criterion variable. However, using the mean from engaged time resulted in a violation of the assumptions of constant variance and independence of residuals from predicted values. For this reason, a decision
<table>
<thead>
<tr>
<th>Variables</th>
<th>Step 1</th>
<th>Full Model</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>b</td>
<td>t</td>
</tr>
<tr>
<td>Group Affiliation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CA</td>
<td>.64</td>
<td>6.22</td>
</tr>
<tr>
<td>DA</td>
<td>.13</td>
<td>1.23</td>
</tr>
<tr>
<td>(Constant)</td>
<td>2.83</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td>1.24</td>
</tr>
<tr>
<td>Age (Constant)</td>
<td>.003</td>
<td>.62</td>
</tr>
</tbody>
</table>

Step 1: $R^2 = .35; F = 23.25; p < .001$
$R^2$ change (Gender, age): $R^2$ change = .01; $F = .93; p = .40$
Full Model: $R^2 = .36; F = 12.07; p < .0001$

$b =$ Regression Coefficients, $t =$ partial t-value, and $p =$ level of significance

**Note.** CA, CD, and gender were entered into the equation using dummy coding. For CA, chronological age peers = 1 and other subjects = 0. For DA, subjects from developmental age peer group = 1 and others = 0. For gender males = 1 and females = 0.

Table 7: Regression of PAAQ scores on group affiliation (CA, DA, & CD), gender, and age (n = 91).
was made to transform the dependent variable using the square root of the mean seconds engaged as recommended by Hair et al. (1995).

The regression analysis of transformed gross motor persistence scores on PAAQ scores, group affiliation, gender, and age satisfied all assumptions related to residuals. Appendix X demonstrates that these data have residuals with a mean of zero, homogeneity of variance, and normal distribution. The Durbin Watson statistic (1.51) indicates that the residuals do not fall below an acceptable level of autocorrelation.

Table 9 contains the summary data relative to the means and correlations of the variables contained in the multiple regression equation. A visual inspection of these data indicate high intercorrelations not only between predictor and criterion variables, but between independent variables as well. This is particularly evident in the dummy coded variables identifying group affiliation and age. A reminder at this point is that age was a factor used to form comparison groups and, therefore some multicollinearity was likely between predictor variables.

Multicollinearity is present in the regression model (as indicated in Table 9). However, tolerance and VIF statistics fall below an acceptable level based on Hair et al. (1995), and do not indicate that substantial collinearity is present (Appendix X). Table 10 presents data on the three step hierarchical model. The first step in the regression model demonstrates that PAAQ scores are significantly correlated to gross motor task persistence.
<table>
<thead>
<tr>
<th></th>
<th>CD (n = 21)</th>
<th>DA (n = 20)</th>
<th>CA (n = 20)</th>
<th>Total (n = 61)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Gross Motor</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Persistence</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mean</td>
<td>146</td>
<td>389</td>
<td>400</td>
<td>309</td>
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<tr>
<td>standard deviation</td>
<td>106</td>
<td>167</td>
<td>166</td>
<td>188</td>
</tr>
<tr>
<td><strong>Fine Motor</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Persistence</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>mean</td>
<td>170</td>
<td>356</td>
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<td>standard deviation</td>
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<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td><strong>Persistence</strong></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>mean</td>
<td>316</td>
<td>745</td>
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<td>601</td>
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<tr>
<td>standard deviation</td>
<td>208</td>
<td>327</td>
<td>328</td>
<td>354</td>
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CD - cognitive disability group, DA - developmental age group, and CA - chronological age peer group

Table 8: Means and standard deviations of both gross and fine motor persistence scores (seconds per session) for all three groups (CD, DA, CA).
<table>
<thead>
<tr>
<th>Variables</th>
<th>X1</th>
<th>X2</th>
<th>X3</th>
<th>X4</th>
<th>X5</th>
<th>Y</th>
<th>Mean</th>
<th>SD</th>
</tr>
</thead>
<tbody>
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<td>PAAQ (1)</td>
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<td>.48</td>
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<td>-.08</td>
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<td>.33</td>
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<td>.47</td>
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<td>Gender (X4)</td>
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<td>.02</td>
<td>.51</td>
<td>.50</td>
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<td>16.5</td>
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</table>

Note. CA, CD, and gender were entered into the equation using dummy coding. For CA, chronological age peers = 1 and other subjects = 0. For DA, subjects from developmental age peer group = 1 and others = 0. For gender males = 1 and females = 0.

Table 9: Summary data for regression of (square root transformed) gross motor persistence scores on PAAQ, group affiliation (CA, DA, & CD), gender, & age (n = 61).
<table>
<thead>
<tr>
<th>Variables</th>
<th>Step 1</th>
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<th></th>
<th></th>
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<th></th>
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<th>Full Model</th>
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Step 1: $R^2 = .14$; $F = 9.69; p < .01$
Step 2: $R^2$ change(PAAQ, CA, DA): $R^2$ change = .27; $F$ change = 13.04; $p < .01$
Step 3: $R^2$ change(CA, DA, GEN, AGE): $R^2$ change = .02; $F$ change = 1.03; $p = .36$
Full Model: $R^2 = .44; F = 8.53; p < .01$

$b =$ Regression Coefficients, $t =$ partial t - value, and $p =$ level of significance.

Note. CA, CD, and gender were entered into the equation using dummy coding. For CA, chronological age peers = 1 and other subjects = 0. For DA, subjects from developmental age peer group = 1 and others = 0. For gender males = 1 and females = 0.

Table 10: Regression of (square root transformed) gross motor persistence scores on PAAQ, group affiliation (CA, DA, CD), gender, and age ($n = 61$).
Figure 3 demonstrates that the relationship between PAAQ scores and transformed gross motor persistence is linear and positive. Also included in Appendix Y is a scatterplot of PAAQ scores as predictors of gross motor persistence in subjects who were identified as having disabilities and educated in self-contained educational classes (n = 27). However, not all subjects contained in Appendix Y were used as part of the CD group since only those with IQ scores below 80 were considered for inclusion. The scatter plot (Appendix Y) was included to demonstrate the suitability of the PAAQ for those with disabilities in comparison to the overall heterogenous sample.
As was the case for the regression of PAAQ scores on select variables, gender and age did not result in significant contributions to the overall regression model (holding other variables constant). The full model statistics for the regression of gross motor persistence on study variables indicate that the linear combination of PAAQ, group affiliation, gender, and age explain 44% of the variance in the dependent variable (Table 10). In the full model, CA and DA group affiliation are the only significant contributors (holding the other variables constant) (Table 10).

**Fine Motor Persistence Scores.** Mean time (in seconds) engaged (over the three sessions) in the fine motor task was used as the measure of task persistence. As was the case for gross motor persistence, the initial multiple regression analysis was calculated by regressing the mean number of seconds (raw data) per session on PAAQ, group affiliation, gender, and age. However, this resulted in violations to the assumption of constant variance. The fine motor persistence score was transformed using the square root of the mean number of seconds engaged for each subject (Hair et al., 1995) and then regressed on predictor variables (see Table 11 for summary means and correlations).

Inspection of the assumptions of residuals for the transformed fine motor persistence model yielded similar results as those found in the gross motor analysis. No violations were found in the plots of residuals and the residual statistics following data transformation (Appendix Z). However, the Durbin Watson statistic (1.30) was low indicating positive auto correlation
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**Note.** CA, CD, and gender were entered into the equation using dummy coding. For CA, chronological age peers = 1 and other subjects = 0. For DA, subjects from developmental age peer group = 1 and others = 0. For gender males = 1 and females = 0.

Table 11: Summary data for regression of (square root transformed) fine motor persistence scores on PAAQ, group affiliation (CA, DA, & CD), gender, and age (n = 61).
for the three step regression model. In an attempt to find the potential sequencing variables, separate plots were analyzed for each independent variable. A visual inspection of these plots (contained in Appendix Z) did not yield patterns to suggest that any carry-over existed from one observation to another relative to the predictor variables. The conclusion is that auto correlation between the fine motor residuals is not a concern since the low Durbin Watson may be unavoidable based on the nature of the variables under investigation. For example, group affiliation (a dummy coded variable) is somewhat correlated to gender (another dummy coded variable). This may be due to an over representation of male subjects.

The multicollinearity analysis indicates that DA group affiliation may be highly correlated to the other independent variables. The relationships for fine motor persistence are found in Table 11. However, as was also the case for gross motor persistence, high correlations between variables may be inherent in the design of this study since groups were formed with age as a factor. Thus, using age as a predictor variable, may explain a large portion of the multicollinearity. However, the VIF and tolerance statistics contained in Appendix Z indicate acceptable levels of multicollinearity (Hair et al., 1995).

Results of the regression model are presented in Table 12. These results demonstrate that the PAAQ is a significant predictor of fine motor persistence (as measured by seconds engaged) as well as group affiliation. When interpreting the full regression model, fine motor persistence can be explained (R²=.30) by a linear combination of PAAQ scores, group affiliation,
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Step 1: $R^2 = .08; F = 4.83; p < .03$
$R^2$ change = PAAQ, CA, DA; $R^2$ change = 18; F change = 7.15; $p < .01$
$R^2$ change = (CA, DA, gender, age); $R^2$ change = .02; F change = .80; $p = .45$
Full Model: $R^2 = .30; F = 4.90; p < .01$

$b =$ regression coefficients, $t =$ partial t-value, and $p =$ level of significance

Note. CA, CD, and gender were entered into the equation using dummy coding. For CA, chronological age peers = 1 and other subjects = 0. For DA, subjects from developmental age peer group = 1 and others = 0. For gender males = 1 and females = 0.

Table 12: Regression of (square root transformed) fine motor persistence scores on PAAQ, group affiliation (CA, DA, & CD), gender, and age (n = 61).
gender, and age (Table 12). However, only group affiliation (as indicated by CA and DA) are significant contributors (p < .05) (holding all other independent variables constant) in the overall regression model (Table 12).

A final note on PAAQ as a predictor of task persistence is that when scores from all subjects with disabilities are correlated, the PAAQ accounts for 27% of the variance (r = .52; p < .01). A scatterplot of these subjects and their scores are included in Appendix AA. These results are almost identical to those found in Appendix Y.

Discussion

The discussion section is divided up into six sections, and is followed by a summary. These sections will discuss PAAQ reliability and validity, group differences in attributional beliefs, group differences in task persistence, generalization of PAAQ results, unique profile in the motor area, and rival hypotheses.

PAAQ Reliability and Validity

Inferences into the attributional beliefs and task persistence of the sample can only be addressed following the establishment of instrument validity. Based on these data, PAAQ reliability and validity are discussed.

Reliability. In determining the predictive capability of the PAAQ, issues of reliability needed to be examined first. Current data support a prior study by Kozub and Porretta (1996), demonstrating that the PAAQ is a reliable measure for children labeled as mentally retarded. Chronbach’s Alpha analysis of the
14 item PAAQ using scores from the 91 subjects retained for attributional testing resulted in a .73 coefficient. This coefficient is consistent with the .76 test retest reliability coefficient attained in Kozub and Porretta who studied 86 subjects with MR (ages 8 -13).

Although the reliability coefficients for the PAAQ are below the goal of .80 as recommended by Nunnaly (1967), the “very strong” association has to be interpreted in relation to the age and ability levels of the target group (low IQ subjects). As outlined in the review of literature, reliability coefficients from other similar studies (on children without disabilities) fall somewhat short of ideal. These include the Nowicki and Strickland (1973) study which reported reliability coefficients of .63 (Nowicki-Strickland Locus of Control scale for children); and, the Crandall et al. (1965) study which reported test retest coefficients of .69 when testing children without any known disabilities. Taking into account the age and ability levels of subjects tested in this study and subjects tested by Kozub and Porretta (1996), results support the contention that the PAAQ is a reliable measure. These results also generalize the reliability of the PAAQ to non-disabled children in this study.

**Concurrent Validity.** The validity of the PAAQ has been tested within a theoretical framework. Content validity for the PAAQ was established and face validity was determined by a panel of experts. Using a principal components analysis, Kozub and Porretta (1996) identified four interpretable
underlying dimensions using attributional elements as described in Weiner (1986).

Using the MIARS, the data found in Table 5 demonstrate concurrent validity for the PAAQ across the sample. Research by Martinek and Griffith (1994) demonstrated that the MIARS is a significant predictor of persistence (relative to physical activity) in adolescents without disabilities (grades six and seven). The Pearson r coefficient of .66 (p < .001) between the PAAQ and the MIARS demonstrate that a substantial relationship exists between the two attributional measures (Davis, 1971). A scatter plot of these data also show a linear relationship (Appendix U).

The magnitude of a .66 correlation (relative to concurrent validity) found in the present data may fall short of an ideal level (.80 or better). However, in trying to understand the variability between the scales, age, and other characteristics of the sample may account for a portion of the unexplained variance relative to the two scales. The validation results of the MIARS found in Martinek & Griffith (1994) and Martinek (1992b) may shed some insight into the present discussion.

An examination of results by Martinek (1992b) indicate that the MIARS demonstrated concurrent validity relative to the Nowicki-Strickland Locus of Control scale (r = .31 for 48 third graders) (r = .61 for 40 seventh graders). The results in Martinek are comparable to the present data, and, therefore warrant some explanation. Taken collectively, concurrent validity scores
between attributional measures (in the present study and in Martinek's study) may indicate that the instruments may be measuring different aspects of the same construct.

The contention that the attributional instruments measure different aspects of the same construct is plausible since each of the scales mentioned (IARS, Nowicki-Strickland, MIARS, and PAAQ) ask questions relative to different contexts and activities. Turner et al. (1996) indicated that attributional measures may need to be somewhat task specific since profiles can vary depending on the individual and context. Given the variability in age and learner characteristics in the present sample and the studies by Martinek and Griffith (1994), the variability in the measures is somewhat explainable and perhaps expected.

The lack of a perfect correlation between the two attributional measures in the present study is of interest since the MIARS is a significant predictor of task persistence (Martinek & Griffith, 1994). However, the MIARS did not account for all of the variance in the Group (elementary & middle school) X Profile (Learned Helpless & Mastery Oriented) ANOVA \( [F(1, 25) = 5.34; p < .05] \). In Martinek and Griffith, results demonstrated that only the older subjects differed significantly in task persistence based on profile \([p < .05\) using a t-test \((t = -2.80)\) as a post hoc analysis]. The PAAQ may be less than perfectly correlated to the MIARS due to not only differences in measuring the attributional beliefs construct, but also accuracy of the scale constructed by
Martinek (1992a). The unaccounted variance in the task persistence scores (in Martinek & Griffith) relative to the MIARS leaves room for differences between the measures (PAAQ and MIARS) that may not necessarily lead to the conclusion that the PAAQ is not an accurate measure.

**Predictive Validity.** Anastas (1982) suggests that for instruments designed to predict future outcomes, as is the case for the PAAQ relative to motor performance, the ability of a scale to go beyond diagnosing an existing status is of relevance. Since motor performance is indicative of trials with the intent to learn (Schmidt, 1988), the predictive capability of the PAAQ may be more relevant in establishing criterion validity than prior results which demonstrate association between the PAAQ and the MIARS. The range of scores found in Table 4 provide an optimal situation to study task persistence relative to the PAAQ scores.

PAAQ scores demonstrate a linear positive relationship to task persistence (Figure 3). The relationship is evident for both gross motor persistence and fine motor persistence. The primary intent of the PAAQ was to measure physical activity related attributional beliefs, and based on attributional studies (Kurtz & Borkowski, 1984; Martinek & Griffith, 1994), the PAAQ demonstrates criterion validity by significantly predicting \( r = .38; p < .01 \) gross motor persistence in the present sample (Table 6). The reasoning of attributional theorists (Diener & Dweck, 1980) appears to hold for the present data in that an internal perception of effort (reflected by the selections
contained in the PAAQ) leads to a perception that future success is possible at the “Stabiball” task. In addition, those who selected a higher proportion of external statements feel that success is related to elements outside of the individual’s control. These external perceptions appear to be carried into challenging tasks (such as the Stabiball game) and results in decreased persistence.

The results contained in Table 10 show that the PAAQ (when entered first in a hierarchical regression model) significantly predicts gross motor task persistence ($p < .01$). The relationship accounts for 14 percent of the variance. For fine motor persistence, Table 12 demonstrates that the PAAQ accounts for 9 percent of the variance ($p < .05$).

To illustrate the appropriateness of the PAAQ for those functioning with cognitive disabilities, all subjects with disabilities (including those from self contained educational placements that were eliminated due to IQ scores above 80) were correlated to task persistence. Although not an analysis relative to the specific research questions, it is noteworthy to examine how the correlation increases from .38 (total sample) to .52 ($p < .01$, $R^2 = .27$) when an appropriate number of subjects with disabilities are analyzed (Appendix Y). Of particular note on the analysis of the 27 subjects described in this paragraph is that the relationship was analyzed adding the previously discarded cases so that an adequate sample was present to run the analysis as recommended by Frankel & Wallen (1994). Also, the LD subjects (with IQ scores above 80) appear to
have slightly higher attributional profiles and, therefore, higher task persistence relative to the gross motor tasks. The range in scores is increased by adding these subjects and therefore leads to an increased Pearson $r$ coefficient.

For gross motor persistence, the PAAQ accounts for 14 percent of the variance in the total sample and 27 percent of the variance for the subjects tested with disabilities. Although the results leave 86 percent of the variance unaccounted for in the total sample, the magnitude may still carry practical significance for teachers relative to the length of persistence on the gross motor task (regardless of ability and age levels). The significance of the results is most evident for the subjects tested from the self contained classrooms ($n = 27$). It is important to note that the scale was designed specifically for children with low standardized intelligence scores (Kozub & Porretta, 1996). The practical significance of the PAAQ can also be measured in terms of which factors could account for the 86 percent unexplained variance. These include factors such as the effects of a peer audience, contingencies for successful or unsuccessful participation, and socioeconomic status. Additional factors such as the presence of the investigator, the nature of the motor task, the time of day relative to the data collection, and rewards or consequences for subject participation could have affected the results of this study. The latter point is critical since many teachers in special education have behavioral plans that are based on tangible rewards for participation. The extent that the subjects perceived the conditions of the study as part of
the school curriculum, and, therefore, under the province of classroom rewards and consequences, may have impacted the results.

A major factor controlled for in the present study is the type and amount of feedback given during the performance of the motor tasks. The protocol did not call for use of positive/negative feedback or rewards for participation in the task. Furthermore, the procedural analysis substantiated that no feedback was used (Appendix Q). The lack of this feedback may have decreased the amount of variability that could be explained solely by the scale since several PAAQ items are related to influence of authority figures (PAAQ items 12, 8, and 7). Silon & Harter (1985) indicate that not only is the teacher or authority figure's feedback to the child with MR important, but the child may be more dependent on external motivational factors than non-disabled peers. How subjects interpreted the investigator's lack of feedback relative to task performance could be interpreted differently based on prior experiences with authority figures.

Finally, a potential factor that could account for a portion of the unexplained variance is that of socioeconomic status (SES). SES has been implicated in attributional research by Nowicki and Strickland (1973). However, for the present study, no attempt was made to control for SES due to limited access to personal files and information about the sample.

Given the above information, the 14 percent of the variance accounted for in the gross motor persistence task may be substantial given the limits of
the study. Furthermore, the significant results lend support that the PAAQ generalizes beyond just those with disabilities since the present sample contained subjects without disabilities. The results may also indicate that perhaps the PAAQ is a better discriminator between those with highly external versus those with highly internal attributional beliefs. Inconsistencies appear to be most evident in the intermediate level profiles (Figure 3).

Group Differences In Attributional Beliefs

Group affiliation for the present sample is a key variable in explaining scores relative to attributional beliefs. The three groups were formed based on the presence of a disability (as identified by IQ scores below 80/ coupled with identification for special education programming) and age (both developmental and chronological). Attributional scores are discussed in the following section for both MIARS and PAAQ results. Though not significant contributors to the overall multiple regression equations, gender and age are discussed relative to attributional profile in the sample since the present investigation is one of the few attributional studies that have examined gender and age relative to general physical activity (as opposed to high profile sport).

MIARS. MIARS scores obtained for the present study lend support to the findings of Turner et al. (1994) where children (ages 9-12) with mental retardation rated effort as less important than subjects without disabilities. The obtained MIARS scores indicate that significant differences exist using a One Way ANOVA (p < .0001) to analyze the three groups. A Scheffe post hoc
analysis indicated that group differences (in MIARS scores) are present between the CA group and the CD and DA groups (Appendix W). Even though the CD group scored higher (more internal) than the DA group, the differences were not significant at the .05 level.

Of interest relative to the MIARS content is the focus of the instrument on situations specific to Physical Education. Social situations and cognitive aspects (e.g., "When you remember something you heard in physical education") are prevalent in the MIARS. However, MIARS content is void of the types of task questions that would pertain to specific motor activities. Instead, improved performance is a function of "the teacher explained it clearly" or "because someone helped you." These external responses are opposite internal responses relative to effort and ability attributions. A visual inspection of item scores (using a frequency count) appears to indicate that subjects with disabilities are responding in a manner that is similar to their developmental age peers.

A key note to consider when reflecting on the results by Martinek and Griffith (1994) (relative to the MIARS) is that their design used the MIARS to identify the two study groups. These groups were identified as "learned helpless" (LH) (highly external selections of items) and "mastery oriented" (MO) (highly internal selection of items). The MO group (n = 14) scored between 18 and 20 on the MIARS and the LH group (n = 13) scored between 9 and 11.
In comparison to results by Martinek and Griffith (1994), the DA group scores ranged from 6 - 14 (mean = 10.2), the CD group scores ranged between 6 - 17 (mean = 10.6), and the CA group scored between 10 - 20 (mean = 14.6). Using Martinek & Griffith's criteria for group selection, all the DA and most of the CD subjects would fall into the LH profile. However, it should be noted that the MIARS did not significantly predict task persistence for the younger group (2nd & 3rd graders) (Martinek & Griffith). Taking into account Martinek and Griffith's criteria for the present results, and removing the younger subjects, a vast majority of the subjects with disabilities and almost 25 percent of the CA group would still have scored in the highly external range.

PAAQ. Group affiliation explained 35 percent of the variance relative to PAAQ scores (Table 7). These results indicate that CA group affiliation significantly contributes to the overall regression model (p < .05). Given the mean PAAQ scores described in Table 3, the CD and DA groups appear to be similar relative to internal selections and competence. These results demonstrate support that those subjects who scored below 80 on a standardized IQ test tend to exhibit an external attributional profile compared to same age peers. The results are similar to those found by researchers on individuals with MR (Turner et al., 1994; Wehmeyer, 1994). For example, Wehmeyer (1994) demonstrated that adolescents without disabilities out scored their same age peers with MR using the ANS-IE locus of control scale.
PAAQ scores reflect a similar trend in that the CA group had a mean PAAQ score of 3.50 (a higher number of internal/competent selections). In contrast, the CD group had a mean PAAQ score of 2.83. The external profile puts the CD group at risk for placing outcomes in a more external frame.

The results from the present study clearly indicate that children from the CD group are at risk of displaying a highly external attributional profile that could not only hinder academic performance, but also achievement later in life relative to new and challenging tasks (Kurtz & Borkowski, 1984; Dweck, 1986; Diener & Dweck, 1980). The external profile and the lack of success in motor tasks that results from a lack of task persistence put subjects at risk to also develop a lowered self-esteem (Weiss et. al., 1990)

**Gender Differences.** Gender was entered into the regression analysis (using PAAQ as the criterion variable) on the second step (along with age) and did not result in a significant change to the $R^2$ value ($R^2 = .01; F = .93; p = .40$). Based on these results, gender is not a significant contributor to the overall regression model. The results are somewhat in contrast to early attributional research. Early attributional studies have placed females at risk for developing an external attributional profile (Bird & Williams, 1980; Deaux & Emswiller, 1974). The current line of thought, however, relative to sport related attributional research is that results are inconclusive relative to gender (Biddle, 1993). The present results did not identify any variability relative to
total attributional scores (PAAQ & MIARS) that can be significantly attributed to gender.

**Age Differences.** Chronological age was also entered into the regression equation on the second step (with gender) and resulted in a combined $R^2$ change value of .01. The effect of age in months on the overall regression model (holding the other variables constant) was not significant ($p = .53$). Based on these results, age does not appear to impact on PAAQ scores. However, the conclusion relative to age on attributional scores is confounded given the composition of the sample. Chronological and developmental age are not constant across the sample.

Analysis of age as a potential variable in attributional research can be studied in the present sample by holding disability constant. To analyze this assumption, data from the CD group were removed and a separate correlational analysis was run on the PAAQ (Figure 4) and MIARS scores relative to age (in months). Significant correlations were found between age and attributional measures (after eliminating the CD group), indicating that the PAAQ ($r = .56; p < .0001$) and the MIARS ($r = .66; p < .0001$) displays a developmental pattern relative to CA and DA subjects (n=66).

Given that the scores of DA and CD groups on the PAAQ and the MIARS do not demonstrate significant group differences, developmental age also appears to have an influence on attributional scores. These data support the contentions of researchers that non-disabled children tend to become more
Figure 4. PAAQ scores from the 66 non disabled subjects (CA & DA groups).


Prior PAAQ research, indicates that a developmental pattern was found within a group of 86 (age 8-13) subjects with MR (Kozub & Porretta, 1996). However, Kozub and Porretta found that age differences were between the youngest (ages 8 & 9) and the oldest participants (12+), whereas differences between the 10 -12 age subgroups were not significant (p > .05). For the present sample, the mean age of the CD sample is 11 years - 5 months. The majority of the subjects fall in the 11 - 12 year old range and, therefore, support Kozub and Porretta’s findings in that after age 10 a leveling-off relative
to increases in internal selection occurs. This leveling off appears to be unique to the individuals with low IQ scores in the present study and in the Kozub and Porretta study. Results by Wehmeyer (1994) on subjects with MR (ages 13-20) also support the lack of internalization during adolescents.

**Group Differences In Task Persistence**

Group differences in task persistence were analyzed using multiple regression. Dummy coded variables were entered to determine if group membership significantly contributed to the overall regression model. Relative to gross and fine motor persistence, Tables 10 and 12 indicate that membership in the CA and DA group contributed significantly to the overall regression models (gross and fine motor). Regression coefficients indicate that for both gross and fine motor persistence, DA affiliation has the highest relative importance followed by CA affiliation.

Age in months is the next highest (after group affiliation variables DA & CA) relative contributor to the overall equation in both gross and fine motor persistence. The order of contribution for variables in the overall model is no surprise since age was used to form the DA and CA groups, and both these groups have mean persistence scores that are greater than the CD group.

**Group Differences.** Group differences in the overall regression model relative to gross motor persistence supports research by Bogie and Buckhalt (1987) which demonstrate that persons with MR persist less than non-disabled peers. However, in the Bogie and Buckhalt study, only the gifted
subjects differed significantly relative to task persistence (as measured by mean time engaged in the task). The present data show similar results. However, as indicated in the results section, the present study attempted to control the number of gifted subjects included in the task persistence portion of the study. This allows for significant results to be interpreted relative to typical cognitive functioning (mean IQ for the CA group that completed motor tasks = 108).

The decision to select two high IQ subjects for inclusion in the CA group was based on the presence of these above average students in general classrooms. Since the research question of interest was concerned with how children with disabilities (IQ below 80) compare to a similar age peer group, elimination of those who are above average would have narrowed the "peer" group. To determine if the CD group persists similar to "same age peers," a spectrum of ability levels should be present in the CA group so that it is representative of a general education classroom.

Significant results were attained relative to $R^2$ change ($R^2 = .27; p < .001$) in the second step of the gross motor regression model (entering CA and DA). CA affiliation is a significant contributor in the overall model, indicating that a positive relationship exists between those who receive a "one" for the dummy coded variable and task persistence. However, the same can be said for DA group affiliation in that, taken collectively, those "coded" in the DA group show a higher mean persistence than those coded as zero for this
variable. The overall results indicate that the mean persistence for the CD group (Table 8) is significantly less than the other two groups. The rationale for this conclusion lies in understanding the analysis design which placed CD group affiliation in the constant for both CA and DA affiliation (dummy coded variables). Furthermore, results indicate that the means from the two comparison groups in seconds persisted (CA = 400, DA = 389) were approximately the same. Given that both CA and DA variables were significant contributors to the regression equation would substantiate that CD group affiliation is negatively related to task persistence. Based on Table 10 results, the presence of a cognitive disability explains a significant amount of the variance ($R^2$ change $= .27$, $p = .0001$) relative to gross motor persistence.

Developmental age (which is based on IQ scores) is similar for both the DA and CD groups. Given the significant results of both CA and DA affiliation, developmental age does not explain group differences in task persistence since the CD group and the DA group have similar developmental ages and vastly different gross motor persistence scores. Differences in task persistence that are reflected in group affiliation emanate from the CD group scores on gross motor persistence.

Based on the present data, generalization of the lack of persistence at challenging motor tasks for the children with cognitive disabilities appears tenable. Reasons for the lack of persistence are based on attributional beliefs for the CD group. Bogie and Buckhalt (1987) and Turner et al. (1994) linked
task persistence in children with MR to attributional elements. Specifically, they believe that external attributions (such as powerful others) are responsible for failures at a task. Turner et al. found a negative correlation between belief in "powerful others" and persistence or total time spent on a task (Turner et al.). In the Bogie and Buckhalt study, the group that persisted the least [subjects labeled Educationally Mentally Retarded (EMR)] also rated that “task difficulty” is more often responsible for failure than the non-disabled comparison groups (Gifted and Average).

**Gender Differences.** For the multiple regression analyses (for fine and gross motor persistence), entering gender on the third step along with age, did not account for a significant portion of the variance holding all other variables constant (Tables 10 & 12). The results substantiate those by Bogie and Buckhalt (1987) that indicated a lack of gender differences relative to task persistence. The gender variable was included based on the theoretical assumption that females are potentially more external relative to attributional beliefs (Deaux & Emswiller, 1974). Kurtz and Borkowski (1984), Diener and Dweck (1980), and Martinek and Griffith (1994) have all linked attributional beliefs to task persistence, but not gender. The regression equation results do not indicate a significant gender contribution. In both fine and gross motor persistence, gender demonstrates the lowest relative contribution to the regression equation when holding the other variables constant.
Age Differences. Given the developmental trend found in figure 3 relative to those without disabilities (the DA and CA groups), task persistence data in theory are expected to demonstrate a similar trend. This trend would be manifested by an increase in persistence that parallels the increase in internal selection. However, the increased persistence with age was not found in either gross or fine motor persistence. Although the older CA subjects out-persisted the younger DA subjects, the CD group (with a mean age of 137.2 months) persisted the least for both the gross and fine motor tasks. The results do not support a trend in persistence data that can be explained by age when the entire sample is analyzed (n = 61).

Rationales for age as an insignificant contributor to the overall regression of task persistence on the predictor variables are of interest. Martinek and Griffith (1994) indicate that younger children with external profiles have not had the opportunity for the learned helpless profile to become “crystallized.” To this end, persistence is not affected to the degree that would be found in older participants (such as the CD group in the present study) since a history of repeated failures that are attributed to external elements is not present in many younger typically developing children. Also, the lack of differentiation between effort and ability in younger children, as described in Nicholls (1978), may have influences on the impact of an external attributional profile. Finally, the study design may have impacted on age differences since
all subjects were ask to “stop” at the ten minute mark for both tasks due to
time constraints placed on the study by cooperating teachers.

**Fine Motor Persistence.** Given the parody in the results between gross
and fine motor persistence, separate reference to the results as they pertain to
the Labyrinth task has been limited. The research questions as they pertain to
task persistence can be addressed referring to the gross motor results.
However, lower total $R^2$ in the fine motor persistence model is an indication
that one or more of the variables are contributing less to the overall regression
equation.

In comparison to gross motor persistence, predictor variables entered in
the fine motor persistence model maintain an identical order of relative
contribution based on the regression coefficients (Appendix X & Z). In
analyzing Table 11, Pearson r correlations are again comparable between the
fine and gross motor models. The only difference between the two solutions is
the magnitude of relationship to the criterion variable (transformed task
persistence for gross and fine motor).

Random error is a possible explanation for the slight differences in the
solutions (gross motor and fine motor models). However, Turner et al. (1996)
propose that a potential difference exists in attributional beliefs relative to task
specific behaviors. A person can “carry” contrasting sets of beliefs into
different types of tasks based on attributional elements. The potential for task
specific influences appears most evident for the variable PAAQ score (as
entered on the first step). For gross motor persistence, 14% of the variance relative to the transformed variable was explained by PAAQ scores. In contrast, fine motor persistence when regressed on PAAQ resulted in 9% of the variance explained. The difference from a practical standpoint is negligible. However, the results of the two separate analyses do lend some support to Martinek and Griffith's study (1995) relative to the pervasive nature of the learned helpless profile in some learners (specifically those classified as the CD group).

Generalization of PAAQ Results

Given the correlations found between gross and fine motor task persistence as predicted by PAAQ scores, generalizability to tasks outside the gross motor area is possible. The PAAQ appears to possess similar predictive capabilities relative to the two tasks. Gross motor persistence does have a higher $R^2$ than fine motor persistence as explained by PAAQ scores. However, the differences between the two correlations are for the most part negligible. Though the results support the generalizability of the PAAQ, the two tasks have similar objectives. The goal in both Stabiball and Labyrinth is to maneuver a ball through a maze without letting the ball drop through a hole. Given the task similarities, generalization of the PAAQ to fine motor persistence outside a game type activity is still in question.
Unique Profile In the Motor Area

The purpose of the present research was to investigate the potential of a unique attributional profile in the motor area as found to exist outside the motor area for individuals with low IQ scores. Attributional testing, using both the PAAQ and the MIARS, indicate that results found by researchers outside the motor area (Bogie & Buckhalt, 1987; Turner et. al., 1996; Turner et al., 1994; Wehmeyer, 1994) are also found in the present study. These data support the contention that persons with low IQ scores (who are educated in self-contained special education classrooms) are highly external compared to same age peers.

Task persistence data support the impact of an external attributional profile for children in the study (ages 10-12) from the CD group. The end result is that data contained in the present report show that those children who comprise the CD group are at risk for a unique attributional profile as found in individuals with MR (Bogie & Buckhalt, 1987; Turner et al, 1996; Turner et al., 1994; Wehmeyer, 1994).

The relevance of the combined results indicate that attributional scores significantly predict gross ($R^2 = .14$, $p \leq .01$) and fine ($R^2 = .09$, $P < .05$) motor persistence. Given the relationship between persistence and motor performance (Schmidt, 1988), the results offer support for the need to target attributional beliefs as a potential variable affecting motor performance in children with cognitive disabilities.
A note on the unique profile of those subjects from the CD group that are identified as MR (n = 15) is warranted relative to the developmental versus differential perspectives as outline in Weisz, Yeates, and Zigler (1982). A differential perspective is supported in the present data since those subjects labeled as MR display attributional scores that are similar to the DA group and persistence scores that are below the other two comparison groups. Inferences into the developmental differential perspective go beyond the present data since the results of the PAAQ are from a forced response questionnaire and do not represent the actual thinking of participants. Also, motor differences (as would support a differential perspective) cannot be substantiated based on the present results.

Rival Hypotheses

The purpose of this study was to examine correlational relationships, and through regression analysis predict attributional beliefs and task persistence in pre-adolescent children. The main predictor variable in the study was group affiliation. By knowing group affiliation and using the PAAQ, the researcher decreased the uncertainty of which subjects were likely to be less persistent as a result of an external attributional profile. Given the aim and techniques of the present study, a need exists to examine certain key rival hypotheses in an attempt to further establish the validity of the findings (Frankel & Wallen, 1993).
Researchers would classify parts of the present study as a static group comparison design with group affiliation assuming the role of independent variable that is being experienced by one group and not the others (Campbell & Stanley, 1963; Frankel & Wallen, 1993). Group affiliation is, in essence, a comparison between those who have educational disability labels to those who do not, but are of similar chronological or developmental age. Key threats exist relative to rival explanations for the results. These threats include Campbell and Stanley’s (1963) external validity threat of “interaction of selection and X” (group affiliation). Though the research questions and subsequent analyses refer to prediction, group differences are targeted in the present sample which presents portions of the study as a static group comparison. An additional external validity concern refers to “reactive arrangements.”

In making inferences into group differences as detected by the multiple regression equation, internal validity threats relative to “mortality” and selection” also need to be examined (Campbell & Stanley, 1963; Frankel & Wallen, 1993). “Experimenter effects” also poses a rival hypothesis since the researcher collected all the data. In all reality, the magnitude of the present study stands on the merits of being able to rule out the identified rival hypotheses (Campbell & Stanley; Frankel & Wallen).

External Validity. The interaction of selection and X (group affiliation) is a concern to the generalizability of the results (Campbell & Stanley, 1963).
Although a treatment was not specifically given to the subjects, two conditions (attributional testing and task persistence testing) were presented to three groups. The testing results as obtained through the conditions of the present study were then analyzed by interjecting group affiliation as a predictor variable.

Existing circumstances that need to be discussed relative to the results of the study include sampling & selection techniques relative to group affiliation for the three study groups. The selection technique is more concerned with how children are labeled and subsequently placed in self-contained classrooms in the state of New York.

Given the reluctance of many local school districts to participate, the present study was unable to rule out the effects of selection entirely by using a random group of participants. The subjects came from two small urban school districts (New York) and were selected on a volunteer basis. Three hundred consents were distributed and approximately one third of the participants and their parents agreed to take part in the study.

In all likelihood, generalizing the present results (relative to group affiliation) to participants who did not choose to participate is problematic. However generalization to other school districts outside the state of New York may not pose a major issue since the present results reflect mean PAAQ scores that are almost identical to those found in a preliminary study by Kozub and Porretta (1996). Given the results by Kozub and Porretta (which also
used a convenience sampling method), the present results go beyond the
volunteering school districts. Given the establishment of criterion validity of
the PAAQ, an assumption can be made that data collected on subjects from
the preliminary study (Kozub & Porretta, 1996) reflect an external attributional
profile.

Reactive Arrangements. The random order and a counterbalance
design of presenting the motor tasks helped to alleviate concerns over multiple
treatment interactions. However, as was stated in the limitations section, the
isolated nature of the testing format is a potential factor that may limit the
results. Generalization of results to a physical education class or other motor
setting that is not individualized (one-to-one teacher to student ratio) or in an
isolated area may not be possible. However, the significant correlations
between the PAAQ and the motor tasks cannot be ignored relative to the
differences in the profiles and persistence of the three study groups.

Internal Validity. How subjects "selected" into group affiliation is a key
concern relative to the effects of an external attributional profile on task
persistence. A key question that must be addressed is the emergence of an
external profile and when the external profile affects task persistence.
Perhaps task persistence and a lack of success results in the external profile.
Given the very limited research relative to the affects of an external profile on
gross motor task persistence, inferences into the temporal order of events
(external scores or persistence) is not possible. However, given the
similarities in profile between the DA and CD groups and the subsequent
differences in task persistence, questions relative to the impact of prolonged
failure are relevant. Perhaps all children begin highly external and the lack of
success and positive self-perceptions make children with cognitive disabilities
highly susceptible to a decrease in persistent behavior. The present results as
well as those by Martinek and Griffith (1994) would support this contention.

An additional threat related to selection that could not be accounted for
was socioeconomic status (SES). The subjects from the CD group may have
come from low SES families which could be a factor (Nowicki & Strickland,
1973). Perhaps the potential CD population available for study had a higher
percentage of lower SES families that, in turn, resulted in a higher percentage
of external profiles unrelated to educational label. In attempting to rule out
SES as the sole contributor to the results, all children in the study came from a
similar geographic area. An attempt was made to secure equal numbers of
subjects from each school relative to the three study groups to guard against
SES factors that may be the result of school neighborhoods. The portion of
Western NY used for study is marked by a high rate of unemployment and low
income families. Many of the subjects come from a similar low to middle class
backgrounds as reflected by the communities that surround the schools.

Differences associated with subjects dropping out of the study could be
a concern for the present data. However, the concern is minimal since only
one girl with MR (who returned a signed consent) dropped out of the study.
The reason for the attrition was due to the subject moving out of the district. Two additional CD subjects completed attributional testing and were selected for motor testing. However, illness forced the two subjects (one boy and one girl) from participating in the motor tasks. All CD subjects were selected for both motor tests since an attempt was made to compare those with IQ scores below 80 with MR labels to those with IQ scores below 80 and LD labels. In all likelihood, a random selection of CD subjects as was the case for CA and DA groups would have eliminated one or both of these subjects. Mortality is not a concern relative to the internal validity of the PAAQ and task persistence results as predicated by group affiliation.

**Implementor Effects.** Two remedies were built into the present study to guard against the potential conclusion that the researcher was responsible for the results. First, an established protocol was used for principal data collection (Appendix Q). Second, a person totally “blind” to the objectives of the study was recruited to examine a random sample of subjects. This included all three sessions of both the gross and fine motor tasks. The procedural analysis was to establish inter-observer agreement of the time engaged and also to substantiate protocol adherence. The procedural checks and the inter observer agreement resulted in the elimination of implementor effects as a rival hypotheses for the present study.

Given the differences in cognitive abilities of the three study groups, a potential still exists that factors beyond experimenter control (i.e., gender and
mannerisms of the researcher as interpreted by the subjects) affected the results. Although the protocol was consistent with the intent, prior perceptions of the subjects relative to a white male or a person dressed in shirt and tie are relevant. Subjects in the CD group have, in all likelihood, had numerous testing sessions with school officials and how this target group perceived the conditions of testing relative to the other study groups remains a rival explanation. Perhaps an external profile emerges in the face of certain adult figures for the CD group in a manner different from those in the study who made up the comparison groups given the potential differences in educational experiences.

Summary

This study does not attempt to present a complete picture of the attributional profiles or task persistence of children with cognitive deficits. In partialing out various aspects of the study, rival hypotheses were presented. However taking into account the results as a whole, requires further study for children with cognitive disabilities (specifically those with MR). These data indicate that PAAQ scores are significantly related to task persistence in the sample. Also, the CD group scored significantly lower on the PAAQ and were less persistent than same age peers without disabilities (CA group).
CHAPTER 5

SUMMARY/ CONCLUSIONS/ RECOMMENDATIONS

This closing chapter will first summarize the results relative to the six research questions. Conclusions will then address salient findings and the generalizability of these results. Given the descriptive nature of the design, generalizing the results of this present study must be made with caution. Although data are substantial in volume, the merit of the present study rests on drawing accurate conclusions relative to external validity. Finally, recommendations are presented for further research into the area of attributional beliefs and task persistence.

Summary

Does the PAAQ serve as an accurate predictor of task persistence for children with CD (ages 10-12)? The PAAQ was a significant predictor of task persistence for subjects with low IQ scores as well as the two comparison groups. Given the low number of subjects with CD (n = 21), a separate unbiased correlational analysis was not possible for this study group (Frankel & Wallen, 1995). However, a separate analysis was calculated on the CD group in conjunction with six subjects with disabilities who had been discarded

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from the CD group (due to IQ scores above 80). The end result was a substantial association ($r = .52$) between PAAQ scores and gross motor persistence of those students identified as LD or MR.

The intent was to study specifically those children who could be identified with IQ scores below 80 (without any other concomitant disabilities). The addition of the students with LD (with IQ scores above 80) demonstrates that the PAAQ was also an accurate predictor for subjects thought to be at risk for having an external attributional profile and low task persistence (Licht et al., 1983). Also, the addition of higher functioning non-disabled subjects assisted in the generalization of the PAAQ to those study participants with relatively internal profiles (given the significant differences in attributional scores within the present sample between the CA and CD groups).

**How does the PAAQ compare to the Modified Individual Achievement Responsibility Scale (MIARS) in relation to concurrent validity for persons with and without disabilities (ages 10 & 12)?** Concurrent validity analysis on PAAQ scores resulted in a substantial association with MIARS scores. Validation of these results are possible given prior work by Martinek and Griffith (1994) which established predictive validity for the MIARS. However, generalization to all children with low IQ scores is speculative given the limited purposeful sampling method. The concurrent validity results coupled with the predictive capability of the PAAQ substantiate Martinek and Griffith’s results (selection of internal attributional statements predicts higher task persistence).
Results support the PAAQ as a criterion valid indicator of attributional beliefs for the present sample in a research setting. The potential to use the PAAQ in further study is without question, however, the generalization to all children with low IQ scores is limited. Results indicate that the evidence is mounting which indicates that those children in the present study who select a higher number of external statements relative to outcomes tend to be less persistent. This supports data obtained by Martinek and Griffith (1994; 1995).

Does the presence of a cognitive disability (IQ scores below 80) in children (ages 10–12) explain variability in relation to attributional scores? Group affiliation (and specifically CD) explained the highest proportion of variability (holding the other variables constant) in the PAAQ. Gender and age (variables identified by early attributional study as potential factors) did not explain a significant portion of the variance. In comparison to same age peers, those subjects with IQ scores below 80 (who made up the CD group) scored significantly lower (external) on both attributional measures. Variability in PAAQ scores were significantly explained by group affiliation.

Data support the contention that those subjects with IQ scores below 80 (typically classified as MR) possess a unique attributional profile. This unique profile is marked by crediting physical activity competence to external attributions. This attributional profile can potentially hamper persistence at motor tasks.
Does the presence of a cognitive disability (IQ below 80) in children (ages 10-12) explain variability in task persistence at select motor tasks? Results of data collected on persistence at both the Stabiball and Labyrinth tasks parallels attributional scores in one key regard. Subjects identified as having a cognitive disability were consistently outscored by same age peers. To this end, persistence data are even more explainable based on the presence of a cognitive disability than attributional scores since the DA group (though highly external in attributional scores) persisted in a similar manner as the CA group. Results support findings by Bogie and Buckhalt (1987) and Dudley-Marling et al. (1982) since typically functioning subjects (as measured by educational label) consistently out persisted subjects from the CD group in both motor tasks.

Does developmental age explain variability relative to attributional beliefs and task persistence in children with low IQ scores, and non-disabled children of similar chronological or developmental age? Conflicting results are presented in data contained in the present report since attributional scores appeared to be a function of developmental age. However, task persistence data did not reflect the same pattern since the DA group persisted in a similar manner as the CA group. Based on these results developmental age may potentially influence attributional beliefs. However, the impact on persistence is not the same for the CD and DA groups even though developmental and attributional profiles may be similar. Perhaps the present sample demonstrates a need to take into account experiences or repeated failures
above above and beyond developmental delays and attributional beliefs in determining which subjects are at risk to display low persistence.

**Does the PAAQ serve as a specific measure of attributional beliefs in physical activity for children with cognitive deficits, and is the scale generalizable to fine motor tasks?** Generalization to all potential fine motor skills is not possible even for the limited sample. However, a potential to generalize that an external profile (that was measured by the PAAQ in the present sample) hampers persistence across the two tasks is possible. The pervasive nature of an external profile (as seen in the present sample of subjects with CD) could potentially be measured by the PAAQ since results from the two regression analyses (regressing fine and gross motor persistence on select variables) were similar. It is unclear at this point if the pervasive nature of low persistence is a function of attributional beliefs or other educational experiences based on the present results. Therefore in interpreting PAAQ results as a predictor of task persistence, the relationship is viewed as correlational. Causes of significantly less persistent behavior could be rooted in other factors such as the task, the setting, and/or educational placement.

The specific nature of PAAQ content is without question. The generalization of criterion outcomes is supported by these data. However, generalization to fine motor tasks is problematic for several reasons. First, the nature of the Labyrinth task is closely aligned with the Stabiball task in
objective. Second, the Labyrinth game is only one of a large variety of activities that can be classified as fine motor.

Conclusions

The salient findings can be summarized into two categories. These categories include results that can be generalized beyond the present sample and results that are sample specific. Sample specific findings have potential implications for other children who are similar to those with disabilities from the present study. The sample specific findings, however, cannot be ignored given the potential impact of attributional beliefs for children with and without disabilities in all academic areas.

Generalizable Results. Results obtained in the present report substantiate suitability of the PAAQ for other related research studies. A disclaimer concerning the generalizability of the PAAQ is that relevance of a test is rooted in the particular context considered in the validity investigation (Anastas, 1982). Therefore the PAAQ does not have merit for educational placement or programming for children. As indicated in the rival hypotheses section, the individual nature of the study setting as well as other intervening factors need to be taken into account by anyone attempting to use PAAQ results beyond a research setting.

Concurrent validity for the PAAQ was established. Although the magnitude of the correlation between the PAAQ and MIARS falls somewhat short of ideal, the implications are substantial. These include that the PAAQ is a valid and suitable measure of activity related attributions for students with
and without disabilities in a research setting. The potential differences between attributional measures and task specific content makes the .66 correlation noteworthy for the PAAQ.

The significant relationship between attributional measures and task persistence provides tangible evidence that beliefs related to effort are substantially related to persistence in this select group of subjects. The predictive capability and the concurrent validity of the PAAQ as a criterion valid instrument demonstrates its suitability for further study of children with IQ scores below 80 (who have no known physical disabilities). The assumption that results contained in the present report generalize to subjects of similar age and circumstance is supported by Anastas (1982).

**Sample Specific Results.** Sample specific results have implications for educational personnel given the weight of evidence that is beginning to mount relative to attributional study in special populations. The current findings need to be viewed collectively with research completed outside the motor area. The end result is that children with certain educational characteristics may be at risk for developing a unique attributional profile which can hamper success in a number of areas, including motor performance.

Several groups of children and adolescents with disabilities have been found at risk to develop undesirable attributional profiles. Those persons with MR are believed to be at risk for developing an external profile that negatively correlates to persistence on recall and problem solving tasks (Bogie & Buckhalt, 1987; Turner et al., 1994). Research, though limited in scope, also
indicates that adolescents with physical disabilities are somewhat at risk for developing external beliefs relative to sport success (White & Duda, 1993). Finally, a group of children with LD were found to possess an attributional profile that is maladaptive and negatively correlated to persistence in reading (Licht et. al., 1985). Taken collectively, findings indicate the need to address attributional characteristics in some adolescent and preadolescent age learners with low IQ scores and educational labels (MR and LD).

In conclusion, the background information and the importance of the present study are grounded in the potential influence of attributional beliefs on motor performance. The assumption is that motor performance is affected by task persistence which, in turn, may be functionally related to a specific attributional profile. Subjects from the present study (particularly those from the CD group) appear to be at risk because of maladaptive motivational beliefs that affect persistence on two motor tasks. Although not directly measured in the present study, the potential relationship between external selection of attributional statements and motor performance in those with low IQ scores is conceivable in light of low motor skills found in a large portion of children with MR (Francis & Rarick, 1959; Porretta, 1990; Schmidt, 1988). Given the lack of persistence from subjects in the CD group, mastery in the two motor tasks appears unlikely. The statistical relationship of motor persistence to attributional beliefs as measured by the PAAQ and MIARS warrant further study by adapted physical activity researchers.
Recommendations

Recommendations for further study center around expanding on the present findings. The results seem to have limited value to practitioners at this point due to issues related to the isolated study setting, educational labels, and lack of measurement relative to effects over time. However, the present findings have merit in laying the foundation for numerous future investigations. The following recommendations are presented.

1. For children with low IQ scores, the most relevant recommendation is to study PAAQ scores and persistence relative to different contexts. Actual classroom settings need to replace the isolated study environment. A determination of how accurate attributional measures are relative to persistence in a integrated or segregated setting need to be investigated.

2. An area in need of further study exists relative to attributions made in conjunction to successful as opposed to unsuccessful experiences (Biddle, 1993; Dudly-Marling et. al, 1982; Whitley & Frieze, 1985). Gender differences relative to the internalization of competent and noncompetent situations need to be investigated. At the present time it is unclear if the associations found in the sample of students with MR studied using the PAAQ (Kozub & Porretta, 1996) warrant further consideration. An investigation into potential differences in processing failure versus success attributions appears highly relevant in the motor performance of those with disabilities.
3. Comparisons between subjects labeled MR and LD relative to attributional beliefs require further study. Also, larger samples that rule out IQ level as a potential factor, need to be studied in order to determine if those subjects labeled LD in the classical sense (typical cognitive abilities with severe discrepancy . . .) are similar to those with IQ scores below 80 relative to attributional beliefs and task persistence. Also, education placement as well as educational label (MR or LD) need to be considered in studies that compare two or more categories of disabilities.

4. A need exists to study persons with disabilities using the PAAQ in conjunction with the analysis of common motor tasks such as those depicted in the actual scale items. These would include batting, running, catching, and etc. Relationships between the PAAQ and persistence at these tasks would further substantiate the validity of this attributional scale. Also, investigations using the PAAQ along with valid motor tests (that quantify motor performance) would help determine the level of association between physical activity deficits in children with MR and an external attributional profile.

5. Longitudinal study of motor performance and attributional beliefs is warranted in a manner similar to a study conducted by Turner et al. (1996). Following a group of children over time and through different contexts seems to be the only way to determine the temporal order of beliefs relative to persistence.

6. A final recommendation would be to investigate potential remedies to low persistence as a function of external beliefs. Behavioral
designs are recommended to study the effects of effort training and strategy training on persistence. Strategy training is the recommended course by researchers to help guard against reinforcing the helpless profile in those considered cognitively delayed (Borkowski et al. 1986). In physical activity (like many other areas) a maximum effort may not produce successful results. Strategy training can serve as a buffer to failure (which leads to inferior attributional beliefs) since it is known that self esteem can be maintained and academic performance improved in persons with cognitive disabilities (Borkowski et. al., 1986; Turner et. al., 1996).
LIST OF REFERENCES


APPENDIX A

ATTRIBUTIONAL PROCESS MODEL
Attributional Process Model

(Modification from Biddle, 1993)

Note. The above model depicts the pattern of attributional beliefs as they impact on motor outcomes.
Revised Weiner Model
Locus of Causality

<table>
<thead>
<tr>
<th>Internal</th>
<th>Stable</th>
<th>Unstable</th>
<th></th>
<th>Stable</th>
<th>Unstable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Controllable</td>
<td>Stable effort</td>
<td>Unstable effort</td>
<td>Other's stable effort</td>
<td>Other's unstable effort</td>
<td></td>
</tr>
<tr>
<td>Uncontrollable</td>
<td>Ability</td>
<td>Mood</td>
<td>Task ease</td>
<td>Luck</td>
<td></td>
</tr>
</tbody>
</table>

(Weiner, 1986)
Dear 

My name is Francis M. Kozub and I am in the School of Health, Physical Education, and Recreation at The Ohio State University. For my dissertation research, I am conducting a test of instruments to measure the perceptions of students with Developmental Handicaps (ages 10-12) and those without disabilities (ages 6-8 & 10-12). Permission will be obtained at the district level through our College of Education before any data collection will begin. I would like to obtain building level permission to use students in your school to complete the proposed study. Following district level and your approval, I will also obtain written permission from teachers, as well as parents of students selected for the project. Confidentiality will be maintained at all times in relation to students, school personal, and school. I will need to obtain standardized testing scores (IQ) for each student to provide a detailed description of subjects for the final writeup, however, names will not be used in relation to subjects. Identification numbers will replace student names following testing. The need for these scores will be conveyed to parents in the parental consent to be sent home. Also, students can be withdrawn from the study at anytime during the procedure. If you are interested in allowing me to use your school as a data collection site please sign below and return. Thank you.

Sincerely,

Francis M. Kozub 
(614) 292-9920

I _______________________________ Agree to allow (school name) to participate in the preliminary test described above.

Signed ___________________________ Date ________________
APPENDIX D

TEACHER CONSENT - SAMPLE LETTER
Dear

I have talked with your building level administrator and have obtained permission to use students in your school to complete my dissertation research. With your permission, I would like to conduct a test of instruments to measure the perceptions of students with Developmental Handicaps (ages 10-12) and those without disabilities (ages 8-8 & 10-12). In this study I will need your help to secure parental consents. Also, I will need your assistance to obtain categorical data on the students from your class. These will include age and standardized test scores (IQ). Confidentiality will be maintained in relation to this information and all other identifying information from school and students by using participant identification numbers to replace names following data collection. This information is necessary to describe the participants for the final report. If you decide to take part in the proposed study, you are free to withdraw at anytime during the procedures. If you are interested in helping complete the preliminary test please print your name and sign below. Thank you.

Sincerely,

Francis M. Kozub
(614) 292-9920

I ____________________________ Agree to take part in the preliminary test described above.

Signed _________________________ Date ________________________

(Teacher)
APPENDIX E

PARTICIPANT CONSENT - SAMPLE
INFORMED CONSENT

Investigators: David Porretta, Ph.D., & Francis M. Kozub, MS
Research Project: A Comparison Between Children with Cognitive Disabilities (CD) and Non-disabled Peers in Relation to Attributional Beliefs and Persistence in Gross and Fine Motor Tasks

The proposed study is a comparison between children with CD and those without disabilities in relation to performance on two motor tasks. Performance will be measured by the number of trials the child is willing to attempt. The two tasks were selected to be novel and found in most physical education catalogs. Along with the two tasks, children will be given two tests to measure beliefs related to effort. The overall goal of the study is to determine if children with CD differ from those without disabilities in willingness to attempt the novel tasks.

If you decide to allow your son/daughter to participate, we will need to have access to personal information about your child such as date of birth and IQ score. For scoring purposes only, a videotape will be made of your child’s participation in the tasks. However following data collection, the videotape and all personal information related to your child will be stored in a secure room (according to university policy) and kept completely confidential. Your son/daughter will be tested on two days and then given three sessions to attempt the two novel tasks. In all, testing will take 20 minutes and the tasks will take 10 minutes per session. All attempts will be made to make sure that the time required to participate in the study does not interfere with your child’s school work.

Though some of the participants will have been identified as CD by the school system, an equal number of participants without any disability are needed for the present study. Participation in the study will in no way harm or affect your child. Children will participate on a one to one basis with the researcher, and in no way will the scores be used to evaluate your child’s academic performance. All identifying information will be removed following data collection and used for research purposes only. All the activities will be treated as games so the participants enjoy the experience. Students who decline participation will not be contacted in any way or be made aware of others participating in the study. Nonparticipation of your child will in no way be reflected in the results of the study. Participation is voluntary, and you or your child can withdraw from the study at anytime.

This activity has been approved by your school district, your child’s principal, and teacher. If you have any questions or concerns please do not hesitate to call at any time, (614 292-9920 / ext. 4-1750).

[ ] I DO hereby voluntarily consent to allow my son/daughter ______________________ to

(Participant)

participate in the project as explained above, and agree to allow the researcher to obtain

information on my child’s achievement scores as explained above.

Signed _______________________________ Date __________________

(Parent or Guardian)

Signed _______________________________ Date __________________

(Investigator)
APPENDIX F

PHYSICAL ACTIVITY ATTRIBUTION QUESTIONNAIRE - MALE PLATES
PHYSICAL ACTIVITY ATTIBUTION QUESTIONNAIRE
(Male Plates)

Directions

1. The testing session needs to be conducted in a quiet room, free of distractions. The child will be seated at a table across from the tester. All items will involve the tester reading the verbal part orally to the child while simultaneously showing the pictures. Tester needs to begin the session by reading the following statements:
   - Before we begin it is important to remember that in this game there are no right or wrong answers.
   - Today I will be showing you some pictures of boys playing.
   - You need to pick the picture of the boy who is most like you.
   - I will read you to reasons “why” you think the boy in the picture is like you. Choose the one that is closest to how you feel (let me read both reasons before you answer why).

2. Once the child identifies the picture, remove the non-chosen picture and read the reasons on the back of the chosen card that depict internal "I" or external "E" responses. Maintain the order of position of items (left/ right) in the presentation of the illustrations of competent versus non-competent. Make sure you read the information on the back of the cards as written.

3. Record which picture was selected and the reasons on the score sheet for each item. Once the child has picked a reason, do not allow him time to expand on the reason. The first choice the child makes will be used for the response. If the child does not identify one of the two responses, repeat the statements and ask him to choose one of the two statements. Do not explain choices, simply repeat and have the child respond.

Scoring of Questionnaire

The questionnaire will give a raw score total for an obtained internal or external attributional profile. Items are to be scored individually first using the following point values that are based on selection of causation statements and level of competence:
Internal/ Competent = 4, Internal/ Noncompetent = 3, External/ Competent = 2, External/ Noncompetent = 1

Total PAAQ Score: ____/56
**Item # 1-Running**

[ ] This boy cannot run very fast.

You cannot run very fast because:
- E. Your shoes are not as good as the other kids.
- I. You don’t try as hard as you can.

**Item # 2-Jump Rope**

[ ] This boy is not good at jumping rope.

You are not good at jumping rope because:
- E. You never get a rope that is the right size.
- I. You don’t try very hard at rope jumping.

**Item # 3-Jumping**

[ ] This boy is good at jumping.

You are good at jumping because:
- I. You have real strong legs from practicing a lot.
- E. Jumping is easy and most people are good at it.

**Item # 4-Dribbling**

[ ] This boy is good at bouncing the ball with one hand.

You are good at bouncing the ball with one hand because:
- I. You work hard at bouncing.
- E. You have a good ball to practice with.

**Item # 5-Swinging**

[ ] This boy is good at swinging on the swing.

You are good at swinging on a swing because:
- I. You pump real hard with your legs.
- E. There is usually someone who helps by pushing you.

**Item # 6-Getting**

[ ] This boy gets the ball thrown to him during the game.

You get the ball thrown to you in a game because:
- I. Teammates know that you will try to catch the ball and help the team win.
- E. Your teammates know that they are supposed to pass to everyone.

**Item # 7-Picking Teams**

[ ] This boy gets picked before the others to be on the team.

You often get picked before others because:
- E. The teacher tells the leader not to pick you last.
- I. People know you are a hard worker in games.

Which boy are you most like?

---

Which boy can run pretty fast.

You can run fast because:
- I. You practice real hard at running.
- E. You have good running shoes.

Which boy are you most like?

---

Which boy is good at jumping rope.

You are good at jumping rope because:
- I. You practice hard at rope jumping.
- E. You have a good rope to practice with.

Which boy are you most like?

---

Which boy is not good at jumping.

You are not good at jumping because:
- E. Jumping is too hard for you.
- I. You don’t practice jumping enough.

Which boy are you most like?

---

Which boy is not good at bouncing the ball with one hand.

You are not good at bouncing the ball with one hand because:
- E. The ball never has the right amount of air in it.
- I. You do not practice bouncing.

Which boy are you most like?

---

Which boy is not good at swinging.

You are not good at swinging on the swing because:
- E. No one will help you learn.
- I. You don’t practice swinging enough.

Section I Total:

Which boy are you most like?

---

This boy does not get the ball thrown to him very much in the game.

You don’t get the ball thrown to you much because:
- I. You don’t work very hard at getting ready to catch the ball.
- E. The other kids know that catching is too difficult for you.

Which boy are you most like?

---

This boy got picked last.

You often get picked last because:
- E. The games are too difficult for you and no one wants you on their team.
- I. You don’t work very hard at playing the games well.
Item # 8-Swimming

[ ] This boy is good at swimming in the deep water.
You are good at swimming in the deep water because:
   ___ E. Swimming is easy when you have a good teacher.
   ___ I. You worked hard at learning how to swim.

Item # 9-Throwing

[ ] This boy is good at throwing balls.
You are good at throwing because:
   ___ I. You practice throwing a lot.
   ___ E. Throwing is easy.

Item # 10-Catching

[ ] This boy is not good at catching balls.
You are not good at catching because:
   ___ I. You don't like to practice catching.
   ___ E. The ball usually gets thrown too hard.

Item # 11-Bike Riding

[ ] This boy is not good at riding a bike.
You are not good at riding a bike because:
   ___ I. You do not practice bike riding a lot.
   ___ E. Your bike is not very good.

Item # 12-Batting

[ ] This boy is good at batting a ball.
You are good at batting because:
   ___ E. The teacher pitched you a good pitch.
   ___ I. You practice batting a lot.

Item # 13-Winning

[ ] These boys have won at the game.
Your team often wins at games because:
   ___ I. You try real hard to help the team win.
   ___ E. You get put on the team with good players.

Item # 14-Shooting

[ ] This boy is not good at shooting a basket.
You are not good at shooting a basket because:
   ___ I. You do not practice shooting enough.
   ___ E. You are not lucky at getting the ball into the hoop.

Which boy are you most like?

[ ] This boy is not good at swimming in the deep water.
You are not good at swimming in the deep water because:
   ___ E. Swimming in the deep water is tougher than swimming in the shallow water.
   ___ I. You don't practice swimming in the deep water.

Which boy are you most like?

[ ] This boy is not good at throwing balls.
You are not good at throwing because:
   ___ E. Throwing is too hard for you.
   ___ I. You don't practice throwing enough.

Section II Total: ______

Which boy are you most like?

[ ] This boy is good at catching balls.
You are good at catching because:
   ___ E. Your partner throws the ball easy so you can catch it.
   ___ I. You have practiced catching a lot.

Which boy are you most like?

[ ] This boy is good at riding a bike.
You are good at riding a bike because:
   ___ E. You have a good bike to ride.
   ___ I. You practice bike riding a lot.

Which boy are you most like?

[ ] This boy is not good at batting a ball.
You are not good at batting the ball because:
   ___ E. The teacher did not pitch you a good pitch.
   ___ I. You don't work very hard at batting.

Section III Total: ______

Which boy are you most like?

[ ] These boys have lost at the game.
Your team often loses at games because:
   ___ I. You don't try very hard for the team.
   ___ E. You never get put on the team with the good players.

Which boy are you most like?

[ ] This boy is good at shooting a basket.
You are pretty good at shooting a basket because:
   ___ I. You practice shooting all the time.
   ___ E. You are lucky at getting the ball into the hoop.

Section IV Total: ______
APPENDIX G

PHYSICAL ACTIVITY ATTRIBUTION QUESTIONNAIRE - FEMALE PLATES
PHYSICAL ACTIVITY ATTRIBUTION QUESTIONNAIRE

(Female Plates)

Directions

1. The testing session needs to be conducted in a quiet room, free of distractions. The child will be seated at a table across from the tester. All items will involve the tester reading the verbal part orally to the child while simultaneously showing the pictures. Tester needs to begin the session by reading the following statements:
   • Before we begin it is important to remember that in this game there are no right or wrong answers.
   • Today I will be showing you some pictures of girls playing.
   • You need to pick the picture of the girl who is most like you.
   • I will read you two reasons "why" you think the girl in the picture is like you. Choose the one that is closest to how you feel (let me read both reasons before you answer why).

2. Once the child identifies the picture, remove the non-chosen picture and read the reasons on the back of the chosen card that depict internal "I" or external "E" responses. Maintain the order of position of items (left/ right) in the presentation of the illustrations of competent versus non-competent. Make sure you read the information on the back of the cards as written.

3. Record which picture was selected and the reasons on the score sheet for each item. Once the child has picked a reason, do not allow her time to expand on the reason. The first choice the child makes will be used for the response. If the child does not identify one of the two responses, repeat the statements and ask her to choose one of the two statements. Do not explain choices, simply repeat and have the child respond.

Scoring of Questionnaire

The questionnaire will give a raw score total for an obtained internal or external attributional profile. Items are to be scored individually first using the following point values that are based on selection of causation statements and level of competence:
Internal/ Competent = 4, Internal/ Noncompetent = 3, External/ Competent = 2, External/ Noncompetent = 1

Total PAAQ Score: ___/56
Item # 1 - Running
[ ] This girl cannot run very fast.
You cannot run very fast because:
   ___ E. Your shoes are not as good as the other kids.
   ___ I. You don't try as hard as you can.

Item # 2 - Jump Rope
[ ] This girl is not good at jumping rope.
You are not good at jumping rope because:
   ___ E. You never get a rope that is the right size.
   ___ I. You don't try very hard at rope jumping.

Item # 3 - Jumping
[ ] This girl is good at jumping.
You are good at jumping because:
   ___ I. You have real strong legs from practicing a lot.
   ___ E. Jumping is easy and most people are good at it.

Item # 4 - Dribbling
[ ] This girl is good at bouncing the ball with one hand.
You are good at bouncing the ball with one hand because:
   ___ I. You work hard at bouncing.
   ___ E. You have a good ball to practice with.

Item # 5 - Swinging
[ ] This girl is good at swinging on the swing.
You are good at swinging on a swing because:
   ___ I. You pump real hard with your legs.
   ___ E. There is usually someone who helps by pushing you.

Item # 6 - Games
[ ] This girl gets the ball thrown to her during the game.
You get the ball thrown to you in a game because:
   ___ I. Teammates know that you will try to catch the ball and help the team win.
   ___ E. Your teammates know that they are supposed to pass to everyone.

Item # 7 - Picking Teams
[ ] This girl got picked before the others to be on the team.
You often get picked before others because:
   ___ E. The teacher tells the leader not to pick you last.
   ___ I. People know you are a hard worker in games.

Which girl are you most like?
[ ] This girl can run pretty fast.
You can run fast because:
   ___ I. You practice running a lot at running.
   ___ E. You have good running shoes

Which girl are you most like?
[ ] This girl is good at jumping rope.
You are good at jumping rope because:
   ___ I. You practice hard at rope jumping.
   ___ E. You have a good rope to practice with.

Which girl are you most like?
[ ] This girl is not good at jumping.
You are not good at jumping because:
   ___ E. Jumping is too hard for you.
   ___ I. You don't practice jumping enough.

Which girl are you most like?
[ ] This girl is not good at bouncing the ball with one hand.
You are not good at bouncing the ball with one hand because:
   ___ E. The ball never has the right amount of air in it.
   ___ I. You do not practice bouncing.

Which girl are you most like?
[ ] This girl is not good at swinging.
You are not good at swinging because:
   ___ E. No one will help you learn.
   ___ I. You don't practice swinging enough.

Section I Total:_______
Which girl are you most like?
[ ] This girl does not get the ball thrown to her very much in the game.
You don't get the ball thrown to you very much because:
   ___ I. You don't work very hard at getting ready to catch the ball.
   ___ E. The other kids know that catching is too difficult for you.

Which girl are you most like?
[ ] This girl got picked last.
You often get picked last because:
   ___ E. The games are too difficult for you and no one wants you on their team.
   ___ I. You don't work very hard at playing the games well.
Item 8-Swimming

[ ] This girl is good at swimming in the deep water.

You are good at swimming in the deep water because:
- E. Swimming is easy when you have a good
teacher.
- I. You worked hard at learning how to swim.

Item 9-Throwing

[ ] This girl is good at throwing balls.

You are good at throwing because:
- I. You practice throwing a lot.
- E. Throwing is easy.

Item 10-Catching

[ ] This girl is not good at catching balls.

You are not good at catching because:
- I. You don't like to practice catching.
- E. The ball usually gets thrown too hard.

Item 11-Bike Riding

[ ] This girl is not good at riding a bike.

You are not good at riding a bike because:
- I. You do not practice bike riding a lot.
- E. Your bike is not very good.

Item 12-Batting

[ ] This girl is good at batting a ball.

You are good at batting because:
- E. The teacher pitched you a good pitch.
- I. You practice batting a lot.

Item 13-Winning

[ ] These girls have won at the game.

Your team often wins at games because:
- I. You try real hard to help the team win.
- E. You get put on the team with good players.

Item 14-Shooting

[ ] This girl is not good at shooting a basket.

You are not good at shooting a basket because:
- I. You do not practice shooting enough.
- E. You are not lucky at getting the ball into the
hoop.

Which girl are you most like?

[ ] This girl is not good at swimming in the deep water.

You are not good at swimming in the deep water because:
- E. Swimming in the deep water is tougher than
swimming in the shallow water.
- I. You don't practice swimming in the deep water.

Which girl are you most like?

[ ] This girl is not good at throwing balls.

You are not good at throwing because:
- E. Throwing is too hard for you.
- I. You don't practice throwing enough

Which girl are you most like?

[ ] This girl is good at catching balls.

You are good at catching because:
- E. Your partner threw the ball easy so you can
catch it.
- I. You have practiced catching a lot.

Which girl are you most like?

[ ] This girl is good at riding a bike.

You are good at riding a bike because:
- E. You have a good bike to ride.
- I. You practice bike riding a lot.

Which girl are you most like?

[ ] This girl is not good at batting a ball.

You are not good at batting the ball because:
- E. The teacher did not pitch you a good pitch.
- I. You don't work very hard at batting.

Which girl are you most like?

[ ] These girls have lost at the game.

Your team often loses at games because:
- You don't try very hard for the team.
- You never get put on the team with the good players.

Which girl are you most like?

[ ] This girl is good at shooting a basket.

You are pretty good at shooting a basket because?
- I. You practice shooting all the time.
- E. You are lucky at getting the ball into the
hoop.

Section IV Total: ________
APPENDIX H

MODIFIED INDIVIDUAL ACHIEVEMENT RESPONSIBILITY SCALE

(MIARS)
Modified Individual Achievement Responsibility Scale

Directions

1. The testing session needs to be conducted in a quiet room, free of
distractions with the child seated at a table across from the tester.

2. All items will involve the tester reading the statements and responses to the
respondents.

3. Tester needs to begin the session by reading the following statements:
   - Before we begin it is important to remember that in this game there are no
     right or wrong answers.
   - I am going to read to a situation that may have occurred in your physical
     education class, and after I read the statement I will read you two reasons
     why the situation happened.
   - Please pick the answer that is closest to how you feel.
   - Please let me read both reasons before you respond.
   - If you cannot remember the exact words for the statement (indicate the part
     that you remember); or, it is OK to pick by telling me you want the "first" or
     "second" reason.
   - If you do not understand what I have read, let me know, and I will read it
     again.
   - Also, I want to tell you that Physical Education is another word for Gym
     Class. When I say Physical Education Teacher, I am talking about your
     Gym teacher.

4. Ask the child if he/she is ready and begin the testing, or repeat the
directions if the child does not appear to understand.

5. Statements and responses should be read to the participant until one of the
two causation statements are selected. No prompting or explanation should
occur for any of the items or statements of causation. Read them as they
appear on the instrument.

Scoring of Questionnaire

A child is rewarded one point for each mastery oriented response (the one's
marked by the bold and italic print). The score is then summed to form a total
scale score between 0 and 20.
QUESTIONNAIRE

STUDENT #______________ INVENTORY #_____

MODIFIED ACHIEVEMENT RESPONSIBILITY QUESTIONNAIRE

MARK EITHER A OR B FOR EACH QUESTION BELOW.

1. When you do well with a task your physical education teacher asks you to do, it is usually

   _____ a. because I work hard to do well, or
   _____ b. because she asks us to do easy stuff?

2. When you have trouble understanding something in your physical education class, is it usually

   _____ a. because your teacher gave us something that was too hard, or
   _____ b. because you didn't pay attention while she was explaining?

3. Suppose you did better than usual in physical education class. Would it probably happen

   _____ a. because you tried harder, or
   _____ b. because someone helped you?

4. Suppose a person doesn't think that you are very smart

   _____ a. can you make him or her change his or her mind, or
   _____ b. are there some people who will think you're not very bright no matter what you do?

5. When you learn something quickly in physical education class, is it usually

   _____ a. because you paid close attention, or
   _____ b. because the teacher explained it clearly?

6. When you find it hard to do something in physical education class, is it

   _____ a. because you didn't practice enough before you tried it, or
   _____ b. because the teacher asked you to do something that was too hard?
7. When you forget something you heard in physical education class, is it
   ___ a. because I have a hard time remembering, or
   ___ b. because you didn't try very hard to remember?

8. Suppose you weren't sure about how to do a certain striking activity, but it turned out that you did it right. Is it
   ___ a. because the physical education teacher didn't care about how you did it, or
   ___ b. because you did it the best way you could?

9. Suppose you don't do as well as usual in physical education class. Would this happen.
   ___ a. because you weren't as careful as usual, or
   ___ b. because you can't seem to understand what was given?

10. When you find it easy to do some of the striking activities your physical education teacher asks you to do, is it usually
    ___ a. because she gave you especially easy things to do, or
    ___ b. because you practiced well before you tried them?

11. When you remember something you heard in physical education, class, is it
    ___ a. because you tried hard to remember, or
    ___ b. because your teacher explained it well?

12. If a boy or girl tells you that you are dumb, is it more likely that they say that
    ___ a. because I usually do dumb things, or
    ___ b. because what you did really wasn't very bright?

13. When you win in a game played in physical education or sport, does it usually happen
    ___ a. because the other player(s) are not very good at the game, or
    ___ b. because you played well?

14. Suppose your parents say you are doing well in school, is it likely to happen
    ___ a. because your school work is good, or
    ___ b. because they are in a good mood?
15. If your physical education teacher says to you, “Your work is fine,” is it
   __ a. something teachers usually say to encourage pupils, or
   __ b. because you did a good job?

16. If your parents tell you you’re acting silly and not thinking clearly, it is
    more likely to be
   __ a. because of something you did, or
   __ b. because they happen to be feeling cranky?

17. If a boy or girl tells you that you are bright, is it usually
   __ a. because you thought up a good idea, or
   __ b. Because they like you?

18. Suppose your parents say you aren’t doing well in your school work. Is
    this likely to happen more
   __ a. because your work isn’t very good, or
   __ b. because they are feeling cranky?

19. Suppose you are showing a friend how to play a game and he or she has
    trouble with it. Would that happen
   __ a. because he wasn’t able to understand how to play, or
   __ b. because you couldn’t explain it well?

20. If your physical education teacher says to you, “Try to do better,” would it be
   __ a. because this is something she might say to get pupils to try
       harder, or
   __ b. because your work wasn’t as good as usual?

   TOTAL MIARS SCORE:_____

*BOLD* indicates a mastery oriented selection and given a point in the total
score.

(Martinek, 1992a)
APPENDIX I

PERMISSION TO MODIFY THE PERCEIVED COMPETENCE SCALE
Message 1/1  From ulrich  Apr 3, 95 11:25:05 pm -0500

Date: Wed, 3 Apr 1995 23:28:02 -0500 (EST)
From: Ulrich <ulrich@esmail.wcs.indiana.edu>
To: Francis K Horn <kona@magmas.ans ohio-state.edu>
Cc: gporrett@magmas.ans ohio-state.edu
Subject: RE: Perceived Comp Scales

Francis,

The PC scales that you are referring to have not been published. The 1990
ABAC article is as far as I got. Jocelyn & I are planning to initiate some
work in a few weeks. You are welcome to use them and modify them in
any way for your research. I will be presenting some additional info in
Norway and providing some suggestions on needed research in this area.
Good luck.

Dale

Dale A. Ulrich, Ph.D.
Motor Development Lab
Tel: (812) 855-8183
Dept of Kinesiology
Fax: (812), 855-5728
Indiana University

Message 1/1  From ulrich  Apr 3, 95 11:25:05 pm -0500

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APPENDIX J

ITEM COEFFICIENTS FOR PAAQ PRELIMINARY TEST
### Pearson r Test-Retest Coefficients
Of Retained Items (n = 86)

<table>
<thead>
<tr>
<th>ITEM</th>
<th>PEARSON r</th>
<th>LEVEL of SIGNIFICANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dribbling Item</td>
<td>.58</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Running</td>
<td>.43</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Jumping Rope</td>
<td>.38</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Games</td>
<td>.27</td>
<td>&lt;.01</td>
</tr>
<tr>
<td>Throwing</td>
<td>.36</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Jumping</td>
<td>.33</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Catching</td>
<td>.40</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Picking Teams</td>
<td>.54</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Bike Riding</td>
<td>.47</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Swimming</td>
<td>.60</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Batting</td>
<td>.29</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Swinging</td>
<td>.64</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Shooting</td>
<td>.45</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Winning</td>
<td>.38</td>
<td>&lt;.001</td>
</tr>
</tbody>
</table>
APPENDIX K

FLASH CARDS FOR MALE AND FEMALE PAAQ
APPENDIX L

PRINCIPAL COMPONENTS ANALYSIS
## PAAQ Items Having Absolute Value Loadings of .40 or Greater

<table>
<thead>
<tr>
<th>Items</th>
<th>Unknown Cont.</th>
<th>Task Diff.</th>
<th>Powerful Oth.</th>
<th>Chance</th>
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<tr>
<td>Running</td>
<td>.67</td>
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<tr>
<td>Jump Rope</td>
<td>.62</td>
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<tr>
<td>Jumping</td>
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<tr>
<td>Dribble</td>
<td>.50</td>
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<tr>
<td>Swinging</td>
<td>.44</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Games</td>
<td>.62</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Pick Team</td>
<td>.56</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Swimming</td>
<td>.49</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Throwing</td>
<td>.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catching</td>
<td></td>
<td>.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bike Riding</td>
<td></td>
<td>-.57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Batting</td>
<td>.42</td>
<td>.48</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Winning</td>
<td></td>
<td></td>
<td>.74</td>
<td></td>
</tr>
<tr>
<td>Shooting</td>
<td></td>
<td></td>
<td>.57</td>
<td></td>
</tr>
</tbody>
</table>

**% of total variance**  
50.6

### Note
The unrotated factor matrix was used based on salient loadings and grouping of the variables.
<table>
<thead>
<tr>
<th>Variable</th>
<th>Communality</th>
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</thead>
<tbody>
<tr>
<td>Running</td>
<td>.56</td>
</tr>
<tr>
<td>Jump Rope</td>
<td>.42</td>
</tr>
<tr>
<td>Jumping</td>
<td>.54</td>
</tr>
<tr>
<td>Dribble</td>
<td>.41</td>
</tr>
<tr>
<td>Swinging</td>
<td>.38</td>
</tr>
<tr>
<td>Games</td>
<td>.49</td>
</tr>
<tr>
<td>Pick Team</td>
<td>.51</td>
</tr>
<tr>
<td>Swimming</td>
<td>.38</td>
</tr>
<tr>
<td>Throwing</td>
<td>.37</td>
</tr>
<tr>
<td>Catching</td>
<td>.53</td>
</tr>
<tr>
<td>Bike Riding</td>
<td>.41</td>
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<tr>
<td>Batting</td>
<td>.54</td>
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<tr>
<td>Winning</td>
<td>.70</td>
</tr>
<tr>
<td>Shooting</td>
<td>.74</td>
</tr>
</tbody>
</table>
APPENDIX M

"STABIBALL" - GROSS MOTOR TASK
APPENDIX N

"LABYRINTH" - FINE MOTOR TASK
APPENDIX O

SCRIPT FOR MOTOR TASKS
Script for Motor Tasks

Session 1

1. How are you doing today?
   Today we are going to play some more games.
   Let me show you how to play the first one.

   I want you to follow a few rules when playing the games.

   *Stabilball:

   2a. (During the Demonstration)
   You must start each turn with the ball in the front of the maze, and your feet on the ground. Like this. Do not try to drop the ball in the maze while standing on the board.

   ... Next, step on like this and try to move the ball through the maze.
   It is against the rules to try and pop the ball up, instead you must try to roll it through the openings like this (without letting the ball drop thru the holes) to win at the game.

   *Labyrinth:

   2b. You must follow the red line to win at the game.

3. Now you try

4. Do you understand how to play?

   “Yes” - Ok now you try to play. “Go”
   “No” - Explain the game again (go back to 2a or 2b)

5. It is OK to stop when you don’t want to play anymore.

6. During the game make sure to prompt students when they do not follow the rules using the following:

Remember start with your feet on the ground with the ball in front (demonstrate if necessary)
Do not try to pop the ball over the maze, roll it.
At 5 minutes:
Remember, it is OK to stop when you don’t want to play anymore.
At 10 minutes: Stop

7. Now I want you to try another game (go to 2a or 2b)
   Go to the 2a or b, Demonstrate/ read the rules.

8. Stop, lets go back to class and get the next person.
Session 2
1. How are you doing today?
Today we are going to play the same games as last time.
Let's start with this one today (counterbalance from last session)
Let me show you how to play the first one again.

Remember the rules for ________ include:

   *Stabiball:
2a. (During the Demonstration)
You must start each turn with the ball in the front of the maze, and your feet on the
ground. Like this. Do not try to drop the ball in the maze while standing on the board.

Next, step on like this and try to move the ball through the maze.
It is against the rules to try and pop the ball up, instead you must try to roll it through
the openings like this (without letting the ball drop thru the holes) to win at the game.

   *Labyrinth
2b. You must follow the red line to win at the game.

3. Now you try

4. Do you understand how to play?

"Yes" - Ok now you try to play. "Go"
"No" - Explain the game again and let student try once as in session 1 (go back to 2a
or b)

5. It is OK to stop when you don't want to play anymore.

6. During the game make sure to prompt students when they do not follow the
rules using the following:

Remember start with your feet on the ground with the ball in front (demonstrate if
necessary)

Do not try to pop the ball over the maze, roll it.
At 5 minutes:
Remember, It is OK to stop when you don't want to play anymore.
At 10 minutes: Stop

7. Now I want you to try another game (go to 2a or 2b)
Go to the 2a or b. Demonstrate/ read the rules.

8. Stop, let's go back to class and get the next person.
Session 3

1. How are you doing today?
Today we are going to play the same games as last time.
Let's start with this one today (counterbalance from last session)
Let me show you how to play the first one again.

Remember the rules for ________ include:

*Stabiball:
2a. (During the Demonstration)
You must start each turn with the ball in the front of the maze, and your feet on the
ground. Like this. Do not try to drop the ball in the maze while standing on the board.

Next, step on like this and try to move the ball through the maze.
It is against the rules to try and pop the ball up, instead you must try to roll it through
the openings like this (without letting the ball drop thru the holes) to win at the game.

*Labyrinth
2b. You must follow the red line to win at the game.

3. Do you understand how to play?

"Yes" - Ok now you try to play. "Go"
"No" - Explain the game again and let student try once as in session 1 (go back to 2a
or b)

4. Now you try.

5. It is OK to stop when you don't want to play anymore.

6. During the game make sure to prompt students when they do not follow the
rules using the following:

Remember start with your feet on the ground with the ball in front (demonstrate if
necessary)
Do not try to pop the ball over the maze, roll it.
At 5 minutes:
Remember, it is OK to stop when you don't want to play anymore.
At 10 minutes: Stop

7. Now I want you to try another game (go to 2a or 2b)
Go to the 2a or b, Demonstrate/read the rules.

8. Stop, let's go back to class and get the next person.
We are finished and I want to thank you for doing such a nice job.
APPENDIX P

PILOT STUDY RESULTS
### Raw Pilot Data

<table>
<thead>
<tr>
<th>Group</th>
<th>Gender</th>
<th>PAAQ</th>
<th>MIARS</th>
<th>GmSec</th>
<th>GmTria</th>
<th>FmSec</th>
<th>FMTrig</th>
</tr>
</thead>
<tbody>
<tr>
<td>CD</td>
<td>Male</td>
<td>2.5</td>
<td>11</td>
<td>132</td>
<td>6</td>
<td>214</td>
<td>16</td>
</tr>
<tr>
<td>CD</td>
<td>Male</td>
<td>3.28</td>
<td>14</td>
<td>564</td>
<td>31</td>
<td>422</td>
<td>44</td>
</tr>
<tr>
<td>CA</td>
<td>Female</td>
<td>3.78</td>
<td>12</td>
<td>80</td>
<td>3</td>
<td>80</td>
<td>6</td>
</tr>
<tr>
<td>DA</td>
<td>Male</td>
<td>2.64</td>
<td>10</td>
<td>426</td>
<td>15</td>
<td>443</td>
<td>29</td>
</tr>
<tr>
<td>CA</td>
<td>Male</td>
<td>3.50</td>
<td>15</td>
<td>474</td>
<td>23</td>
<td>557</td>
<td>43</td>
</tr>
<tr>
<td>DA</td>
<td>Female</td>
<td>3.00</td>
<td>9</td>
<td>481</td>
<td>36</td>
<td>373</td>
<td>46</td>
</tr>
</tbody>
</table>

**Note.** Both subjects representing the CD group had LD labels with IQ scores below 80 (79 & 75). No female CD subjects were used for pilot due to low numbers reflecting this categorical variable. The CA IQ scores for pilot subjects were within 1 SD of the norm.

### TASK PERSISTENCE X PAAQ SCORE FOR PILOT

(\(n = 8\))

![Graph showing task persistence vs. PAAQ score for pilot](image)

**Note.** Results of pilot work for participants from subjects representing the Cognitive Disability Group (CD), Chronological Age Group (CA), and Developmental Age Group (DA).

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APPENDIX Q

PROCEDURAL CHECKS AND RESULTS OF
INTER OBSERVER AGREEMENT
PROCEDURAL CHECKLIST AND RESULTS (n = 15)

Directions: Complete each question for the sessions contained on the tapes. All subjects have three motor sessions that contain a gross and a fine motor task. Please do not leave any questions blank.

Session 1

1. The investigator explained the game to the subject in a manner that followed the protocol:
   Fine Motor Task (Labyrinth)  Gross Motor Task (Stabiball)
   \[100\% \text{ Yes} \quad \text{No}\]  \[93\% \text{ Yes} \quad 7\% \text{ No}\]

2. The investigator gave the subject an adequate demonstration of the game:
   Fine Motor Task (Labyrinth)  Gross Motor Task (Stabiball)
   \[100\% \text{ Yes} \quad \text{No}\]  \[93\% \text{ Yes} \quad 7\% \text{ No}\]

3. The subject was given a practice trial, and appeared to understand the concept of the game:
   Fine Motor Task (Labyrinth)  Gross Motor Task (Stabiball)
   \[100\% \text{ Yes} \quad \text{No}\]  \[100\% \text{ Yes} \quad \text{No}\]

4. At the 5 minute mark (approximately), the subject was prompted: "it is OK to stop when you do not want to play anymore."
   Fine Motor Task (Labyrinth)  Gross Motor Task (Stabiball)
   \[93\%^* \text{ Yes} \quad 7\% \text{ No}\]  \[100\%^* \text{ Yes} \quad \text{No}\]

* Reflects "yes" responses and that subject did not persist beyond the 5 minutes.

5. a) The subject engaged in the fine motor task (Labyrinth) for \[\text{minutes} \quad \text{seconds}\] from the time the investigator said "go" till the subject stopped. \[r = .99\]

b) The subject engaged in the gross motor task (Stabiball) for \[\text{minutes} \quad \text{seconds}\] from the time the investigator said "go" till the subject stopped. \[r = .99\]
6. The investigator used feedback relative to successful or unsuccessful participation at the task in an attempt to motivate the subject (i.e., “nice job” etc.).

Fine Motor Task (Labyrinth)  Gross Motor Task (Stabiball)

____ Yes  100% No  ____ Yes  100% No

Session II

1. The investigator explained the game to the subject in a manner that followed the protocol:

Fine Motor Task (Labyrinth)  Gross Motor Task (Stabiball)

93% Yes  7% No  100% Yes  ____ No

2. The investigator gave the subject an adequate demonstration of the game:

Fine Motor Task (Labyrinth)  Gross Motor Task (Stabiball)

93% Yes  7% No  100% Yes  ____ No

3. At the 5 minute mark (approximately), the subject was prompted: “It is OK to stop when you do not want to play anymore.”

Fine Motor Task (Labyrinth)  Gross Motor Task (Stabiball)

100% either “Yes” or Subject did not persist past the 5 minute mark

4. a) The subject engaged in the fine motor task (Labyrinth) for _____ minutes _____ seconds from the time the investigator said “go” till the subject stopped.

   (r = .99)

   b) The subject engaged in the gross motor task (Stabiball) for _____ minutes _____ seconds from the time the investigator said “go” till the subject stopped.

   (r = .99)

5. The investigator used feedback relative to successful or unsuccessful participation at the task in an attempt to motivate the subject (i.e., “nice job” etc.).

Fine Motor Task (Labyrinth)  Gross Motor Task (Stabiball)

____ Yes  100% No  ____ Yes  100% No
Session III

1. The investigator explained the game to the subject in a manner that followed the protocol:
   Fine Motor Task (Labyrinth)   Gross Motor Task (Stabiball)

   100% Yes   _____ No           100% Yes   _____ No

2. The investigator gave the subject an adequate demonstration of the game:
   Fine Motor Task (Labyrinth)   Gross Motor Task (Stabiball)

   100% Yes   _____ No           100% Yes   _____ No

3. At the 5 minute mark (approximately), the subject was prompted: “It is OK to stop when you do not want to play anymore.”
   Fine Motor Task (Labyrinth)   Gross Motor Task (Stabiball)

   100% “yes” response or subject did not persist past 5 minute mark.

4. a) The subject engaged in the fine motor task (Labyrinth) for _____ minutes _____ seconds from the time the investigator said “go” till the subject stopped.

   \( r = .92 \)

   b) The subject engaged in the gross motor task (Stabiball) for _____ minutes _____ seconds from the time the investigator said “go” till the subject stopped.

   \( r = .94 \)

5. The investigator used feedback relative to successful or unsuccessful participation at the task in an attempt to motivate the subject (ie., “nice job” etc.).
   Fine Motor Task (Labyrinth)   Gross Motor Task (Stabiball)

   _____ Yes 100% No           _____ Yes 100% No

Total Pearson \( r \) for each task using means from IOA and Investigator (all 3 sessions):

Fine motor persistence using three session mean: \( (r = .95) \)
Gross motor persistence using three session mean: \( (r = .99) \)
APPENDIX R

CASES ELIMINATED FROM ANALYSIS AND RATIONAL FOR ELIMINATION
<table>
<thead>
<tr>
<th>ID Number</th>
<th>Group</th>
<th>Rationale for Throwing Case Out</th>
</tr>
</thead>
<tbody>
<tr>
<td>203</td>
<td>DA</td>
<td>General education placement and labeled LD by school district (IQ=79).</td>
</tr>
<tr>
<td>208</td>
<td>CA</td>
<td>Missing data (MIARS)</td>
</tr>
<tr>
<td>219</td>
<td>DA</td>
<td>General education placement and labeled SI.</td>
</tr>
<tr>
<td>221</td>
<td>DA</td>
<td>Subject's attributional data was used for analysis, however, task persistence data was thrown out. Subject did not complete any sessions for either motor tasks due to toileting problem and subsequent refusal to continue in study.</td>
</tr>
<tr>
<td>225</td>
<td>DA</td>
<td>General education placement and labeled LD by school district.</td>
</tr>
<tr>
<td>234</td>
<td>DA</td>
<td>Missing data (MIARS)</td>
</tr>
<tr>
<td>259</td>
<td>CA</td>
<td>New student in school district that attends the resource room. No IQ scores available for student. Based on teacher comments student may be eligible down the road for special services.</td>
</tr>
<tr>
<td>263</td>
<td>CA</td>
<td>Missing data (MIARS)</td>
</tr>
<tr>
<td>279</td>
<td>CD</td>
<td>Student speaks Spanish as first language and requires an interpreter for educational testing. Student file indicates that a discrepancy may exist in the IQ score (83/ S-B) and the child's abilities.</td>
</tr>
<tr>
<td>280</td>
<td>CD</td>
<td>Labeled ED (emotionally disturbed) by district</td>
</tr>
<tr>
<td>284</td>
<td>CD</td>
<td>Subject labeled speech impaired (SI) and has physical disabiility (mild spastic cerebral palsy).</td>
</tr>
<tr>
<td>291</td>
<td>CD</td>
<td>WISC-III composite IQ of 84.</td>
</tr>
<tr>
<td>293</td>
<td>CD</td>
<td>Verbal IQ of 74 and Performance IQ of 91 (85/ WISC-R) with an LD educational label.</td>
</tr>
<tr>
<td>295</td>
<td>CD</td>
<td>IQ score of 81 (WISC-R) with LD educational label.</td>
</tr>
<tr>
<td>304</td>
<td>CD</td>
<td>IQ score of 86 with LD educational label.</td>
</tr>
<tr>
<td>307</td>
<td>CD</td>
<td>Subject had limited verbal ability and the researcher could not understand responses to MIARS and PAAQ attributional statements.</td>
</tr>
<tr>
<td>409</td>
<td>CA</td>
<td>General education placement and labeled LD by school district (IQ=88).</td>
</tr>
<tr>
<td>456</td>
<td>CA</td>
<td>General education placement and labeled LD by school district (IQ=90).</td>
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<tr>
<td>464</td>
<td>CA</td>
<td>General education placement and labeled LD by school district (IQ=94).</td>
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APPENDIX S

DEMOGRAPHIC DATA ON COGNITIVE DISABILITY GROUP
<table>
<thead>
<tr>
<th>Id #</th>
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<th>Label</th>
<th>IQ/ Test</th>
<th>DOB</th>
<th>Adaptive Behavior</th>
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<tbody>
<tr>
<td>207</td>
<td>M</td>
<td>LD</td>
<td>75/ OL</td>
<td>12/9/95</td>
<td>Missing Data</td>
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<tr>
<td>217</td>
<td>M</td>
<td>LD</td>
<td>79/ OL</td>
<td>11/1/85</td>
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<tr>
<td>281*</td>
<td>M</td>
<td>MR</td>
<td>67/ K-TEA</td>
<td>11/30/86</td>
<td>Missing Data</td>
</tr>
<tr>
<td>282*</td>
<td>F</td>
<td>MR</td>
<td>57/ K-TEA</td>
<td>1/20/85</td>
<td>Missing Data</td>
</tr>
<tr>
<td>283*</td>
<td>F</td>
<td>LD</td>
<td>78/ WISC-III</td>
<td>5/15/85</td>
<td>Missing Data</td>
</tr>
<tr>
<td>285*</td>
<td>M</td>
<td>LD</td>
<td>64/ WISC-III</td>
<td>6/18/85</td>
<td>71/ Vineland</td>
</tr>
<tr>
<td>286*</td>
<td>F</td>
<td>LD</td>
<td>69/ WISC-R</td>
<td>6/17/85</td>
<td>58/ Vineland</td>
</tr>
<tr>
<td>287</td>
<td>F</td>
<td>LD</td>
<td>79/ WISC-R</td>
<td>12/16/85</td>
<td>Missing Data</td>
</tr>
<tr>
<td>288</td>
<td>M</td>
<td>LD</td>
<td>78/ WISC-R</td>
<td>1/2/85</td>
<td>Missing Data</td>
</tr>
<tr>
<td>292*</td>
<td>F</td>
<td>MR</td>
<td>64/ WISC-R</td>
<td>12/17/83</td>
<td>49/ Vineland</td>
</tr>
<tr>
<td>294*</td>
<td>M</td>
<td>MR</td>
<td>66/ S-B</td>
<td>5/18/84</td>
<td>60/ Vineland</td>
</tr>
<tr>
<td>296*</td>
<td>M</td>
<td>LD</td>
<td>74/ K-TEA</td>
<td>11/25/84</td>
<td>Missing Data</td>
</tr>
<tr>
<td>297*</td>
<td>M</td>
<td>MR</td>
<td>64/ WISC-R</td>
<td>4/15/83</td>
<td>71/ Vineland</td>
</tr>
<tr>
<td>298*</td>
<td>F</td>
<td>MR</td>
<td>55/ WISC-III</td>
<td>1/5/83</td>
<td>77/ Vineland</td>
</tr>
<tr>
<td>299*</td>
<td>F</td>
<td>MR</td>
<td>56/ WISC-III</td>
<td>12/14/85</td>
<td>59/ Vineland</td>
</tr>
<tr>
<td>300*</td>
<td>F</td>
<td>MR</td>
<td>76/ OL</td>
<td>9/12/86</td>
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<tr>
<td>301*</td>
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<td>LD</td>
<td>75/ OL</td>
<td>5/6/86</td>
<td>Missing Data</td>
</tr>
<tr>
<td>302*</td>
<td>M</td>
<td>MR</td>
<td>68/ OL</td>
<td>7/19/85</td>
<td>Missing Data</td>
</tr>
<tr>
<td>303*</td>
<td>F</td>
<td>MR</td>
<td>62/ OL</td>
<td>3/26/85</td>
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</table>
(Appendix S continued)

<table>
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<th>Id #</th>
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<th>DOB</th>
<th>Adaptive Behavior</th>
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<td>305*</td>
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<td>LD</td>
<td>48/ S-B</td>
<td>12/25/83</td>
<td>Missing Data</td>
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<tr>
<td>306*</td>
<td>M</td>
<td>MR</td>
<td>41/ Peabody</td>
<td>6/23/85</td>
<td>Missing Data</td>
</tr>
<tr>
<td>308*</td>
<td>M</td>
<td>MR</td>
<td>70/ Missing</td>
<td>2/25/85</td>
<td>Missing Data</td>
</tr>
<tr>
<td>309*</td>
<td>M</td>
<td>MR</td>
<td>45/ Peabody</td>
<td>7/12/87</td>
<td>Missing Data</td>
</tr>
<tr>
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<td>M</td>
<td>MR</td>
<td>40/ Missing</td>
<td>3/13/87</td>
<td>Missing Data</td>
</tr>
<tr>
<td>311*</td>
<td>M</td>
<td>MR</td>
<td>66/ S-B</td>
<td>6/18/85</td>
<td>Missing Data</td>
</tr>
</tbody>
</table>

**Note.** (*) denotes subject participated in both Attributional Testing and Motor Tasks. IQ test are denoted as follows: Otis Lennon = OL, Koffman Test of Educational Achievement = K-TEA, Wechsler Intelligence Scale for Children-III = WISC-III, Wechsler Intelligence Scale for Children - Revised = WISC-R, Stanford-Binet intelligence Scale = S-B, Peabody Pictorial Scale of Intelligence = Peabody, and Missing = teacher did not know the scale.
APPENDIX T

NORMAL PROBABILITY PLOTS OF KEY VARIABLES
APPENDIX U

SCATTERPLOT OF TOTAL PAAQ X TOTAL MIARS SCORES

FOR ALL SUBJECTS (n = 91)
Relationship Between Attributional Measures

PAAQ MEAN per item Score
Scores are for total sample (n = 91)

Rho = .56
APPENDIX V

MULTIPLE REGRESSION ANALYSIS OF TOTAL PAAQ SCORES
**MULTIPLE REGRESSION**

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std Dev</th>
<th>Label</th>
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<td>PAAQ</td>
<td>3.111</td>
<td>.477</td>
<td>PAAQ MEAN per Item Score</td>
</tr>
<tr>
<td>CA</td>
<td>.363</td>
<td>.463</td>
<td>Chronological Age (Non dis)</td>
</tr>
<tr>
<td>DA</td>
<td>.363</td>
<td>.483</td>
<td>Developmental Age (Non dis 6-8)</td>
</tr>
<tr>
<td>AGE_MO</td>
<td>114.462</td>
<td>24.283</td>
<td>Chron Age In Months</td>
</tr>
<tr>
<td>GENDER</td>
<td>.505</td>
<td>.503</td>
<td>Gender Coded</td>
</tr>
</tbody>
</table>

\[ \text{N of Cases = 91} \]

Equation Number 1  Dependent Variable.. PAAQ  PAAQ MEAN per Item Score

Descriptive Statistics are printed on Page 2

Block Number 1. Method: Enter CA DA

<table>
<thead>
<tr>
<th>Step</th>
<th>MultR</th>
<th>Rsq</th>
<th>F(Eqn)</th>
<th>SigF</th>
<th>Variable</th>
<th>Betain</th>
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<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>In: DA -.2416</td>
</tr>
<tr>
<td>2</td>
<td>.5880</td>
<td>.3457</td>
<td>23.248</td>
<td>.000</td>
<td>In: CA</td>
<td></td>
</tr>
<tr>
<td>.6518</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

End Block Number 1 All requested variables entered.

Block Number 2. Method: Enter AGE_MO GENDER

Variable(s) Entered on Step Number

3.. GENDER  Gender Coded
4.. AGE_MO  Chron Age In Months

Multiple R .59963
R Square .35956
Adjusted R Square .32977
Standard Error .39016
Analysis of Variance

\[ \begin{array}{ccc}
\text{DF} & \text{Sum of Squares} & \text{Mean Square} \\
\text{Regression} & 4 & 7.34997 & 1.83749 \\
\text{Residual} & 86 & 13.09150 & .15223 \\
\end{array} \]

\[ F = 12.07076 \quad \text{Signif F = .0000} \]

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Variables in the Equation

<table>
<thead>
<tr>
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<th>SE B</th>
<th>Beta</th>
<th>Tolerance</th>
<th>VIF</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>CA</td>
<td>0.689144</td>
<td>0.114265</td>
<td>0.699044</td>
<td>0.554321</td>
<td>1.804</td>
<td>6.031</td>
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<tr>
<td>DA</td>
<td>0.292014</td>
<td>0.270361</td>
<td>0.296209</td>
<td>0.099015</td>
<td>10.099</td>
<td>1.080</td>
</tr>
<tr>
<td>AGE_MO</td>
<td>0.003011</td>
<td>0.004818</td>
<td>0.153440</td>
<td>0.123577</td>
<td>8.092</td>
<td>0.625</td>
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<tr>
<td>GENDER</td>
<td>0.102092</td>
<td>0.082673</td>
<td>0.107696</td>
<td>0.979122</td>
<td>1.021</td>
<td>1.235</td>
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<td>2.358568</td>
<td>0.666792</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

in

<table>
<thead>
<tr>
<th>Variable</th>
<th>Sig T</th>
</tr>
</thead>
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<tr>
<td>DA</td>
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<td>AGE_MO</td>
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<td>GENDER</td>
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<tr>
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Collinearity Diagnostics

<table>
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<tr>
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<th>Eigenval</th>
<th>Cond Index</th>
<th>Variance Proportions</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Constant</td>
<td>CA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>DA</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>AGE_MO</td>
</tr>
<tr>
<td>GENDER</td>
<td>3.30362</td>
<td>1.000</td>
<td>0.00033</td>
</tr>
<tr>
<td></td>
<td>.02878</td>
<td>1.02750</td>
<td>1.793</td>
</tr>
<tr>
<td></td>
<td>.00862</td>
<td>2.700</td>
<td>0.00021</td>
</tr>
<tr>
<td></td>
<td>.07019</td>
<td>3.934</td>
<td>0.00206</td>
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<tr>
<td></td>
<td>.54738</td>
<td>39.331</td>
<td>0.99740</td>
</tr>
<tr>
<td></td>
<td>.21348</td>
<td>2.1440</td>
<td>0.89370</td>
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<tr>
<td></td>
<td>.00214</td>
<td>0.00650</td>
<td>0.99202</td>
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</table>

End Block Number 2 All requested variables entered.

Equation Number 1 Dependent Variable: PAAQ MEAN per Item Score
Residuals Statistics:

<table>
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<tr>
<th></th>
<th>Min</th>
<th>Max</th>
<th>Mean</th>
<th>Std Dev</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>*PRED</td>
<td>2.7260</td>
<td>3.5443</td>
<td>3.1107</td>
<td>.2858</td>
<td>91</td>
</tr>
<tr>
<td>*RESID</td>
<td>-1.4392</td>
<td>.8953</td>
<td>.0000</td>
<td>.3814</td>
<td>91</td>
</tr>
<tr>
<td>*ZPRED</td>
<td>-1.3462</td>
<td>1.5174</td>
<td>.0000</td>
<td>1.0000</td>
<td>91</td>
</tr>
<tr>
<td>*ZRESID</td>
<td>-3.6887</td>
<td>2.2946</td>
<td>.0000</td>
<td>.9775</td>
<td>91</td>
</tr>
</tbody>
</table>

Durbin-Watson Test = 2.07136
Plot of Residuals with Predicted PAAQ Scores
(n = 91)

Scatterplot
Dependent Variable: PAAQ MEAN per Item Score

Regression Standardized Residual

Regression Standardized Predicted Value
Normal Probability Plot of Residuals
(n = 91)

Normal P-P Plot of Regression Standardized Residual
Dependent Variable: PAAQ MEAN per Item Score
APPENDIX W

ONE WAY ANOVA ANALYSIS OF VARIANCE - MIARS SCORES
## ONE WAY

Variable MIARS MIARS total score
By Variable GROUP Group Affiliation based on IQ

### Analysis of Variance

<table>
<thead>
<tr>
<th>Source</th>
<th>D.F.</th>
<th>Sum of Squares</th>
<th>Mean Squares</th>
<th>F</th>
<th>F Prob.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>2</td>
<td>407.4133</td>
<td>203.7066</td>
<td>36.9174</td>
<td>.0000</td>
</tr>
<tr>
<td>Within Groups</td>
<td>88</td>
<td>485.5758</td>
<td></td>
<td>5.5179</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>892.9890</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Variable MIARS MIARS total score
By Variable GROUP Group Affiliation based on IQ

Multiple Range Tests: Scheffe test with significance level .05

The difference between two means is significant if

\[
\text{MEAN}(J) - \text{MEAN}(I) \geq 1.6610 \times \text{RANGE} \times \sqrt{1/N(I) + 1/N(J)}
\]

with the following value(s) for RANGE: 3.52

(*) Indicates significant differences which are shown in the lower triangle

```
G G G
r r r
p p p
```

<table>
<thead>
<tr>
<th>Mean</th>
<th>GROUP</th>
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</thead>
<tbody>
<tr>
<td>10.2424</td>
<td>Grp 2</td>
</tr>
<tr>
<td>10.6000</td>
<td>Grp 1</td>
</tr>
<tr>
<td>14.7879</td>
<td>Grp 3</td>
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</table>
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APPENDIX X

MULTIPLE REGRESSION ANALYSIS OF GROSS MOTOR PERSISTENCE
***MULTIPLE REGRESSION***

<table>
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<tr>
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<th>Std Dev</th>
<th>Label</th>
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</thead>
<tbody>
<tr>
<td>SQRGM</td>
<td>16.477</td>
<td>6.168</td>
<td>Transformed Gross Motor Score</td>
</tr>
<tr>
<td>PAAQ</td>
<td>3.110</td>
<td>.485</td>
<td>PAAQ MEAN per Item Score</td>
</tr>
<tr>
<td>CA</td>
<td>.328</td>
<td>.473</td>
<td>Chronological Age (Non dis)</td>
</tr>
<tr>
<td>DA</td>
<td>.328</td>
<td>.473</td>
<td>Developmental Age (Non dis 6-8)</td>
</tr>
<tr>
<td>GENDER</td>
<td>.508</td>
<td>.504</td>
<td>Gender Coded</td>
</tr>
<tr>
<td>AGE_MO</td>
<td>117.230</td>
<td>24.385</td>
<td>Chron Age In Months</td>
</tr>
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</table>

N of Cases = 61

Equation Number 1  Dependent Variable..  SQRGM  Transformed Gross Motor Scor

Block Number 1. Method: Enter  PAAQ

Variable(s) Entered on Step Number
1..  PAAQ  PAAQ MEAN per Item Score

Multiple R       .37566
R Square         .14112
Adjusted R Square .12666
Standard Error   5.76433

Analysis of Variance

<table>
<thead>
<tr>
<th></th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>1</td>
<td>322.11457</td>
<td>322.11457</td>
</tr>
<tr>
<td>Residual</td>
<td>59</td>
<td>1960.42084</td>
<td>33.22747</td>
</tr>
</tbody>
</table>

F = 9.69422  Signif F = .0029

End Block Number 1 All requested variables entered.

Block Number 1. Method: Enter  PAAQ

Step  MultR  Rsq  F(Eqn)  SigF  Variable  Betain
1  .3757  .1411  9.694  .003  In: PAAQ  .3757

End Block Number 1 All requested variables entered.
Block Number 2. Method: Enter CA DA

Variable(s) Entered on Step Number:
2. DA Developmental Age (Non dis 6-8)
3. CA Chronological Age (Non dis)

Multiple R .64486
R Square .41584
Adjusted R Square .38509
Standard Error 4.83657

R Square Change .27472
F Change 13.40299
Signif F Change .0000

Analysis of Variance

<table>
<thead>
<tr>
<th></th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>3</td>
<td>949.17005</td>
<td>316.39002</td>
</tr>
<tr>
<td>Residual</td>
<td>57</td>
<td>1333.36535</td>
<td>23.39237</td>
</tr>
</tbody>
</table>

F = 13.52535  Signif F = .0000

Block Number 1. Method: Enter PAAQ

Step MultiR Rsq F(Eqn) SigF Variable Betain
1 .3757 .1411 9.594 .003 In: PAAQ .3757

End Block Number 1 All requested variables entered.

Block Number 2. Method: Enter CA DA

Step MultiR Rsq F(Eqn) SigF Variable Betain
2 .6449 .4158 13.525 .000 In: DA .3881
3 .3881 .5366

End Block Number 2 All requested variables entered.

Block Number 3. Method: Enter GENDER AGE_MO

Variable(s) Entered on Step Number:
4. GENDER Gender Coded
5. AGE_MO Chron Age In Months
Multiple R  .66097
R Square  .43688  R Square Change  .02104
Adjusted R Square  .38569  F Change  1.02755
Standard Error  4.83423  Signif F Change  .3646

Analysis of Variance

<table>
<thead>
<tr>
<th></th>
<th>DF</th>
<th>Sum of Squares</th>
<th>Mean Square</th>
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</thead>
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<tr>
<td>Regression</td>
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<tr>
<td>Residual</td>
<td>55</td>
<td>1285.33793</td>
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F = 8.53408  Signif F = .0000

Equation Number 1  Dependent Variable..  SQRGM  Transformed Gross Motor Scor

------------------ Variables in the Equation ------------------

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<tr>
<th>Variable</th>
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<th>SE B</th>
<th>Beta</th>
<th>Tolerance</th>
<th>VIF</th>
<th>T</th>
</tr>
</thead>
<tbody>
<tr>
<td>PAAQ</td>
<td>1.700567</td>
<td>1.723340</td>
<td>.133599</td>
<td>.558572</td>
<td>1.790</td>
<td>.987</td>
</tr>
<tr>
<td>CA</td>
<td>8.065182</td>
<td>2.096584</td>
<td>.618938</td>
<td>.395500</td>
<td>2.528</td>
<td>3.847</td>
</tr>
<tr>
<td>DA</td>
<td>12.146554</td>
<td>3.763756</td>
<td>.932151</td>
<td>.122724</td>
<td>8.148</td>
<td>3.227</td>
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<tr>
<td>GENDER</td>
<td>.832698</td>
<td>1.255842</td>
<td>.068054</td>
<td>.971922</td>
<td>1.029</td>
<td>.663</td>
</tr>
<tr>
<td>AGE_MO</td>
<td>.085676</td>
<td>.066590</td>
<td>.338733</td>
<td>.147714</td>
<td>6.770</td>
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<td>-5.905592</td>
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--- in ---

<table>
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<th>Sig T</th>
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<td>CA</td>
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Collinearity Diagnostics

<table>
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<th>Eigenval</th>
<th>Cond Variance Proportions</th>
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</tr>
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<td>6</td>
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<td>20.298 .01722 .89855 .46736 .14814 .01273 .12255</td>
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<tr>
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<td>42.609 .98135 .08994 .01672 .72551 .00042 .87202</td>
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End Block Number 3 All requested variables entered.

Residual Statistics:

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<th>N</th>
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Total Cases = 61

Durbin-Watson Test = 1.51066
Plot of Residuals with Predicted Gross Motor Persistence Scores
(n = 61)

Scatterplot

Dependent Variable: Transformed Gross Motor Score
Normal Probability Plot of Residuals of Transformed Gross Motor Persistence
(n = 61)

Normal PP of Residuals GM Persistence
Dependent Variable: Transformed Gross Motor Score
APPENDIX Y

PAAQ by Gross Motor Persistence Scatterplot

Subjects with Disabilities
Relationship Between PAAQ Scores of Students with Disabilities and Gross Motor Persistence

\( n = 27 \)

Pearson \( r = .52 \)

**Note.** Figure contains all participants from special education (regardless of education label & IQ score) except subject 279. This includes those subjects tested who had LD labels and IQ scores above 80 (see Appendix R).
APPENDIX Z

MULTIPLE REGRESSION ANALYSIS OF FINE MOTOR PERSISTENCE
**MULTIPLE REGRESSION**

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<tr>
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<td>PAAQ MEAN per Item Score</td>
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<tr>
<td>CA</td>
<td>.328</td>
<td>.473</td>
<td>Chronological Age (Non dis)</td>
</tr>
<tr>
<td>DA</td>
<td>.328</td>
<td>.473</td>
<td>Developmental Age (Non dis 6-8)</td>
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<tr>
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<td>.504</td>
<td>Gender Coded</td>
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<tr>
<td>AGE_MO</td>
<td>117.230</td>
<td>24.385</td>
<td>Chron Age 'n Months</td>
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N of Cases = 61

Listwise Deletion of Missing Data

Equation Number 1 Dependent Variable.. SQRFM

Block Number 1. Method: Enter PAAQ

Variable(s) Entered on Step Number
1. PAAQ PAAQ MEAN per Item Score

Multiple R .30604
R Square .09366
Adjusted R Square .07830
Standard Error 5.36612

Analysis of Variance

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<td>1698.91975</td>
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F = 6.06711 Signif F = .0185

Equation Number 1 Dependent Variable.. SQRFM

--- Variables not in the Equation ---

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<tr>
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<th>T</th>
<th>Sig T</th>
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<tr>
<td>CA</td>
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End Block Number 1 All requested variables entered.
Block Number 2. Method: Enter CA DA

Variable(s) Entered on Step Number
2. DA Developmental Age (Non dis 6-8)
3. CA Chronological Age (Non dis)

Multiple R .52499
R Square .27581 R Square Change .18195
Adjusted R Square .23749 F Change 7.15889
Standard Error 4.88077 Signif F Change .0017

Block Number 1. Method: Enter PAAQ

Step MultR Rsq F(Eqn) SigF Variable Betain
1 .3060 .0937 6.097 .016 In: PAAQ .3060

End Block Number 1 All requested variables entered.

Block Number 2. Method: Enter CA DA

Step MultR Rsq F(Eqn) SigF Variable Betain
2 .5250 .2756 7.229 .000 In: DA .3410
3 .5250 .2756 7.229 .000 In: CA .3949

End Block Number 2 All requested variables entered.

Block Number 3. Method: Enter GENDER AGE_MO

Variable(s) Entered on Step Number
4. GENDER Gender Coded
5. AGE_MO Chron Age In Months

Multiple R .54416
R Square .29611 R Square Change .02049
Adjusted R Square .23212 F Change .80060
Standard Error 4.89794 Signif F Change .4542

Analysis of Variance
<table>
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F = 4.62737 Signif F = .0014

231
--- Variables in the Equation ---

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Collinearity Diagnostics

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End Block Number  3  All requested variables entered.

Residuals Statistics:

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</table>

Total Cases =  61

Durbin-Watson Test =  1.29637
Plot of Residuals with Predicted Fine Motor Persistence Scores
(n = 61)

Scatterplot
Dependent Variable: SQRFM
Normal Probability Plot of Residuals of Transformed Fine Motor Persistence

(n = 61)

Normal P-P Plot of Regression Standardized Residual

Dependent Variable: SQRFM
APPENDIX AA

PAAQ BY FINE MOTOR PERSISTENCE SCATTERPLOT

SUBJECTS WITH DISABILITIES
Relationship Between PAAQ Scores of Subjects with Disabilities and Fine Motor Persistence
(n = 27)

Pearson $r = .52$

Note. Figure contains all participants from special education (regardless of educational label & IQ score) except subject 279. This includes those case with LD labels who have IQ scores that were above 80 (see appendix R).