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Aharoni, Hezkiah

ASSESSMENT OF CHILDREN'S RISK-TAKING BEHAVIOR AS REFLECTED IN MOTOR ACTIVITY

The Ohio State University

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In memory of my parents--my mother, Leah, and father, Abraham--who inspired my quest for knowledge
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FIELDS OF STUDY

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# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACKNOWLEDGMENTS</td>
<td>iv</td>
</tr>
<tr>
<td>VITA</td>
<td>ix</td>
</tr>
<tr>
<td>LIST OF TABLES</td>
<td>xiv</td>
</tr>
<tr>
<td>LIST OF FIGURES</td>
<td>xvi</td>
</tr>
<tr>
<td>CHAPTER I. INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>Rationale</td>
<td>2</td>
</tr>
<tr>
<td>Statement of the Problem</td>
<td>7</td>
</tr>
<tr>
<td>Hypotheses</td>
<td>8</td>
</tr>
<tr>
<td>Definitions</td>
<td>10</td>
</tr>
<tr>
<td>Delimitations of the Study</td>
<td>12</td>
</tr>
<tr>
<td>Limitations of the Study</td>
<td>13</td>
</tr>
<tr>
<td>Summary</td>
<td>14</td>
</tr>
<tr>
<td>CHAPTER II. REVIEW OF LITERATURE</td>
<td>16</td>
</tr>
<tr>
<td>What Is Risk Taking?</td>
<td>16</td>
</tr>
<tr>
<td>Early Development/Experiences and Risk Taking</td>
<td>21</td>
</tr>
<tr>
<td>Play Environments, Play Apparatus, and Risk Taking</td>
<td>23</td>
</tr>
<tr>
<td>Movement Confidence--An Emerging Model</td>
<td>26</td>
</tr>
<tr>
<td>Risk Taking and Exceptional Children</td>
<td>34</td>
</tr>
<tr>
<td>Variables Influencing Risk-Taking Behavior</td>
<td>40</td>
</tr>
<tr>
<td>Risk Taking and Participation in Sport</td>
<td>60</td>
</tr>
<tr>
<td>Training and Modification of Risk-Taking Behavior</td>
<td>62</td>
</tr>
<tr>
<td>Other Variables and Risk-Taking Behavior</td>
<td>66</td>
</tr>
<tr>
<td>Evaluation and Measurement of Risk-Taking Behavior</td>
<td>67</td>
</tr>
<tr>
<td>Summary</td>
<td>81</td>
</tr>
<tr>
<td>CHAPTER III. METHODS AND PROCEDURES</td>
<td>84</td>
</tr>
<tr>
<td>Subject Selection</td>
<td>87</td>
</tr>
<tr>
<td>Site Selection</td>
<td>88</td>
</tr>
<tr>
<td>Pilot Study</td>
<td>89</td>
</tr>
<tr>
<td>Instrumentation</td>
<td>91</td>
</tr>
</tbody>
</table>
J. Pictorial Risk-Taking Preference--Testing Manual, Data Collection for the PRTP and LP 194
K. Parent Questionnaire 219
L. Judges' Training 222
M. Data Collection Sheet for the PRTP and LP 230
N. Follow-up Thank You Letter 232
O. Summary for Data Collection 235
P. Raw Data 237
REFERENCES 241
LIST OF TABLES

<table>
<thead>
<tr>
<th>TABLE</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Number of Subjects Participating in the Pilot Study by Age and Sex</td>
<td>87</td>
</tr>
<tr>
<td>2. Number of Subjects Participating in the Major Study by Age and Sex</td>
<td>88</td>
</tr>
<tr>
<td>3. Number and Percent of Subjects Selecting One of the Pairs of Photographs as &quot;Most Scary&quot; (Risky)</td>
<td>98</td>
</tr>
<tr>
<td>4. Means and SD of Risk-Taking Behavior by Sex</td>
<td>120</td>
</tr>
<tr>
<td>5. Means and SD of Risk-Taking Behavior by Age</td>
<td>121</td>
</tr>
<tr>
<td>6. Means and SD of Risk-Taking Behavior by Birth Order</td>
<td>122</td>
</tr>
<tr>
<td>7. Correlation Matrix for PRTP, LP, FR, MR, and MC</td>
<td>127</td>
</tr>
<tr>
<td>8. Standard Regression Weight of PRTP, LP, FR, MR</td>
<td>128</td>
</tr>
<tr>
<td>9. Analysis of Variance of MC by Sex and Age</td>
<td>129</td>
</tr>
<tr>
<td>10. Scheffé Post Hoc Comparison of MC by Age</td>
<td>130</td>
</tr>
<tr>
<td>11. Analysis of Variance of PRTP by Sex and Age</td>
<td>130</td>
</tr>
<tr>
<td>12. Analysis of Variance of LP by Sex and Age</td>
<td>131</td>
</tr>
<tr>
<td>13. Scheffé Post Hoc Comparison of LP across Age</td>
<td>132</td>
</tr>
<tr>
<td>14. Analysis of Variance of PRTP by Skill Level</td>
<td>133</td>
</tr>
<tr>
<td>15. Scheffé Post Hoc Comparison of PRTP and Skill Level</td>
<td>134</td>
</tr>
<tr>
<td>16. Analysis Variance of LP by Skill Level</td>
<td>134</td>
</tr>
<tr>
<td>17. Scheffé Post Hoc Comparison of LP across Skill Level</td>
<td>135</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>18.</td>
<td>Analysis of Variance of MC by Skill Level</td>
</tr>
<tr>
<td>19.</td>
<td>Scheffé Post Hoc Comparison of MC across Skill Level</td>
</tr>
<tr>
<td>20.</td>
<td>Analysis of Variance of PRTP by Birth Order and Age</td>
</tr>
<tr>
<td>21.</td>
<td>Analysis of Variance of LP by Birth Order and Age</td>
</tr>
<tr>
<td>22.</td>
<td>Analysis of Variance of MC by Birth Order and Age</td>
</tr>
<tr>
<td>23.</td>
<td>Scheffé Post Hoc Comparison of MC across Birth Order</td>
</tr>
<tr>
<td>24.</td>
<td>Correlation Matrix of Sex, Age, BRUN, Birth Order, Fathers' Ratings, Mothers' Ratings, PRTP, LP, and MC</td>
</tr>
<tr>
<td>25.</td>
<td>Variance in MC, PRTP, LP Explained by the Set of Independent Variables (Sex, Age, BRUN, Birth Order, Parents' Perceptions)</td>
</tr>
<tr>
<td>26.</td>
<td>Results--Summary Table</td>
</tr>
</tbody>
</table>
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>FIGURES</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Elements of R.T.</td>
<td>19</td>
</tr>
<tr>
<td>2. Movement Involvement Cycle</td>
<td>29</td>
</tr>
<tr>
<td>3. Example of Practice Sheet Similar to Test Used by Crawford for MC</td>
<td>32</td>
</tr>
<tr>
<td>4. Map of the Gymnasium and Placement of Each Apparatus/Task for the LP and MC</td>
<td>90</td>
</tr>
<tr>
<td>5. Graph Representation of Interaction between Birth Order and Age</td>
<td>140</td>
</tr>
</tbody>
</table>
CHAPTER I
INTRODUCTION

The ongoing research on human risk-taking behavior in the behavioral sciences, economics, and education is relatively new. However, the concept of risk taking is as old as mankind. The survival of early man was likely dependent to a great extent on ability to dare, overcome fear, avoid danger, work through difficult obstacles, and take risks in order to survive the wilderness. The nature of risk requires that the individual have the capacity to modify the environment in order to control one's destiny.

In the thousands of years since early man, society has changed, as has the human condition. However, risk taking and chance continue to be terms associated with success and failure, safety-danger, gain-loss, life-death, all events wherein the individual finds himself faced with the assumption of risk in these either/or situations. While various investigators have differing interests in risk taking and apply the concept to their needs, risk taking is common to all. Only the method of inquiry and application varies.

The term risk taking has been used in economic investment and management, games and gambling theories, psychological literature related to personality, achievement, creativity, motivation theories, and cognitive style. In general, risk taking as a concept may be
applied to everyday life choices and decision making (Bem, 1971; Byrd, 1974).

Children, too, learn to risk, make choices or decisions under uncertainty, although the nature of their risk might have a different value. Young children accommodate risk taking with their play and activities (McGinnis & Berg, 1973; Abroms, 1982).

Rationale

The environment has great impact on an individual's behavior. Studies on risk-taking behavior in the psychological literature have examined the influence, effect, and interaction of variables such as sex, age, child-rearing practices, birth order, culture, socioeconomic strata, religion, and geographical location. For this reason, studies on risk-taking behavior have different interpretations because of the multidimensional nature of the concept. Risk-taking behavior in individuals depends on a variety of situational events and subject characteristics (Slovic, 1962, 1964).

Young children, in particular, have limited ability to process information. Many of the tools used to assess risk-taking behavior of adults do not yield accurate behavioral data when used with young children. In recent studies of young children's risk-taking behavior psychologists have used innovative ideas (Kamal, 1979; Ginsburg & Miller, 1982). Perusal of the available literature on risk-taking behavior yields conflicting conclusions. Yet, studies relating to children are few and inconclusive (Kopfstein, 1972; Montgomery & Landers, 1974).
In physical education and sport the term risk taking is also used to describe the behavior of an individual or a group regarding choice and decision making expressed in motor acts (Vaughan, 1971). Developmentally, and for the purpose of this paper, physical risk taking could be considered as the behavior a child displays during observation, after making a choice or decision under varied levels of uncertainty, and when the consequences are unknown. Tasks involved in taking risks could be perceived by the child as dangerous, causing physical harm, or as a safe and pleasant activity.

Educators working with young children often advocate the need to encourage and develop "healthy risk taking" (Lady Allen, 1968; Miller, 1972; Herkowitz, 1977; Abroms, 1982; Gallahue, 1982; Heston, Masla & Gallahue, 1982; Philipp, 1986). Everyday references to "risk taking," as related to children, imply a concept whose meaning and purpose are clearly understood. Unfortunately, this is a belief founded on experience and intuition of professionals working with young children, but it lacks experimental support. The paucity of literature available on children's risk-taking behavior in relation to learning of motor skills is at the beginning of the exploratory stage (Gallahue, 1983). Hence, it is impossible to make general statements regarding risk-taking behavior, particularly as applicable to children. In order to understand such behavior one needs to explore the available studies, including areas outside physical education, and then to initiate research. Such action might encourage future inquiries into the topic, arouse interest, and provide fresh insight into children's motor behavior.
Technological advances in today's industrial society, improving conditions in education and society at large, minimize the continuous physical threat to survival and lessen environmental opportunities for young children to take risks. Young children, however, decidedly need the experience to develop healthy risk-taking behavior and an environment conducive to the development of the child's social, cognitive, and physical behavior. Allport (1955), describing children's personality development, argued that growth can occur only through experiencing risk taking via a variety of situations.

It is likely that with increased automation, urbanization, economic pressure, changing family life, and child-rearing styles, the quality of play and childhood experience might not support the development of "healthy risk taking" (Friedberg & Berkeley, 1970). Children who are restricted physically from exploring their environment at home and in school may have their free expression of motor behavior inhibited (Riley, Barrett, Martinek, & Robertson, 1980). If one is over-cautious about safety and limits the child's free exploration at home and on the playground, then rules are often structured, and all this could impede the child's self-expression, increasing his uncertainty, hesitance, and conservatism. This approach is unlikely to help the child become a better risk-taker. Free exploration by the child of his environment may help in acquisition of confidence in movement, fear inhibition, and allow free motor expression. A confident individual is more likely to seek participation in motor activities and achieve satisfaction (Griffin & Keogh, 1981; Keogh, Griffin, & Spector, 1981).
Interest in young children's risk taking related to motor behavior has recently attracted scholars in motor development. There appear to be two schools of thought. Indiana University researchers are using a traditional approach to assess young children's risk-taking behavior and its relationship to movement confidence (Gallahue, 1983). Illustrations of varied risk-taking tasks of different levels of perceived physical risk have been drawn by an artist. These pictures are intended to be used as a projective technique to estimate children's perception of risk-taking behavior.

A second approach has been taken by investigators at the University of California, Los Angeles; the University of Nebraska, Lincoln (Keogh, Griffin, & Spector, 1981; Griffin & Keogh 1982); and the University of Missouri-Columbia (Crawford, 1983; Crawford & Griffin, 1986). They have been working on a theoretical model of "movement confidence" which has psychological and developmental components and requires further refinement based on additional experimental research. The main difference between movement confidence and risk-taking behavior is that movement confidence is a construct which hypothesizes the existence of feelings or attitudes. Confidence presumably influences behavior, i.e. risk taking (Keogh, 1983). The investigator believes that an individual who is confident in his/her movement may demonstrate higher risk taking than one who is less confident.

Risk-taking behavior as a concept in motor learning and motor development becomes extremely important when considering benefits it would provide to educators working with young children. When adults
are aware of the child's need for risk taking and understand its components, they are more likely to assist and encourage the child. Of import also is the adult's perception of the child during motor performance. Keogh, Griffin, and Spector (1981) hold it to be likely that the adult will interact differently with the child perceived as confident than with one viewed as passive or nonconfident.

Understanding of children's risk-taking needs by observation and assessment could facilitate the instructor's provision of support for handicapped children who need to increase their confidence and capacity to take risks in their motor activities (Shaw, 1976; Griffin & Keogh, 1981). Due to physical, social, emotional, or cognitive limitations, impaired children are more likely to experience failure and low confidence in their movement. The investigator believes that they might also be more reluctant to take the chance or risk involvement in motor tasks.

The development of risk-taking behavior is a continual process which depends on the child's early experiences. It is possible that the earliest years are crucial to the development of risk-taking behavior. The writings on early training of children in motor development demonstrated the effect of this intervention on their future motor performance (Gesell & Thompson, 1929; McGraw, 1935, 1939; Diem, 1982). Children receiving early motor development training were described as less afraid of falling, having greater assurance in their movement, and seeming more confident. Assessment of children's risk-taking behavior at an early age might provide a measure of the extent of such movement behavior. It could also
indicate appropriate programming to improve/modify the behavior. Assessment could evaluate the effects of early training on future motor behavior. Currently there is no reliable, valid, standardized assessment tool to evaluate young children's risk-taking behavior as observed in the gymnasium or on the playground.

Statement of the Problem

The focus of this study is the construction of a developmentally designed assessment tool, capable of reliable measurement of the risk-taking behavior of children aged 3 to 6 years during play and motor performance in the gymnasium environment. Therefore the main problem of this study is how to construct such a reliable and valid instrument. Together with the assessment tool construction, the following subproblems demand consideration:

1. Which tasks are to be included in the assessment? What is appropriate and most representative of the child's risk-taking behavior?

2. How would the instrument be validated?

3. Could the assessment be used to yield sex and age differences in children aged 3 to 6 years?

4. Could tasks included in the suggested assessment be correlated with other measures of child risk-taking behavior?

5. What is the possible influence of birth order and motoric skill level on risk-taking behavior?

6. Which method of assessment may best predict or contribute to risk-taking behavior?
Hypotheses

Based on the above statement of the problem and subproblems the following null hypotheses were generated:

1. Risk taking and method of assessment: Using MC as a criterion for measurement of risk-taking behavior, there will be no significant relationship between MC and other methods of assessment.
   A. MC with PRTP
   B. MC with LP
   C. MC with FR
   D. MC with MR

2. Risk taking and best method of assessment: Among the four methods of assessing risk-taking behavior (PRTP, LP, FR, and MR), none of the methods can best contribute to the significant variance in MC.
   A. MC with PRTP
   B. MC with LP
   C. MC with FR
   D. MC with MR

3. Risk taking and gender:
   A. Boys and girls will not significantly differ on scores measured by PRTP.
   B. Boys and girls will not significantly differ on scores measured by LP.
   C. Boys and girls will not significantly differ on scores measured by MC.
4. Risk taking and age:
A. Children aged 3, 4, 5, and 6 years will not significantly differ in their risk-taking performance on the PRTP.
B. Children aged 3, 4, 5, and 6 years will not significantly differ in their risk-taking performance on the LP.
C. Children aged 3, 4, 5, and 6 years will not significantly differ in their performance on the MC.

5. Risk taking and skill level on the Bruininks-Oseretsky Test of Motor Proficiency: Boys and girls who were grouped into four levels on Bruininks-Oseretsky will not significantly differ on the following:
   A. PRTP
   B. LP
   C. MC

6. Risk taking and birth order: Children who are first-born will not differ significantly from those who are later-born on the following:
   A. PRTP
   B. LP
   C. MC

7. All independent variables (sex, age, skill level, birth order, and parental ratings (FR & MR) will not equally explain the significant variance in PRTP, LP, or MC.
Definitions

For the purpose of this study, the following terms are defined:

Risk-taking behavior: (as it is adapted from the psychological literature on cognition and personality by Kogan and Wallach [1964]). Making a choice or decision under varied levels of uncertainty or perceived harm, and when the consequences or the results of taking the risk are unknown or at chance. In the case of the young child the consequences might not be clear as s/he might not perceive whether jumping from a high platform would be pleasant or cause injury. The outcome of such behavior might be the extent of motor response displayed in the gymnasium or play environment.

Physical risk taking: Refers to the individual's state of response to various gross motor tasks which are shown to the subject depicted by illustration or live, and when the subject must indicate the extent of preference to perform those tasks.

Chance risk taking: A situation involving "guessing," where the odds of winning may or may not be known precisely. Subject has little control over the outcome (Cohen, 1960).

Skill risk taking: A situation where the odds of winning or losing depend on the individual's ability to solve new problems and the motor skills already in his/her possession. It is up to the individual to succeed (Cohen, 1960). This concept is closely related to taking risk which involves gross motor activity.

Movement confidence: Described as the individual's feeling or attitude of adequacy in movement situations. Individuals who do not hesitate to perform novel or seemingly difficult movement tasks are
often described as confident, while those who appear reluctant to perform a task are described as nonconfident (Griffin & Keogh, 1981, 1982).

**Fear**: An emotional component state of an individual's accompanying motor performance. Fear may cause emotional or physical harm to the individual, be that fear based on actuality or perception alone. High fear level might inhibit motor performance.

**Danger**: A state or activity in which an unpleasant event has a fairly high probability of occurring. The more dreadful the event, or the higher the probability, the greater the danger (Ross, 1975).

**Pictorial Risk-Taking Preference (PRTP)**: A group of pairs of illustrations depicting various apparatus and a child performing the motoric task using those apparatus (Appendix J). The subject is shown the illustrations in pairs and then asked by the experimenter which one of tasks in each pair he/she would like to perform the most.

**Live Preference (LP)**: All apparatus used in the PRTP above (Appendix I) are set up in the gymnasium. Child is shown and explained about their use. The child then is shown one pair of those apparatus at a time and asked to indicate on which of the apparatus he/she would like to perform the task the most.

**Movement Confidence (MC) Assessment**: This involves the same tasks described above (PRTP and LP), with the difference that the child is videotaped while performing each of the tasks on the apparatus. The accumulated permanent record of the child's Movement Confidence is later scored by a panel of judges (Appendix L).
Parents' Questionnaire (PQ): A questionnaire given to parents to provide personal information on each subject and indication of parents' perceptions of their child's risk-taking behavior (Appendix K).

Father's Rating (FR): A part of the PQ where the father rates his child's risk-taking behavior (Appendix K).

Mother's Rating (MR): A part of the PQ where the mother rates her child's risk-taking behavior (Appendix K).

Delimitation of the Study

The following delimitations were set forth for this study:

1. Subjects participating in the study were from communities from central Ohio whose parents volunteered them for this study.

2. Subject data collection was performed at variable times of the day and the week, primarily on weekends between 8:00 A.M. and 2:00 P.M. and lasted from fall 1985 to summer 1986.

3. The short form of the Bruininks-Oseretsky Test of Motor Proficiency (Bruininks, 1978) was used to assess motor proficiency of all subjects who participated in the study.

4. Modified Movement Confidence criteria as originally established by Spector (1980) and Keogh, Griffin, and Spector (1981) were employed in the study.

5. Apparatus used in the study included: slide, gymnastics box, ball, balance beam, steps, ladder, and incline board (bleacher), all of which are illustrated and described in Appendix A.
6. Children's perception of risk and the various levels of risk each task relatively demands were obtained by the researcher through a pilot study described in Chapter IV.

7. During the data collection no person was present other than the experimenter and the subject, in order to control observer influence.

8. Subjects who had apparent physical or psychological handicaps were excluded from the study.

Limitations of the Study

1. Subjects participating in the study were from the central Ohio communities. All subjects were volunteered by their parents who responded to newspaper articles, posted flyers, and flyers sent home through the day care centers or schools. Subjects were taken on a first come, first served basis. No randomization was involved.

2. The experimenter had no control as to the subjects' previous experience with tasks used in this study. However, parents were asked to write in detail regarding their children's motor/play experience (Appendix K).

3. The Bruininks-Oseretsky Test of Motor Proficiency used for this study is standardized for ages 4½ to 14½ years. Some of the items were difficult for some of the younger subjects. However, no comparable, appropriate, valid, and reliable test was available on the market at the time of the study.

4. Parents were asked to complete a questionnaire (Appendix K) to indicate their perceptions of their child as a risk taker.
Fathers and mothers were requested to rate their child separately. It is possible that parents' responses were not always completed accurately.

5. The variability in scheduling of data collection may have affected the outcome for some individuals.

6. Subjects were divided arbitrarily by age groups for the statistical analysis; however, the researcher is aware of this limitation since children at this age possess great variability in their behavior, performance, and rate of learning even though they are of the same chronological age.

Summary

Observation of children at play leads to speculation as to why one child climbs the high ladder, jumps to the floor from a high platform, and jumps over obstacles with ease and confidence, whereas another child of the same age requires continuous adult encouragement in performance of these activities, is afraid of heights, enjoying only those activities perceived as safe and nonthreatening. What makes a child smilingly jump into deep water, while a second child remains at the shallow end refusing to enter the pool? These common occurrences in young children demonstrate what the investigator believes are commonly found differences in risk-taking behavior. How one can reliably measure this behavior, and determine the relative degree such behavior is possessed by young children are the problems of this study.
Construction of an assessment device for risk-taking behavior in children will facilitate:

1. Provision of an experimental support base for the intuition professionals have as to the need to develop "healthy risk-taking behavior."

2. Use of the instrument for further research on children's risk-taking behavior.

3. Assistance to parents and professionals in estimating their children's risk-taking behavior and provision of necessary programming for improvement and modification.

4. Use of the tool in play environment/equipment development and design to ascertain if they are conducive to optimal risk-taking behavior.

5. Identification of difficulties handicapped, delayed children, and those lagging behind their normal peers might display via inhibiting behavior and the accompanying fear and nonconfidence.

6. Correlation of the instrument with other measures of risk-taking behavior.

CHAPTER II
REVIEW OF LITERATURE

The purpose of the review of literature is to add to the investigator's knowledge and to provide the reader with background information. The literature review adds to the capacity of the researcher to see possible answers to the questions surrounding the topic and in establishing hypotheses for the study. It stimulates thought, providing a philosophical base which enables synthesis of previous and current concepts to facilitate derevision of maximal benefit from the inquiry.

This chapter will review the following related areas: what is risk taking, early development/experiences and risk taking, play environments, play apparatus and risk taking, movement confidence—an emerging model, risk taking and exceptional children, variables influencing risk-taking behavior, risk taking and participation in sport, training and modification of risk-taking behavior, other variables and risk-taking behavior, and evaluation and measurement of risk-taking behavior.

What Is Risk Taking?
Psychologists have been greatly interested in risk-taking behavior, and extensive research on this subject has been carried
out for more than two decades. However, the construct of risk taking is quite elusive and still lacks specific definition. Risk taking is an area of basic research and a major facet of the more general field of decision making. Hence, a definitive, well-constructed theory of risk taking is not available, and definitions of risk taking may vary from one study to another, depending on the nature of the research and given environmental and individual situations. Kogan and Wallach (1967) described risk-taking behavior on the basis of situations in which it is likely to be elicited. They define risk-taking behavior as the:

... situations where there is a desirable goal and lack of certainty that it can be attained. The situation may take the form of requiring a choice between more and less desirable goals, with the former having a lower probability of attainment than the latter. A further possible, but not necessary, characteristic of such situations is the threat of negative consequences for failure so that the individual at the postdecisional stage might find himself worse off than he was before he made the decision. (Kogan & Wallach, 1967, p. 115)

An individual who is described as a high-risk-taker is more likely to make a choice where the probability of winning is quite low, but if one wins, the payoff is high. A medium-risk-taker usually selects an option where the probability of winning or losing is 50/50, and the payoff is moderate. The low-risk-taker is characterized as an individual who makes a choice wherein the probability of winning is quite sure and high, but the final payoff is very low. Both the probability of winning or losing and the amount of the pay-off may determine one's action in taking risk. No value judgment is made here if being a high-risk-taker or low-risk-taker is perceived as positive or negative. It is most
likely dependent on the given situation, and it is possible that an individual may take high risks in one situation, but lower risks in another, and vice versa. Also risk taking might not generalize from one environment to another (Slovic, 1962).

Based on the psychological literature reviewed in this chapter, one may be able to distinguish common elements involved in risk-taking behavior (Figure 1). As described in this figure, one first deals with an individual who then voluntarily or involuntarily (depending on the situation under investigation) is faced with a dilemma to choose or select a course of action, which involves the decision-making process.

At the second stage, there is uncertainty about the outcome if the individual makes a decision. This uncertainty may be unknown or at chance, involve physical or psychological harm, gain or loss, or the feeling of thrill, enjoyment, or an aversive experience. All the above elements may be in the possible consequences which the individual weighs in decision making.

It is also possible in general to distinguish among three groups of variables which may influence one's action as described by Kogan and Wallach (1967).

1. Aspects of the situation: Decision making and amount of risk taking involved may be influenced by the type of risk taking as described by Cohen (1960). Chance risk taking and skill risk taking, according to Cohen, may produce different results. In chance risk taking, as in gambling, the individual has little control over the outcome, while in skill risk taking, the success in gaining or
Figure 1. Elements of R.T.
losing may depend to a great extent on the skill the individual possesses (i.e., shuffleboard game). In many studies related to risk-taking behavior, both chance and skill-related aspects must be examined or clarified.

Other variables which relate to the situation may also affect the outcome. For example, previous experience with gain or loss, or the carrying out of an experiment in the laboratory versus in the naturalistic environment, may yield different results (Slovic, 1964; Walesa, 1977).

2. Aspects of the individual: Many personal characteristics and attributes may affect the decision-making process, and ultimately the degree of risk-taking behavior. For example, gender, age, birth order, and social class differences have been reported.

These and other variables will be examined further in this chapter.

3. Aspect of the social setting: This relates to the social phenomena—the "risky-shift effect." Social psychologists have been studying how the group may effect the individual to take lesser or greater risk. The chapter will also describe this phenomenon and various theoretical explanations.

The last part of Figure 1 deals with the measurement aspect of risk taking, or as it is referred to, the R. T. Index, which forms the score to be treated statistically for the research study. Assessment methods vary. Many of those methods are described in the literature, and all have their strengths and weaknesses. Some of these methods will be chance risk taking, as in the toggle switch or
various gambling machines, whereas shuffleboard games, horseshoes, games of shooting to the basket may involve skill risk taking. The above assessment methods and others will be discussed throughout the literature review.

Early Development/Experiences and Risk Taking

Classic studies by prominent psychologists and recent studies by physical educators dealt with the influence of early training on young children's motor development (Gesell & Thompson, 1929; McGraw, 1935, 1939; Diem, 1982). These investigations did not deal directly with risk-taking behavior, but they may help explain the nature of the relationship between motor development and risk-taking behavior.

Gesell and Thompson (1929) examined the effects of early and later training on twins. Their results failed in general to find significant performance differences between the twins as a result of the presence or absence of early training. However, the twin receiving training early in life in stair climbing was reported as more agile, less afraid of falling, and walked faster.

McGraw's (1935, 1939) classic study of the twins Johnny and Jimmy provided similar results. McGraw indicated that early training did not greatly affect phylogenetic activities, which seemed more dependent on maturational factors. However, early practice did influence the acquisition of ontogenetic or culturally shaped activities, i.e., bicycle riding, roller skating, swimming, and throwing. McGraw maintained that early training seemed to influence an individual's general "rapport" or "feeling" for particular motor
activities. Johnny, the experimental twin, exhibited greater motor coordination and assurance in his movement well into later childhood, adolescence, and adulthood.

As a result of interest in facilitating the acquisition of swimming skills of infants and young children, the last decade has yielded an increase in the number of swimming programs offered for infants. However, such progress has not gone without criticism by physicians and educators (Brown & Maleski, 1973; Homan, 1974). Diem's (1982) study of the effect of early swimming training of infants considered swimming's influence on physical, personal, and social development of young children. Two groups of children were compared: those who were exposed to swimming in the second month of life with those who had water experience from the age of 28 months. Preliminary subjective observation of the researcher and parental reports revealed that: "'Swimming babies'--in contrast to their peer group--were better adapted, had a stronger self-security, and were more independent." In addition, observations made during gymnastic classes led to the following hypothesis:

Swimmers are self-willed and more independent in making decisions. They move spontaneously, are unafraid and self-secure, and demonstrate generally greater motor activity. New situations are handled faster and more independently, and swimmers are more physically fit than non-swimmers. (Diem, 1982, p. 23).

A four-year longitudinal study of the above groups demonstrated that the group which received early swimming stimulation displayed outstanding differences in movement quality, movement accuracy, balancing and reaction ability when compared with the control group.
Gesell and Thompson's (1929), McGraw's (1935, 1939), and Diem's (1982) research indicates that early motor training appears to have some influence on the "confidence" of the child. Such "confidence" could facilitate children's tendencies to take risks, engage in activity, when introduced to new motor skills. McGraw (1935, 1939), and Gesell and Thompson (1925) pointed out the importance of an optimal time in early acquisition of motor skills.

The studies by Gesell and Thompson (1929), and McGraw (1935, 1939) significantly contributed to the study of child development. Since they used a small number of subjects, however, their results may be subjective. Diem's (1982) study had similar limitations since it was not fully documented. In spite of the above limitations of those studies, they do provide insight into the behavior of young children.

**Play Environments, Play Apparatus, and Risk Taking**

Elements of risk taking as reflected in children's motor behavior can be studied in the play environments. Such studies have been undertaken by Hayes (1977), Karlsson (1969), Karlsson and Ellis (1972), and Shaw (1976). These studies also considered how the nature/kind of the equipment or apparatus may affect the child's behavior.

Karlsson and Ellis (1972) assessed the height to which young children, ages 4 to 6 years, who had a 15-minute free play period for a total of five sessions, climbed. The play environment was predesigned and highly controlled. Information about the children's
behavior was collected by a set of cameras, and this was then analyzed by computer. Karlsson and Ellis (1972) hypothesized that the more exposure the children had to the play apparatus of various heights and shapes, the higher they would climb on such apparatus. However, their final analysis indicated no trend for height preference with increased exposure to the apparatus. Rather, height preference was found to be related to the nature of the apparatus (shape, height, surface). Their findings supported the tenets of arousal theory which stated that organisms are stimulus seeking (Ellis, 1973). Novelty, complexity, and variability of the environment influenced the children's interaction with the apparatus. Karlsson's and Ellis' (1972) experiments, although not directly involved with children's risk taking, dealt with height, which has been recognized as an element associated with motor risk-taking performance (Wyrick, 1970; Alberts, 1976; Shaw, 1976) and movement confidence (Keogh, Griffin & Spector, 1981).

Shaw (1976) gave children free time to explore and interact with a unified, modular, experimental playground which had varied levels of height and various possibilities for modification. Children were noted to gradually explore higher levels with more exposure. Shaw (1976) also observed the jumping behavior of children from different height platforms to the sandy ground. He then defined the ability of children to overcome fear and make judgments as to jump or not as "the ability to code the danger." In addition to pointing out the height as an element in risk-taking behavior, the research also contained a description of the information capacity of children
in decision making related to risk taking and motor performance. Shaw's (1976) "danger coding" concept seems to hold some promise in the study of children's perception of danger or harm during motor performance. Although Shaw's (1976) study was not rigorously controlled, it was one of the first studies of children's motor risk-taking behavior on the playground.

Hayes (1977) examined children's risk-taking behavior on an adventure playground. Adventure playgrounds are assumed to elicit greater risk taking than traditional playgrounds. Lady Allen of Hurtwood (1968) had earlier advocated the importance of adventure playgrounds' contribution to the development of children's risk-taking behavior. Hayes (1977) compared two groups of children (boys and girls) aged 6 to 16 years. The first group of 40 children (out of 50 original participants) took part in the adventure playground, while the second group of 13 subjects (out of 59 in the beginning of the study) participated on the traditional playground. A modified Risk-taking Preference Rank-order Scale (which included pictures of low, medium, and high categories of risk-taking activities) was used to pretest and posttest both groups. Hayes (1977) concluded that the adventure playground group did not show significantly greater preference for higher risk after exposure to the adventure playground. This result may, in part, be due to the fact that over half of the adventure group were found to be high risk-takers before the study started. Adventure and non-adventure groups were compared on the pretest scores. The adventure group was
found to be significantly higher risk-takers. In addition, boys were more likely to select higher risk activities than girls.

Although the studies of Karlsson and Ellis (1972), Shaw (1976), and Hayes (1977) did not produce statistically significant results regarding children's risk-taking behavior in play environments, they did provide important contributions to the beginning of investigation in this area.

Recent years have witnessed growing interest in how equipment/apparatus in children's play area and gymnasium may influence their behavior, the rate of learning new skills and efficiency of acquiring motor skills (Herkowitz & Kieffer, 1975). The child's readiness to learn motor skills and the efficiency and rate of learning depends largely on prior experience and relative development of his/her risk taking. There are a dearth of studies dealing exclusively with the nature of risk taking and motor skills.

Movement Confidence--An Emerging Model

Movement confidence has been defined in general terms as an individual's feeling of adequacy in a movement situation (Griffin & Keogh, 1982). It describes the behavior of the individual, how s/he processes information, and how it influences his/her actions. One may feel more confident when s/he perceives the environment as nonthreatening and the task as holding no apparent danger. The nonconfident individual might avoid the task, perceiving it as entailing danger. S/he might also be hesitant, have less confidence, which would be reflected in his/her motor performance. The concepts
and terms used to describe movement confidence are closely related to those used in risk-taking behavior although theoretically, they are different. Risk-taking behavior is the final and observable act; while confidence is a construct (to hypothesize the existence of feelings and attitudes), it presumably influences behaviors such as risk taking (Keogh, 1983). One who has less confidence in his/her movement may be described as less willing to take a risk during motor task performance, and vice versa.

The research on movement confidence related to young children's motor performance has recently been described (Griffin, Keogh, Maybee, Allen, & Gill, 1980; Spector, 1980; Griffin & Keogh, 1981, 1982; Keogh, Griffin, & Spector, 1981; Griffin, Keogh, & Maybee, 1983; Crawford, 1984; Crawford & Griffin, 1986). Ideas relevant to the development of a movement confidence model follow.

The initial development of the model (Spector, 1980) required establishment of a reliable test to measure movement confidence. Twenty-two girls and 14 boys with a mean age of 4 years, 2 months, who were enrolled in a developmentally oriented preschool gymnastics class, were filmed on three tasks: bar balance, falling back on a mat, and jumping down from height to a soft landing. The films were then shown to children and adults. Their task was to classify each child with regard to confidence, mixed confidence, and nonconfidence.

Analysis of the study revealed that observers had very high levels of agreement in identifying a child as confident or nonconfident in a particular movement situation. Based on the observers' perceptions of movement confidence, and on common criteria
which they had listed as being associated with making decisions about movement confidence, a table of behavioral manifestations of movement confidence was constructed. This table included:

1. Movements--preparatory movements and performance movements displayed by the subject during performance;

2. Tempo--the pace of the movement during performance; observed if too slow, too fast, or stopping; and

3. Attending--the use of auditory and visual modalities to focus appropriately or inappropriately on the subject's body or the environment.

This study established a scale, a means of observationally measuring children's movement confidence. It provided the basis for the further development of a theoretical model for movement confidence (Griffin & Keogh, 1982). In presenting the model for movement confidence, Griffin and Keogh thought that they should go beyond looking only at the individual's movement competence. They chose to also emphasize the role of the individual's sensory experience (MOVSENSE) and cognitive components (MOVCOMP). They conceived the process of movement confidence also involved a cycle where the outcome or consequences produce movement confidence which, in turn, mediates characteristics of the individual's participation, such as choice, performance, and persistence (Figure 2).

The issue of "perception of risk/danger and competence" (Griffin, Keogh, Maybee, Allen, & Gill, 1980) was raised by conference participants regarding the possible effects of risk/danger on the movement confidence of the performer. The risk/danger concept
Figure 2. Movement involvement cycle. (Adapted from Griffin and Keogh, 1982).
in the model was reformulated as the performer's perception of harm within the task and the likelihood of its occurrence which might affect the mover's behavior.

Although the above model is attractive, it has limitations (Griffin et al., 1980) and requires further refinement and experimental support. In Griffin et al. (1980) questions and limitations were posed regarding the model. One problem is that the perception of the observer might differ greatly from that of the mover (subject) as to the task's demands and anticipated outcomes. Another difficulty is the model's emphasis on the cognitive component involved in the decision making and relative lack of concern for the influence of effective variables (i.e., emotion, social judgments) which could influence the subject's movement confidence.

Although such weaknesses are part of this new model, it represents a first attempt to assess movement confidence and establish a theoretical base of operation. In the last two years there have been various studies which used the movement confidence model. Griffin and Keogh's model has been gaining both in popularity and theoretical support, as well as limited application in the field setting as was shown by Crawford (1984), and Crawford and Griffin (1986).

In a recent study (Crawford, 1984; Crawford & Griffin, 1986), the Movement Confidence Model was utilized in the development of a Playground Movement Confidence Inventory (PMCI). The above study strengthened the model's validity, demonstrating its applicability in the field.
Crawford (1984), using a stratified sampling method, randomly selected 250 fifth-grade children from the Omaha Public School system. Following field study and content validation of the PMCI by a jury of experts, a test-retest reliability/validity study was conducted. The PMCI is a self-report instrument in questionnaire form with illustrations of six playground tasks:

A. Jungle gym climb and stunt without hand support;
B. Climbing to a horizontal bar, hanging, and dropping off;
C. Climbing onto a high platform via cargo net and dismounting;
D. Doing a hip circle around a horizontal bar and dismounting;
E. Pulling into knee hang on a horizontal bar, recovering, and dismounting; and
F. Climbing and sliding down a high slide.

Accompanying each of the above illustrated tasks, series of questions and statements were given. Subjects were instructed to look at the illustrated tasks and relate them to the questions/statements below by check-marking the ones which best fit their feelings, liking of the task, and previous experience (Figure 3).

Crawford's (1984) major hypothesis was to demonstrate the interaction of the three subcomponents which constituted the Movement Confidence as described by Griffin & Keogh (1982). They depict Movement Confidence as comprised of subcomponents including: (1) competence in performing the task (MOVCOMP), and (2) the potential for harm (risk) and potential for enjoyment in performing the task (together described as MOVSENSE). The above three variables
WHAT I AM LIKE

NAME ________________________ AGE ________ SEX ________

How sure are you that you could do this?
☐ I am very sure
☐ I am pretty sure
☐ I'm not very sure
☐ I know that I couldn't

How many times have you done this?
☐ I have done this a lot
☐ I have done this a few times
☐ I tried it once
☐ I've never done it

Now, for each sentence below mark the box which best describes what you are like:

REALLY TRUE SORT OF TRUE REALLY TRUE
TRULY TRUE for me for me for me for me

1.  ☐ ☐ Some kids are good at jumping onto moving things BUT other kids don't always do it so well.
☐ ☐

2.  ☐ ☐ Some kids might slip and fall off the merry-go-round while it's moving BUT other kids can ride this and be safe.
☐ ☐

Adapted from Crawford & Griffin, 1986.

Figure 3. Example of practice sheet similar to test used by Crawford for MC.

are predicted to be $MC = C + (E - H)$, where $MC =$ movement confidence, $C =$ competence, $E =$ enjoyment, and $H =$ harm.

Crawford (1984) identified and described the above three components within each playground task in a form of questions and statements, to which the subjects were asked to respond.

Using multi-discriminant analysis, Crawford obtained a validity coefficient of $r = 0.768$ for the 3 major interacting components as previously described in the Movement Confidence Model. The same
components were operationalized in the self-reported questionnaire given to the subjects.

Based on the above study, movement confidence across tasks seems to be the dominant component, while potential for enjoyment and harm account for 10% only. However, when each task is analyzed separately, each may have a specific proportion of these subcomponents (Crawford & Griffin, 1986).

Crawford's (1984) study contributed to the refinement of the Movement Confidence Model, strengthening its validity. Paramount is the application of the model to study children's behavior on the playground. However, limitations included:

A. The PMCI deals only with fifth-grade children. This investigator maintains that early detection of children's movement confidence performance is crucial, with the earliest detection enabling the educator to most efficient use to help children.

B. Self-report questionnaires entail limitations. Although Crawford (1984) selected the wording and format carefully, it is possible that such questions and statements carry different values and eventually different responses for different children.

C. Crawford did not find significant differences between the small group of exceptional children used and "normal" peers. If one purpose of the PMCI is ultimately to identify those children who withdraw from challenge and movement opportunities (Crawford, 1984), then it is important for the PMCI to predict/identify children educationally classified as exceptional since they are most likely deficient in movement confidence.
D. Crawford's study dealt only with how children projected their feelings to the questions/statements dealing with movement confidence. There could be a gap in reality between how they perceive themselves and how they would perform "practically" were they given the opportunity. Crawford could expand his study to compare children’s responses and self-reported questionnaire and their actual performance.

Risk Taking and Exceptional Children

Deficits in risk-taking behavior (McManis & Bell, 1968; West, Fretz, & MacDonald, 1970; Shaw, 1976; Roswal, 1979; Roswal & Frith, 1980; Roswal, 1981) and low movement confidence (Griffin & Keogh, 1982) are more apparent and acute in special children than in normal populations. Risk taking or movement confidence require perceptual and cognitive processing which might be difficult for members of exceptional populations (Griffin & Keogh, 1982). Interference with sensory and perceptual processing may limit the individual’s decision making and the execution of efficient movement (Kephart, 1971). It is, therefore, not unlikely that impaired children might display low levels of risk taking and confidence in their motor behavior.

Effectiveness of intervention in increasing the movement confidence or risk-taking behavior of handicapped children might be possible. Because of their apparent low level of movement confidence and risk taking it may be easier to pinpoint weakness and then establish a remediation program to increase their movement confidence and risk-taking behavior. Several studies with exceptional
populations will be reviewed in this regard (McManis & Bell, 1968; West, Fretz, & MacDonald, 1970; Shaw, 1976; Roawal, 1979; Griffin & Keogh, 1981).

Griffin & Keogh (1981) realized the importance of movement confidence in developing effective movement behavior in handicapped individuals. Griffin and Keogh (1981) applied the model previously described in their discussion of movement confidence, believing that for students involved in adapted physical education, those who are confident with their movement will choose to participate in the activity and vice versa.

Griffin and Keogh (1981) believe that the role of the physical education teacher is critical in helping develop movement confidence in the handicapped student. The instructor who learns to recognize the behavioral manifestations of a low level of movement confidence will be more likely to provide remediation. Recognition of the deficiencies in movement confidence allows the teacher to modify the motor task of the handicapped learner. This makes the individual more successful in performance which increases movement confidence. Additionally, the instructor can provide more support for the handicapped learner by providing reinforcement. Task modification in teaching motor skills to handicapped individuals and the reinforcement provided upon successful learning contribute to increased movement confidence. Handicapped individuals with increased movement confidence are more likely to do well when mainstreamed into regular physical education classes (Griffin & Keogh, 1981; Rich & Wuest, 1983).
To facilitate the development of movement confidence in the handicapped student, Griffin and Keogh (1981) have suggested the following educational support strategy:

1. Vary the task to increase confidence. Demands of the task must be tailored to the ability of the individual to meet them and to his level of performance. The task must be perceived as challenging, but not too demanding.

2. Offer support to increase confidence. While the primary instructional application of the movement confidence model is to influence the initial participation of the individual, the persistence of performing the task depends on the continuous support given during performance.

3. In addition to the above, Griffin and Keogh (1981) emphasized that teachers who work with impaired children need to focus on the child's effective movement behavior, rather than on efficiency. Effectiveness of movement in the handicapped child is of prime importance. A child with physical limitations may not be able to swim across the swimming pool in the conventional manner, but if s/he can move effectively and accomplish the goal with task/environmental adaptation the inefficiency is overcome.

Griffin and Keogh (1981) concluded their discussion by providing the three basic observational components of movement confidence which are manifest in the child's movement behavior. These components have been fully described previously. They include the individual's behavior as s/he is preparing to execute the movement/task, the movement tempo, and degree of attention to the
task. The movement itself can be used by the teacher to evaluate the children's movement confidence.

Crawford (1984) included 41 (out of 53 originally) exceptional children in his for the development of the PMCI previously described. Crawford wished to compare movement confidence performance of these subjects and normal subjects. He failed to find significant differences, which could in part be due to comprehension difficulty of questions and statements on the questionnaire to which subjects were to respond.

Roswal (1979) investigated the effect of developmental play programs which include motor programming on exceptional children's self-concept, risk-taking behavior, and motor proficiency. The experiment involved 32 exceptional children ranging in age from 5 to 13 years. Half of the subjects were assigned to the experimental group and the other half to the control group. The experimental group then participated in a 9 week program. Pre- and posttests were employed (the Martinek-Zaichkowsky Self-Concept Scale, an adaptation of the Slovic Risk-Taking Test, the Bruininks-Oseretsky Test of Motor Proficiency, and subjective evaluation of teachers and parents). Roswal's findings indicated significant improvement between pretests and posttests for the experimental group compared to the control in self-concept, motor proficiency, and overall effect of the program, but failed to show significant changes in the risk-taking behavior.

Shaw (1976) observed normal and handicapped children given free play time to explore and interact with a unified modular playground
which incorporated platforms of varied heights. Children, in general, were observed to gradually explore the higher levels with increased experience. Handicapped children displayed the same trend but at a slower rate. Shaw, in observing the children's jumping behavior, noticed that the handicapped children had more difficulty in "coding the danger," which was defined as the child's ability to overcome fear and jump from a height to the ground. This observation is of interest because it demonstrated that experience may increase risk-taking behavior. It may increase decision making, which is often inhibited because of the cognitive and perceptual problems of handicapped children.

West, Fretz, & MacDonald (1970) compared the risk-taking behavior of 49 boys aged 5 to 13 years (mean age was 8.45 years). The boys were a homogeneous group who had been referred to the clinic due to concerns associated with academic and social difficulties. A second group, serving as control, consisted of 23 boys of similar ages and social background from outside the clinic. This study employed chance risk taking measured on a 10-toggle-switch apparatus (West, Fretz, & MacDonald, 1970). Pretests indicated the experimental group was low in risk taking in comparison to the control's. The experimental group then was exposed to a variety of individualized physical activities in the gymnasium and at the swimming pool. Pre- and posttest comparisons, using a test to measure chance risk-taking behavior, indicated a significant increase in risk-taking behavior of the experimental group. West, Fretz, &
MacDonald (1970), however, did not report posttest statistical comparison between the groups.

McManis and Bell (1968) studied the risk-taking behavior of 74 institutionalized retarded boys and girls, which they classified into three groups: those who were reward seekers, punishment avoiders, and a third group of mixed orientation. These three categorized groups were then tested for skill risk-taking preference using ring tossing. Findings indicated that the reward seekers took relatively more intermediate shots than the punishment avoiders. The mixed orientation group took an intermediate chance and the punishment avoiders took the least risk. This study pointed out three important things: the retarded as a group clearly preferred a low risk/low payoff to a high risk/high payoff situation, with this tendency being more pronounced among girls than boys. Among the retardates it was possible to distinguish various levels of risk taking; those who tended to avoid punishment or escape an aversive stimulus were more likely to be low risk-takers.

The investigator believes that handicapped children as a group seem to display more of the characteristics typical of low risk-takers (McManis & Bell, 1968; West, Fretz, & MacDonald, 1970). It is likely due to lack of "normal" experience which may be a result of their social-emotional, cognitive, and physical characteristics. Kephart (1971) described, for example, the child's development of space awareness. It is possible that any perceptual-motor deficits involved in developing such space awareness might interfere with the development of the child's motor risk
taking. In the literature these children are described as uncoordinated, clumsy, bumping into objects, and miscalculating or inhibiting motor responses (Arnheim & Sinclair, 1979) and possessing low confidence in their movement and physical activities (Griffin & Keogh, 1981; Rich & Wuest, 1983).

Variables Influencing Risk-Taking Behavior

An individual's behavior is influenced by a host of variables: Risk taking is no exception. Some of these are sex, age, childrearing practices, life style, birth order, culture, socio-economic status, religion, and geographical location. In the following studies variables influencing risk taking will be described, particularly those relevant to the role of the environment, for which evidence is readily available.

Risk Taking--Age and Development

Age and developmental differences in risk-taking are variables importantly influencing risk-taking. With increased age and experience one expects the child to be able to develop more complex skills and to adapt and modify them according to environmental demands (Case, 1980). The child can interact more efficiently with the environment after developing the ability to move and explore his/her surroundings (Piaget, 1960). As yet there is no documented experimental evidence as to the nature of the emergence of risk-taking behavior in children. There are few tests for evaluating
risk-taking behavior, and many difficulties involved in measuring such behavior.

The visual system appears to play an important role in the development of risk-taking behavior. Early studies of children's visual detection of danger have involved the "visual cliff" phenomenon (Gibson & Walk, 1960). They have demonstrated the ability of animals and human infants to avoid the deep parts of a visual "cliff" early in life.

Campos (Human Behavior, 1979; Bertenthal & Campos, 1984), a child psychologist at the University of Denver's Infant Study Lab and University of Virginia, believes that fear of falling from height is acquired by young children as a result of "self-produced locomotor activity" rather than inborn behavior. When infants start crawling and exploring their environment they learn to identify objects and increase awareness of space qualities. They become more cautious of apparent danger and show signs of fear.

Schwartz, Campos, and Baisel (1973) observed the fear behavior of over 100 infants, aged 6 to 9 months. Young babies who crawled little or not at all showed almost no fear of perching on the edge of a bed or crawling on the edge of a sofa. Slightly older babies who crawled better showed a marked fear of high places. In a similar experiment Schwartz et al. (1973) used a 4-foot-high visual cliff to measure infant fear of heights. They observed that babies with less experience in crawling, and who were considered "relatively inactive" babies, crawled slowly to their mothers over the shallow and deep sides of the "cliff." The more active crawlers of the same age
crawled only over the shallow side, and they usually refused to cross over the deep side. A few took a detour crossing only a small portion of the deep side. 

Schwartz et al. (1973) observation might explain the development of fear in children, which in turn is likely to influence motor risk-taking behavior. This might account for individual behavior, i.e., a child experiencing his/her first jump into deep water in the pool might do it without hesitation if assisted by an adult in the pool. However, after experiencing the first discomfort or becoming aware of the water's depth the child might inhibit future jumping. Similarly any task involving some unpleasant consequence which the individual had previously experienced would likely be one which he/she would not attempt. Based on these observations one might ask what the strategies are in teaching children motor activities involving risk taking.

A child's cognitive ability in terms of how a problem is perceived, the ability to process information from the time of encoding to the decision making, is an important component of movement confidence (Griffin & Keogh, 1982) and probably of risk-taking behavior. Risk-taking tasks involve chance and probability, perception of the presence or absence of danger. These require the individual to make judgments.

Kass (1964) assessed the chance risk taking of children and the influence of age and sex differences on 21 boys and 21 girls aged 6, 8, and 10 years. He found that children manipulated the slot machine with different probabilities of payoff level quite consistently.
However, he found no significant age or sex differences. This study might indicate that at age 6, children "grasp" the concept of chance and probability. Piaget's (1960) view is different, believing that cognitive development of children in understanding chance and probability is a slow ontogenetic process. Piaget (1952) claimed that children under the age of 11 have not mastered the concept of probability and that the preoperational child, aged 7 and below, perceives things as essentially static, not given to random chance fluctuation.

It may be that Piaget's and Kass' assessment of probability development in children are not in conflict. Kass' 6-year-old subjects appeared immature in their understanding of chance and probability, and therefore took greater risks, failing to see the real probability of losing. McGinnis and Berg (1973) indicated that when young children are involved in games entailing chance and probability as those used by numerous researchers, they are not much concerned with the probability of losing or gaining. As a group they mainly derive enjoyment from the activity itself. Playing a game which involved risk-taking activity was a much stronger reinforcer than the reward offered as part of the experiment. This explanation calls into question the validity of some risk-taking tests employed with children and indicates the need to consider the role of age and cognitive development in risk-taking behavior. To what extent the founding of probability and chance development may effect motor behavior remains uncertain and needs further inquiry.
Studies related to age level and risk taking were also carried out by Slakter, Koehler, Hapton, and Grennel (1971) and by Robbins (1969). Slakter et al. were concerned with sex and age differences in children's chance risk-taking behavior. They used an "objective examination" involving guessing, which had a penalty for incorrect responses. Their results showed higher risk taking in grades 5, 6, and 7, than for those in grades 8, 9, and 10. These findings are interesting and might lead one to speculate that with more education children become more cautious and conservative. It is also possible that socialization increases conformity to a set of rules, and lessens decision making based on individual desires. This conformity may pay off better in the school setting and in society.

In similar studies Kogan and Wallach (1967) and Robbins (1969), assessing college students, confirmed the same phenomenon as Slakter et al. (1971), i.e., the more education the subject had completed, the more conservative the risk taking.

Cohen, Dearnaley, and Hansel (1957) were concerned about the nature of uncertainty and objective probability in children's risk-taking behavior. Assessment of these variables was accomplished using a skill risk-taking test. The children, ranging in age from 9 to 14 years, were asked to estimate the number of times they would succeed in throwing a ball to hit a target, when the number of attempts was at varied values. Their study revealed that children's responses varied with their age. As the number of hypothetical attempts in the task become larger, subjective probability tended to
decline. This effect, however, was less marked among the older children.

Comparing nursery school children (aged 4 to 6 years) with elementary school children (aged 9 to 11 years) on responses in choice behavior, Jones and Liverant (1960) found differences between the above groups. Their conclusion was that age significantly contributes to response mode.

Arenson (1978) studied probability preferences of children, finding no age or sex differences. The 57 boys and 55 girls in his study, aged 5 to 13 years, were assessed using a game of chance risk taking in which there was a series of choices, all of which involved potential loss.

Assessment of 480 young children, aged 3 to 11 years, was conducted by Ginsburg and Miller (1982) on risk-taking behavior. The investigators were particularly interested in the sex differences, but their findings on age differences are relevant to this section. Risk-taking behavior was assessed in four different locations at the San Antonio Zoo. The children's risk-taking behavior was observed in riding an elephant, feeding an adult burro, petting and feeding domestic animals, and climbing to and walking on a steep river embankment adjacent to the zoo. Older children were more likely to demonstrate higher risk taking than younger children, except on the task involving feeding the animals which was less appropriate for older children.

The effects of age and developmental differences on risk-taking behavior in general seem to be closely related to cognitive
development, and age and risk taking were found to be related in most studies. Issues which appear unresolved are the relative contribution of cognitive development to motoric risk-taking behavior, the optimal period for such development, and the relative contribution of home and society to conservatism in risk taking demonstrated in some of the studies (Kogan & Wallach, 1967; Robbins, 1969; Slakter, Koehler & Hapton, 1971; Krzesni, 1973; Layne, 1973).

Risk Taking and Sex Differences

In addition to the numerous studies of risk-taking age and development, sex differences have been one of the most popular studied variables.

In a study involving chance risk taking, Slovic (1966) looked into age and sex differences among 735 boys and 312 girls, aged 9 to 11 years, who volunteered their participation in a county fair. The children participated in a slot machine game wherein they could win a candy until pulling a "disaster" switch. His results showed that boys were more daring and girls more cautious, but girls received a better payoff. Similar results were obtained by Meyers (1975). Slovic (1966) speculated that the girls' payoff was due to intellectual maturity over the boys and not as a result of risk taking.

Kass (1964) studied children's decision making using chance risk taking. Subjects were 21 boys and 21 girls aged 6, 8, and 10 years. This study involved differences in probability preferences where boys chose the low and intermediate probabilities of payoff.
significantly more often than girls. This indicated that boys were more willing to take a risk than girls. This was in spite of the consequence that slot machine with the highest probability of payoffs actually had a lower number of rewards.

Pankov and Kogan (1968) studied creative ability and risk-taking behavior in children. They concluded that competitive contests using a shuffleboard game in a skill risk-taking task aroused greater response in boys than in girls. As to self-confidence, girls exhibited more conservatism than boys. The researchers suggested that self-confidence appeared to be a possible mediating link between creativity and risk taking.

Slakter (1967, 1969) studied risk taking on objective examinations which involved chance. An objective examination was defined as "guessing when the examinee is aware that there is a penalty for incorrect responses" (p. 33). He compared schools located at different sites, finding differences only between the locations, but that sex differences in general were not significant. In a later study, Slakter, Koehler, Hapton, and Grennel (1971) indicated that boys took greater risks than girls on objective examinations. This was true by school location, but was only significant in one school system.

To control sex and geographic variables influencing risk-taking behavior, Weller, Eytan, and Sollel (1976) compared Israeli kibbutz and city children. They hypothesized that due to an ideology of sexual equality in the kibbutz, if sexual differences were to be found in risk taking, they would only be among city children.
Interestingly, results yielded no significant differences in risk taking between the kibbutz and city children or among the city children. Their findings are similar to those of Jamieson (1969) and Gratch (1964) who found no significant sex differences in chance risk taking.

Other recent studies on sex and risk taking include those of Hayes (1977), Arenson (1978), and Ginsburg and Miller (1982). When investigating choice probability of boys and girls, ages 5 to 13 years, Arenson (1978) used a game wherein 80 choices could be made to insert a stylus into boards with holes of varied numbers and payoff probabilities. Arenson (1978) found no evidence for the cultural stereotype that boys take greater risk than girls. Hayes (1977), in his study of the effect on traditional playground versus adventure playground, found that in both groups of those playing on the traditional and on the adventure playground girls were significantly lower risk-takers compared to boys, regardless of the kind of playground they played on. Ginsburg and Miller's study (1982), previously described, dealt primarily with sex differences in children's risk taking. The investigators observed children's risk-taking behavior while riding an elephant, petting or feeding an adult burro, feeding a variety of domestic animals, and climbing and walking a steep river bank at the San Antonio Zoo. In general, boys were found to be more significantly engaged in the risk-taking activity at the zoo than girls. This is the first study to investigate children's natural activity and evaluate children's risk taking as young as 3 years old with age appropriate tasks.
From the previously reviewed literature one cannot easily arrive at a conclusion and further study is required on sex and age and risk-taking behavior because of conflicting reports. Studies also demonstrated differences between sexes in chance and skill risk taking, where there were some differences in skill risk taking but less in chance risk taking (Krzesni, 1973). Similar conclusions were obtained by Kogan and Wallach (1967) and Anifant (1972). Psychologists have not, as yet, concurred as to the differences between boys and girls in chance versus skill risk taking. It is likely that boys tend to be higher risk takers than girls when skill risk taking is involved. This is probably due to their athletic inclination, and being encouraged from an early age to participate in gross motor activities. In chance risk taking, those with prior participation experience in gross motor or physical activities, and those who do not experience such activities, have an equal chance of doing well in tests involving chance risk taking. Skill risk taking, however, requires motor skills to be in the individual's possession, and success depends on the individual. There is also some evidence that while boys were more riskers than girls, the payoff was less than for the girls, who were more conservative (Kass, 1964; Krzesni, 1973; Meyers, 1975).

Society is highly influential in influencing sex differences with regard to risk-taking behavior. There is a likelihood of a trend in the future for a decrease in sex differences due to changing societal values regarding women's rights and nonsexist orientation. However, due to the multidimensional nature of
risk-taking behavior (Slovic, 1964) there might still continue to be differences regardless of changing societal values.

Studies comparing risk-taking behavior between boys and girls can be valid and reliable when they are isolated from each other. Problems arise when one study is compared with another to reach a conclusion. Slovics (1966) discussed the inherent problem of the multidimensional aspect of risk-taking behavior. Studies of one dimension cannot be compared to another, even though both might deal with sex differences, and under similar conditions. Experimentors might need to carefully and accurately define the dimension of risk-taking behavior they are researching. In addition, sufficient experimental replications of this dimension may need meaningful data which can prove or disprove a theory. Same description as above may also apply to studies dealing with the possible relationship of risk taking and motor performance of young children.

Child-Rearing Practices Influencing Risk Taking

In addition to age and sex, variables over which one has no control, there are environmental factors which may influence risk-taking behavior: the family, society or culture, and geography.

Torrence and Ziller (1957), using a questionnaire measure, constructed an inventory to assess risk-taking propensities from a knowledge of life experiences. Their study was designed to develop and validate a scale measuring risk-taking tendencies of 370 combat air crew men and 730 fighter pilots. Some items covered which were hypothesized to be related to risk taking were: early childhood
experience, sport participation, competition, financial risk, and risk of interpersonal relationship. Risker subjects tended to have been raised on a farm, in a rural area, or in a small town. They were better able to take risk without fear at an early age. They also demonstrated independence and often traveled and stayed away from home without their parents. They enjoyed participation in sport, particularly that which entailed rough activities and competition.

Carment (1974) studied the influence of child-rearing practices of Canadian and East Indian 19-year-old males. He found that East Indians were more conservative in risk taking. In successive episodes of skill risk taking they tended to withdraw from higher commitment in taking risks. Carment thought that their conservative risk-taking behavior might have been due to the authoritarian East Indian family life practices, which motivate males to avoid failure, and therefore to take fewer chances.

Lykken (1982) emphasized the influence of the home environment and adult guidance in the early years on the development of risk taking. He believes that the small minority of people who are fearless are greater in risk taking and in daring sport activities. If those individuals had not been properly trained in childhood, Lykken (1982) and Farley (1986) write, they might have just as easily turned into psychopathic criminals, who would also be involved in risk-taking behavior with a negative outcome.

Torrence and Ziller (1957), Carmant (1974), and Lykken (1982) studies commonly observed and described the influence of the
environment on the individual's risk-taking behavior. They delineated many of the elements involved in the shaping of risk-taking behavior. However, the above studies have their limitations since the use of questionnaires and descriptive studies were employed.

The environment probably has the greatest influence on the individual's behavior, and therefore on one's risk taking. Unfortunately there is minimal research substantiating this statement. Well-controlled longitudinal studies are often impossible and research control may be difficult to demonstrate regarding the environmental influence on risk taking. Carefully designed cross-cultural studies similar to the ones carried out by Carmant (1974) may contribute to the understanding of the role of the environment. Longitudinal studies, while difficult, are possible and can be carried out to study the role of the environment on risk-taking behavior.

Risk Taking and Dependence

The degree of independence has social significance regarding one's judgment. This, in turn, is an indicator of maturity and readiness to face daily complexities. Those who develop independence would be better able to solve problems and perform everyday life duties. Taking a risk involves making a judgment, solving a problem, and fulfilling one's obligation to achieve and be successful in life under conditions which are perceived to be, or actually are, threatening. A few studies investigated the relationship between
independence and risk-taking behavior (Torrence & Ziller, 1957; Gratch, 1964; Ogilvie, 1974).

Gratch (1964) investigated the difference in degree to which dependence of children was associated with adult approval and age. He wished to ascertain if children who depend on adults are willing to take a chance during a task involving guessing and various degrees of uncertainty. His 84 subjects (42 girls, 42 boys) were aged 6, 9, and 11 years. Dependent children did not differ significantly from independent ones in their comprehension of random events. However, highly independent children were significantly more willing to take a chance at guessing.

The variable of dependence as it related to risk-taking behavior was also investigated by Ogilvie (1974) via the relationship to participation in dangerous sport activities, Torrence and Ziller (1957) for predicting successful enrollment in the army combat activities. Studies involving birth order and risk-taking behavior were completed by Weller, Eytan, and Sollel (1976) and by Landers and Martens (1971). Both assumed that independent subjects are higher risk-takers than those who are more dependent on their parents. Their results were substantially the same.

Birth Order and Risk Taking

The relationship of dependence and risk-taking behavior is also clearly demonstrated by additional studies investigating birth order and risk taking (Jamison, 1969; Weller, Eytan, & Sollel, 1976). It is assumed that birth order of an individual mediates the degree of
dependence, level of achievement, and anxiety (Schacter, 1959). Firstborn, compared to later born, generally received more attention from their parents, were more protected, hence fostering greater dependence on the adult.

Firstborn, in comparison to later born, generally were found to possess greater fear and anxiety. They perceived the threat of physical harm to be high (Schacter, 1959). Therefore, they were less likely to take risks than later born.

Jamieson (1969) looked at birth order, family size, and sex among 10- and 12-year-old children in New Zealand, finding no evidence of chance risk-taking differences between boys and girls, or due to birth order. However, family size did make a difference. Subjects from smaller families were less risk-takers than those from large families. Speculation could be that with one child or in small families more dependence is encouraged in these children, hence inhibiting their ability to make independent judgments in risk situations.

Weller, Eytan, and Sollee (1976) presented 10 hypothetical situations in which subjects had to choose between two courses of action, where for one the reward is greater than the other, but the likelihood of success is also less. They compared kibbutz and city children relevant to birth order and chance risk taking. This study found significant differences in risk taking among city children only. The first and only born in the city were more cautious than the later born. This result could be attributed to the fact that adults in the kibbutz setting have collective responsibility for all
children. Children also spend much of their growing up years under supervision of caretakers, and they live separately from their parents. Hence their child-rearing practices encourage more independence which is more likely to be associated with high risk-takers.

Alberts (1976) conducted an experiment where she examined the birth order effects on children's motor performance using high anxiety tasks (jumping from varied heights) and low anxiety tasks (games in which a ball was rolled towards a target and which did not involve potential harm). Firstborn subjects performed better than second born on the achievement-oriented motor tasks which did not involve potential physical harm, while second born performed significantly better on high anxiety tasks requiring a higher level of physical risk.

Albert's study (1976) is of particular interest for this proposed investigation. The use of gross motor skills performance of children as an indicator of their risk-taking behavior is a potentially useful approach for future risk-taking assessment that would relate closely to physical education.

Not all studies, however, agree that birth order may effect risk-taking behavior, and many other variables associated with birth order need to be taken into account. Ernst and Angst (1983) provide excellent collections of studies on birth order, including those described in this study.
Risky Shift Phenomenon

The risky shift phenomenon was first introduced by Stoner (1961), and is described as the tendency of members of a small group to collectively make a riskier decision than individuals in the group. This tendency has been attributed to the individuals' discovering that they are not as risky as their peers. The individual under such conditions tends to shift toward the group, becoming more risky in order to maintain the group norm of riskiness.

Social psychologists have been interested in the risky shift phenomenon and have proposed various explanations of the risky shift. In their experiments they usually presented a choice, dilemma, or series of questions to be solved, and in which the hypothetical solution involved taking risk. The outcome of extent or degree of risk then is compared under two conditions. One condition is when the individual alone was presented with the dilemma/choice, and the second condition was when an individual was part of a group making decisions collectively.

The diffusion of responsibility hypothesis (Wallach, Kogan & Bem, 1962) and the risk as value hypothesis (Brown, 1965) are two views explaining risky shift which received most support in the literature. Wallach et al. (1962) explained risky shift via diffusion of responsibility, arguing that large numbers of people in the group allowed a greater sharing of responsibility in case of negative consequences. This diffusion of responsibility then allowed the individual within the group to take a riskier decision. Brown (1965) explained risky shift using the risk as value hypothesis, wherein
risk is associated with cultural values and is perceived as a desirable value. When people become aware of how risky other individuals in the group are, they tend to perceive themselves as risky, or riskier than others.

The extensive literature on the risky shift phenomenon has dealt almost exclusively with adults. Studies dealing with children are few and include those of Kogan and Carlson (1969), Maurer (1972), and Kamel (1979). Kogan and Carlson (1969) attempted to measure risk taking, the risky shift, and some effect of competition in 4th- and 5th-grade children, and in college students. Study for the children and college students was similar in methodology, but was analyzed separately. One hundred and fifty children were subdivided into experimental and control groups and then were given the option to choose questions from varied levels of difficulty. The most difficult questions yielded the greatest reward if answered correctly. Children were placed in groups of three; subjects were matched for age, sex, and IQ, and then assigned to five different conditions, differing in level of competitiveness, or absence of competition in the control group.

To determine degree and direction of the risky shift, subjects were first asked individually to decide on a series of tasks which enabled taking lesser or greater chances. Later, the same subjects were placed in a group situation and were required to discuss and reach a group decision on the same problems. The mean differences between those of the individual risk score and the group consensus score served as the measure of risky shift.
Kogan and Carlson (1969) found no evidence of the risky shift in children, but only in the adult group. Their conclusion was that the series of questions presented to the children were too confusing and that may account, in part, for the absence of the risky shift in their child subjects.

Maurer (1972) investigated the risky shift in children, aged 6 to 12, using the toggle switch instrument. Children were told they will gain a token for each time they push one of the switches, but one of the switches is a "disaster switch," which if pressed results in a loss of all previously gained tokens. They were also informed they could stop whenever they wished. The level of risk taking was measured as the number of trials the child pressed the switch, regardless of the payoff. Higher risk-takers took more trials, whereas low risk-takers stopped voluntarily after a few trials.

Children were tested individually in the presence of the experimentor and later in a group of 3 children, wherein they had to arrive at a consensus as to number of trials to press the switch. Results indicated significant differences between groups, when performed as individuals, and when executed as a group, where significantly greater risky shifts occurred in group situations.

Kamel (1979) investigated risk taking and the risky shift in 7- to 11-year-old boys and girls, employing both chance and skill risk-taking tasks. Kamel wished to determine whether children working in pairs take greater risk when making a choice than when alone. Sex and age differences were also considered.
Kamel's chance risk-taking task employed a toggle switch game similar to that used by Maurer (1972). For skill risk taking, she used a modified shuffleboard game. Her scoring criteria on the toggle switch were similar to those previously described by Maurer (1972). On the shuffleboard, children had to push the disc from various distances as they wished. The greater the distance selected, the greater the payoff if successful, with penalties for unsuccessful attempts from greater distances were considered riskier.

Data analysis indicated that children who worked in pairs took significantly greater risks than those who performed alone; i.e. the risky shift did occur in children. However, there were no significant differences between boys and girls. Younger children, aged 7, took less risk than 8-, 10-, or 11-year-olds. Children's risk taking did not differ significantly as a function of chance vs. skill risk taking.

Studies involving risky shift phenomena have not as yet established a uniform theory, although most researchers tend to support the risk as value theory, since alternative theories provided some evidence regarding the risky shift phenomena results might be due to methodological procedures. The investigator believes that no one theory solely accounts for risky shift. Until methods/procedures used in research are more finely tuned, it will not be possible to ascertain the relative contribution of each theory in explaining the phenomenon.

Regarding children, studies are few and assumptions cannot be made on these alone. Risky shift phenomenon investigations dealing
with children are of interest to social psychologists and physical educators. Learning in a group situation may improve student motor skill acquisition. The risky shift may facilitate gains in confidence and increase risk taking, while in their absence learning might occur at a slower rate. Also, creativity, which should be part of dance and movement, with problem solving, may be impaired by group pressure. Further research on the risky shift in children is needed, particularly in the realm of physical education. What skill, or part of skills are taught better individually, or within groups? What is optimal group size to teach motor skills? What size best facilitates the risky shift? How does one determine when the risky shift toward the group value discourages creative expression and problem solving in dance, movement, and during physical education classes? One may also ask if risky shift affects all individuals equally. Kogan and Carlson (1969) believe that risky shift might discourage or inhibit some individuals from expressing their thoughts in the classroom.

Risk Taking and Participation in Sport

Are there any attributes which characterize participants in high risk-taking sport? What, if any, common elements exist? Many studies dealing with high-risk skill in sport made an attempt to answer these questions (Ogilvie, 1974; Yiannakis, 1976; Casher, 1977; Nixon, 1981; Brannigan & McDougall, 1983). Knowledge of the makeup of high risk-takers participating in sport activities may increase awareness as to which variables wield influence on the development of risk-taking behavior. This could provide parents,
educators, and coaches with valuable information facilitating understanding of the development and influence of variables on risk-taking behavior. Although participants in extremely dangerous sports may be viewed by society as deviant and not approved (Brannigan & McDougall, 1983) it would be helpful to learn the possible motivation for such extremity. Unfortunately, those studies were descriptive, employing questionnaire which limits their use and interpretation to other subjects and settings.

In a study of adults (Ogilvie, 1974), 250 national and world class athletes were investigated for risk taking and personality traits via questionnaire. Ogilvie noted that no indication or trend was seen in sex differences related to risk-taking behavior. However, he supported previous findings indicating the strong independence observed in those athletes participating in high-risk sport. He described the athletes as stimulus addicts who have a unique need for excitement by testing their outer limits of physical and emotional endurance. They also tend to take leadership roles, be decision-makers, have high abstract reasoning, and also are loners.

A study by Yiannakis (1976) investigated birth order and its relationship to participation in dangerous sports. In a comparison of first and later born male college students as to their preference for dangerous sport participation, results revealed that firstborns were more likely to avoid sports in which the severity of physical harm was perceived to be high and the opportunity to affiliate under stress tended to be low.
Most studies related to risk taking and participation in dangerous sports investigated the effect of birth order on those variables. Assumptions were derived from Schacter (1959) that firstborn are more likely to possess greater fear and anxiety than later born, and that they perceived the physical harm to be high. Firstborn individuals are more likely to avoid participation in dangerous sports where the severity of the physical harm is perceived to be high (Nisbett, 1968; Landers & Martens, 1971; Yiannakis, 1976). It was assumed that the level of anxiety in the firstborn is a function of early parental expectations for higher achievement.

Casher (1977), in a similar study, looked at the relationship between participation in potentially harmful sports and birth order. Her subjects were 127 varsity athletes attending Ivy League universities, and results showed birth order rather than family size or socioeconomic background to be significantly related to dangerous sport participation. Her firstborn subjects avoided participation in dangerous sports more than later born.

Training and Modification of Risk-Taking Behavior

While many studies on risk-taking behavior have employed ex post facto research techniques to look at specific traits, few studies have actually attempted to increase risk-taking behavior (Klein, Quarter, & Laxer, 1969; West, Fretz, & MacDonald, 1970; Karls, 1971; Kopfstein, 1972; Montgomery, 1972; Roswal, 1979; Griffin & Keogh, 1981).
Karls (1971) found out that children who were exposed to successful models in risk taking were more willing to take greater risk than those exposed to unsuccessful adult models.

Montgomery and Landers (1971) and Montgomery (1972) investigated the effect of modeling on children's risk-taking behavior within the context of Bandura's social learning theory (Bandura, 1962) which hypothesized that children will imitate the behavior of the model. A second hypothesis tested was that of Slovic (1966), which indicated that risk taking is associated with sex role development in society, and that males and females are not presumed to conform to their respective sex role stereotype until 11 years of age. Montgomery's subjects were 1st-grade children, mean age being 7 years, 3 months, and 5th-grade children, mean age being 11 years, 4 months. All subjects were divided into three separate groups. Each group was exposed to a filmed model of a young adult male. The task involved chance risk-taking behavior similar to the buzz switch employed by Slovic (1966). The first group observed the model performing in a risky manner; the second group observed the model performing in a conservative manner; and the third group, which served as control, observed the model only being given instructions on film. Subsequent assessment consisted of asking the children to imitate what they had seen. Results supported Bandura's social learning theory, suggesting that risk-taking tendencies might be learned through imitation. This study, however, did not support the hypothesis that risk-taking behavior is associated with sex role development.
When training for risk taking, the sex of the instructor or experimenter might also affect the subjects' behavior. Fourth-grade girls took significantly more risks when working with a male experimenter than with a female one (Kopfstein, 1972). Risk-taking "training" had an effect on Klein's subjects (Klein, Quarter, & Laxer, 1969). Seventh- and 8th-grade underachievers were trained in improving their achievement motivation and risk-taking behavior. Achievement motivation theory (Atkinson, 1958) hypothesizes that a person with high achievement motivation will tend to take higher or moderate risks. Experimental groups that received "achievement training" took significantly more extreme risks on a ring-tossing task.

Individualized physical activities in the gymnasium and swimming pool were demonstrated to have a significant effect on children's risk taking by West, Fretz, and MacDonald (1970). Their experimental subjects, 49 boys, aged 5 to 13 years, who had been diagnosed as having social and academic difficulties, participated in the activity program for a period of six weeks for two sessions per week. Pre-and posttest comparisons with the control group measured using 10 toggle-switch apparatus showed significant increases in chance risk-taking behavior of the experimental group.

Roswal (1979) and Roswal and Frith (1980) have developed a motor program to increase self-concept, skill risk taking, and motor proficiency of exceptional children. Thirty-two exceptional children, aged 5 to 13 years, participated in the study where half of them served as a control group. The experimental group which participated
in a psychomotor training program significantly improved their self-image and motor proficiency, but not their risk-taking behavior. The assessment for chance risk taking used by the investigator was a modified form of Slovic’s risk taking (1966).

Griffin and Keogh (1981) were concerned with the motor performance of handicapped individuals during adapted physical education classes and have lent theoretical and practical support to the concept of increasing the confidence of children. Confidence presumably influences risk-taking behavior (Keogh, 1983). They described an assessment procedure for identifying the child with low movement confidence. Griffin’s and Keogh’s ideas were previously described in detail. Others have not, as yet, experimentally supported the application of their suggestions in the field setting.

Some evidence has been reviewed which suggests that it is possible to modify risk-taking behavior, and that such training has tremendous effect on children’s performance. Outward Bound programs have long been concerned with training to increase and modify individual self-confidence and risk taking (Darst & Armstrong, 1980; Thomas, 1983). The surrounding environment and given situation, in addition to the group influence, is assumed to elicit high quality of risk-taking behavior. Outward Bound activities can have positive results even with socially maladjusted juvenile delinquents (Bear, Jacobs, & Carr, 1975). In the challenging outdoor environment children can demonstrate their best achievement under stressful and risky situations. The physical educator could incorporate risk-taking training in the school program similar to that of West, Fretz, &
MacDonald (1970). They could use risk-taking task modeling as did Montgomery (1972) and Karls (1971), and incorporate the views of Griffin and Keogh (1981) into their program. While physical educators may be doing similar things unconsciously, it would probably be more effective if training were planned for and executed systematically and continuously.

Other Variables and Risk-Taking Behavior

There are additional variables which may influence risk taking and on which there is currently little information. Cohen and Hansel (1956) contend that risk-taking tendencies have been important determiners of criminality. Chemicals have also been suggested by Furlong (1969), and Rosenthal (1967, 1968) as a chemical reason individuals who participate in risk-action sports experience unusual exhilaration.

Karlsson and Ellis (1972) and Ellis (1978) have described man as stimulus seeking. Such stimulus-seeking behavior effects the level of arousal and might also be used to explain risk-taking behavior. The more complex and novel the environment, the more it will attract the individual to interact with it. The highly complex and novel environment will elicit higher risk-taking behavior until the object, environment, or the task is no longer attractive and when most possibilities for manipulation have been optimally explored. Similar support has been found in research dealing with participation in dangerous sport activities. Ogilvie (1974) described the elite athletes who are constantly being attracted to increasingly
"dangerous" and highly stimulating activities with high risk taking: Hayes (1974) and Brannigan and McDougall (1983) interviewed high risk-takers, hang-gliders, and indicated how subjects tried to test their limits and, when reached, seemed to be disinterested in the activity. Some physical educators identify risk-taking behavior in sport as it is related to level of arousal (Harris, 1973), and Zuckerman (1979) developed a scale to measure level of arousal and physical risk taking which has been used by a number of investigators. As in the case with many measures of personality traits, Zuckerman's scale employed a type of questionnaire which may be subjective and cannot be used for children.

Evaluation and Measurement of Risk-Taking Behavior

The quest for the development and refinement of an assessment of risk-taking behavior in adults, as well as in children, has challenged researchers. Criticism of investigations of risk-taking behavior pointed to methodological difficulties, especially the inappropriateness of assessment tools (Slovic, 1964; McGinnis, 1973; Arenson, 1978; O'Keefe, 1979). Limitations of measurement did not discourage researchers from using the instruments in their work since assessments of human behavior in many areas have the same limitations.

These concerns are not new and Slovic's (1964) article described strengths and weaknesses of many of the risk-taking behavior measurements. If researchers are aware of these limitations, they can either make an adaptation of the assessment device or indicate
in their study the existing difficulty. Slovic pointed out that many
of the contradictions in risk-taking studies could be due to the
multidimensional nature of risk-taking behavior. One kind of
measurement of risk-taking behavior might not be appropriate for
another kind of risk taking, and lack of validity would be common if
different characteristics are being measured.

Slovic (1964) distinguished three kinds of risk-taking indices.
One is a response set and a judgmental measure such as those
involved in the willingness to gamble on an ability test as
reflective of risk-taking tendencies and includes strategies that
the individual gambler might use. The second is a questionnaire
measure as in the device by Torrance and Ziller (1957), wherein
subjects must choose answers with varying degrees of risk, and then
their selected answers are categorized as high, moderate, or low
risk. The third measure described by Slovic is of probability and
variance preference, and related to differences in individual
preferences in probability of winning and losing. Recent popular
measures of this genre include studies of achievement motivation and
Dave, 1965).

Additional important measurement distinctions are assessment of
risk taking in chance risk taking and in skill risk-taking situations
(Slovic, 1964). Chance risk taking involves tasks of guessing, as in-
gambling and slot machines, wherein the individual has no control
over the outcome. Skill risk taking entails decision-making tasks in
which the individual has personal control over the outcome, i.e.,
shooting a ball into the basketball hoop from differing distances with almost sure reward from a short distance and greater reward from farther away but with less success (deCharms & Dave, 1965). There is some evidence that tests involving chance risk taking and skill risk taking possibly producing different results (Cohen, 1960; Slovic, 1964; Kogan & Wallach, 1967; Krzesni, 1973; Meyers, 1975; Thomas, 1978). The results could be for two possible reasons: the investigators comparing chance and skill risk taking were not careful to clearly define their area of assessment. Slovic (1964) maintains that because of the multidimensional nature of risk-taking behavior it is possible that sources comparing two or more dimensions which may vary in their nature. Regarding children, and particularly sex differences, it is possible that those who have had more exposure and experience of motor activity and sport will do better on tasks involved in skill risk taking. However, when chance risk taking is involved all have an equal chance of doing well regardless of sex or previous motor experience.

Slovic (1964) also raised the issue of the possible different results of risk-taking assessments involved in objective risk to unobjective or perceived risks. When an individual is in a condition involved in real risk, it is more likely that true risk-taking behavior will emerge in his action. However, in an experiment using "artificial atmosphere" of risk, i.e., via games simulating risk, the resulting behavior will probably not reflect the true risk-taking behavior of the individual. Slovic also held that emotional arousal can be used to measure risk-taking behaviors, but that such
measurement may produce negative results due to the assessment device's failure to provide the subject with a true atmosphere of risk. The idea of inducing risk-taking behavior under real risk conditions was demonstrated by Slovic, Lichtenstein, and Edward (1965), when they compared choices among bets under make-believe and real gambling conditions. The subjects in the make-believe condition changed their strategies to those using minimum thought and effort.

The assessment of risk-taking behavior in the natural environment seems to hold the most promise to develop valid risk-taking situation tests (Hayes, 1977; Ginsburg & Miller, 1982). Assessments for children's risk taking using illustrations identifying varied levels of risk, such as those suggested by Gallahue (1983), and which will be discussed later, do not provide real risk taking. In addition they are developmentally inappropriate for very young children, who cannot perceive and discriminate the varied levels of heights on illustrated risk-taking tasks. Young children's information processing is limited, and their ability to discriminate is also limited (Case, 1980).

Slovic (1964) and Slovic, Lichtenstein, and Edward (1965) provided points for real conditions to elicit risk-taking behavior. They might question the Griffin and Keogh (1982) and Alberts (1976) tasks used to measure movement confidence which might influence risk taking. Griffin and Keogh (1982) used a mat on the floor where the child landed to protect the child from possible injuries. Alberts' subjects were attached to a safety belt before attempting the jump. It is understood that problems related to protection of subjects'
rights and ethical considerations will not allow human subjects to be placed in real risky situations which might cause injury (American Educational Research Association, 1985). While there is no ethical method to assess the "optimal risk" of each subject before the experiment, it may assist to maximize real risk taking when skill risk taking is the task involved in the study. Such strategy was demonstrated by deCharms and Dave (1965) and is discussed below.

A problem encountered when studying skill risk taking is that individuals are different in their ability skill performance (deCharms & Dave, 1965; West, Fretz, & MacDonald, 1970). In chance risk-taking situations optimal risk taking may be defined by the "reality" of probability of success (where one's decision maximizes payoff). In chance risk taking a clearly identifiable "universal" optimal risk can be predetermined by the experimenter. In the past studies on achievement motivation which used skill risk taking, optimal level was determined by group average in defining the test's level of difficulty. However, group average of "optimal risk" gives no indication of an individual subject's perception of what is low, medium, or high level of risk. deCharms and Dave (1965) decided each individual's optimal level by letting the subjects practice shooting to the basket from varied distances. The subjects' choices of distance along with their skill levels were the bases for the establishing of each individual's optimal risk taking for their further study.

Slovic (1966) suggested that, due to the inherent problem with skill risk taking, choice risk taking is more appropriate because it
does not require motor or physical abilities which are possessed in
greater measure by children of a particular age or sex. Anastasi
(1958) observed boys as greater risk-takers than girls since they
were bolder on the playground. The larger number of accidents
occurring among boys than girls may signal them as greater
It may not be, however, because boys are encouraged more to
participate in gross motor activities than are girls. Slovic believed
that use of choice risk-taking tasks would control for the
motor/physical ability differences between boys and girls which
could effect risk-taking behavior in skill situations.

As previously cited, Slovic (1964) indicated the varied nature
of risk-taking assessment. Selection of one test over another depends
on the area of the researcher's interest, and what is to be
produced. Much research on cognitive style, impulsivity, and risk
taking could be listed under Slovic's category of response set and
judgmental measures. These investigations use chance and skill risk
taking.

Questionnaire measures, widely used in research involving risk
taking, particularly with adults, require comprehension and paper
and pencil. The questionnaire is usually based on a scale which
would have been previously validated on a small group of some
population, and it may be supported by theory. In questionnaires the
subjects are given statements or questions which are assumed to
indicate varied levels of risk taking. Based on the subject's
selection of the statements, s/he could then be classified as a low,
medium, or high risk-taker. Questionnaire measures of risk taking use projection as the technique where the individual's behavior is reflected in his/her score. An example of questionnaire measurement of risk-taking behavior was used by Torrence and Ziller (1957), Anifant (1972), movement confidence by Crawford (1984), and in sport by Nixon (1981), Brannigan and McDougall (1983), Yiannakis (1976), and in measuring risk taking and arousal using a questionnaire by Zuckerman (1979). Slovic (1964) stated that one has to be cautious interpreting results since correlations between the scale and risk-taking tendencies may be inflated due to indices' show of common self-report response modality rather than actual risk taking, and variance.

Studies using probability and variance preference measures were concerned with the probability of winning and losing differences among individuals. This type of assessment was also in achievement motivation tasks introduced by McClelland (1956) and Atkinson (1957). Their studies dealt with the relationship between need for achievement and preference for moderate probability for success. Tasks used to test this theory involved skill risk taking, i.e., ring toss, shuffleboard game, and shooting a ball through a basket. Games of gambling involving chance risk taking were also used.

Wyrick (1970) first measured risk-taking behavior related to motor tasks. He used two motor tasks, running and cross-stepping 4 feet above the ground, to classify his college student subjects. Their performance on these motor tasks was the basis for their performance being classified as excellent, average, or poor. He
compared these three groups with their previous pleasant or unpleasant experience with height, expressed fear of height, emotional response to height, risk-taking activity level, running, and cross-stepping without the height element. Scores for the above variables were obtained via subjects' self-reports. On comparison between these variables and motor performance, only risk-taking activity was significantly related to motor skill performance. Risk-taking activity level was provided by the subjects indicating the extent of their participation in risky activities such as water skiing, diving, and skydiving. The group, who based on motor performance was classified as excellent had been reported to have the most participation in risky activities. Wyrick's assessment is important as it uses current risk-taking behavior as a measure for motor skills. Wyrick also was concerned with perceived fear of height, emotional response to height, and previous experience with height, elements which are likely to influence risk-taking behavior.

Alberts (1976) investigated the influence of birth order and maternal influence on motor performance of children. She used two components in her assessments of harm anxiety: one to assess the low harm anxiety and the second to assess high harm anxiety. Based on previous work with adults (Landers & Martens, 1971; Yiannakis, 1976; Casher, 1977), she hypothesized that the firstborn would be more likely to avoid high harm anxiety tasks. Alberts marked three height levels of bleachers to be used as the apparatus for the high harm anxiety test. The child could select any of the heights from which to jump and land on a floor mat. For safety the subject was
suspended from the ceiling using an overhead spotting belt. Alberts selected this task on the advice of local professionals in elementary school physical education who believed that willingness to jump from heights was a good indication of the degree of risk a young child was willing to take.

For the low harm anxiety task, Alberts (1975) used an apparatus which required rolling a ball to a target. This task, compared to the high harm anxiety task, did not involve perceived physical harm by the child. Alberts' results indicated that firstborns do perform better than second borns on low harm anxiety achievement tasks (rolling a ball to a target) but low on the high harm anxiety tasks (jumping off the bleachers). She speculated that it might be due to greater demands and parental expectations of their firstborn children. These findings are also supported by the literature.

Hayes (1977) devised the first test to deal with risk-taking behavior on the playground, using pictures. The Risk-Taking Preference Rank Order Scale has photographs of various playground activities from those in high risk, i.e., rope bridge; medium risk, i.e., climbing a tree; and the lowest ranked, i.e., playing on a slide. After a pilot study, a total of 12 activities were rank ordered by children and adults from the highest to lowest risk. The instrument was then used in pre- and posttests to compare a group who was exposed to adventure playgrounds and the control group who used the traditional playground. The adventure playground had loose materials such as wood bundles, plywood, etc. where the children had to construct their own playground. The traditional playground
included typical fixed swings, slides, and other climbing apparatus found in ordinary playgrounds.

Gallahue (1983) has been developing a similar instrument for preschoolers to be used in future research, in which illustrations of motor tasks are of varying difficulties, i.e., child is seen in front of four platforms of varied height. The tester shows the child each illustration and asks the child to indicate his/her preference for the platform from which s/he would be willing to jump if given the choice. The child's preference may then be compared with his/her movement confidence, as assessed by Griffin and Keogh (1982). The difficulty with the Gallahue proposed illustrated assessment is that it presented the child with too many variables and could not be cognitively dealt with by the preschool child (Case, 1980). It also does not provide a "real" risk-taking situation as Slovic (1964) discussed earlier.

Walesa (1977) investigated the development of risk-taking perception in children and adolescents. Walesa used a pictorial technique. He believed that risk-taking studies, especially those with children, that looked at potential loss, amount of loss, and probability of loss, are inappropriate for use with young children. Walesa claims that in real life risk occurs as a rule in situations wherein it is difficult to ascertain the nature and amount of probability of loss. Real-life situations can be made more intelligible using graphic means such as drawings and photographs, according to Walesa. In his study he tested 600 subjects aged 4 to 18 years old, with 20 boys and 20 girls in each age group. On the
illustrations Walesa presented six categories of risk, which made a set of 48 pictures. Walesa then asked the subjects to respond to questions regarding the pictures. His results across ages were found to be U-shaped, where the lowest value fell between ages 8 and 11. Walesa's understanding of the limits of other methods of assessing risk taking and offering an alternative way when dealing with children is a significant contribution for similar studies.

Spector (1980) and Keogh, Griffin, and Spector (1981) had constructed the first test designed to study children's movement confidence. It is based on a theoretical model. Their scale of movement confidence includes three tasks, which the child performs, and a list of behaviors to be used by the observer in order to rate the child's movement confidence.

The three motor tasks include the following:

1. Bar balance--the child is assisted into a standing position on an uneven parallel bar, where s/he stands on the lower bar 30 inches high from the ground, and is supported by the higher bar 56 inches from the ground. Then s/he is asked to perform a sequence of seven tasks (such skills as lifting a hand, foot, and various combinations).

2. Fall-back--the child is asked to stand on a box which is 2 inches higher than a foam safety mat and, when directed, to fall backward on his back into the mat, keeping his body straight.

3. Jump down--the child climbs onto vaulting boxes, from which s/he is asked to jump down and land on a soft mat. The first box is 28 inches high above the mat and the other is 40 inches high.
Subjects performing the above activities were filmed, and observers who rated them used the following criteria to rate the child as confident or nonconfident in his/her movements:

1. A. Preparatory movements: What the child does before he starts the actual task, such as moving to the starting line, waiting appropriately in position, or doing unnecessary movements, protective movements, etc.

1. B. Performance movements: Does the child do the task in an appropriate and complete manner from start to finish? Unnecessary movements, incomplete ones, or protective movements were observed.

2. Tempo: Does the child do the movement at an appropriate pace? Is s/he performing it too slowly or too fast? Is there no continuity in the movement, or does s/he refuse to perform?

3. Attending: Does the child appropriately attend to the task visually and auditorily? Does s/he focus unnecessarily on body parts, equipment and environment, or does s/he attend excessively to the instructor?

In a presentation of the movement confidence model (Griffin, Keogh, Maybee, Allen, & Gill, 1980) critical issues concerning the model were raised by the participants which required further refinement. Some of the points included that a distinction should be made between the cognitive and affective features in the model which might effect the individual's movement confidence. Individual movement confidence could also be influenced by one's locus of control. Conference participants also raised the issue regarding the perception of risk/danger and competence. There might be a
relationship between individual movement confidence, perception of
danger, and its effect on risk taking.

In addition to the above concerns and others mentioned by Griffin et al. (1980) the investigator believes that the criteria used to develop the model are likely to be subjective. Although criteria for movement confidence were reported to be highly reliable among the professional raters (Griffin et al., 1980) it is likely that such agreement could not be reached if the test criteria are used by physical education practitioners. Additionally, the tasks used to develop the criteria for movement confidence are not representative of many of the movement activities in physical education. The task should use common equipment found in most homes, day care centers, and elementary schools. The criteria list should be simple, valid, and able to be reliably used by parents and teachers. The above procedure might be acceptable since the main purpose was to establish and validate a theory for the Movement Confidence Model. Crawford's (1984) and Griffin and Crawford's (1986) field application of Movement Confidence Model is the right direction in correcting the limitations discussed above.

Griffin et al. (1980) suggested that the concept of risk/danger was "reconceptualized as the performer's perception of harm, both potential within the task and the probability of occurrence" (Griffin et al., 1980, p. 339). Since the tasks employed in the study for safety of the subjects did not involve objective risk/danger, the child's perception of harm might be subjective since "true" risk/danger was not provided (Slovic, 1964).
In spite of some of the above and other limitations of the model which are generally acknowledged by the researchers, they believe that with more knowledge the obtained model will be refined. The model of movement confidence has great potential for the study of motor behavior in children. Ideas from the model could be modified and incorporated in similar studies dealing with motor behavior, including the effect of movement confidence on risk-taking behavior.

Evoked potential techniques may also be used to measure brain wave patterns in order to detect change in the individual's arousal (Calloway, 1975). Children's perceptions of pictures and their immediate thoughts regarding those pictures can be reflected in their brain wave patterns. The problem with such electrical instruments is contamination. Particular brain wave patterns may be produced, for example, by a variety of physical states, not only the one in which an investigator may be interested. Calloway (1975) believed it worthwhile to use evoked potential in order to gain insight into human behavior, which is not available via conventional methods. It is feasible to assess risk-taking behavior using evoked potential, i.e., presenting children with varied pictures of risky activities and later observing their brain wave patterns for a trend. Activities pictured were climbing, jumping from a high platform, diving or sliding on a playground. The child's immediate reaction to the exposure to such pictures may be reflected in his brain wave patterns registered on the graph. These evoked potential readings may then be classified to varied levels of risk taking and
later be compared to the child's motor risk taking in the gymnasium environment. Similar ideas have been used at the Nisonger Center of The Ohio State University in studying the cognitive behavior of learning disabled children and their reaction to illustrations as reflected in their brain wave patterns (Naour, 1982).

Summary

This chapter reviewed the relevant literature on risk-taking behavior, particularly as applied to children. It was stated that the nature of risk taking is multidimensional (Slovic, 1964). Elements related to risk taking might be seen in wide areas and skills and risk-taking behavior may depend on the given situation and the individual. Hence, research often is conflicting, and it is incumbent upon the investigator to clearly delineate his area of investigation before selecting appropriate assessment instruments.

The influence of early training in movement and on the development of risk taking was reviewed. Age and development appear to have great impact on learning, including risk-taking behavior. The paucity of studies on children's risk-taking in natural play environments was also described (Shaw, 1976; Hayes, 1977; Ginsburg & Miller, 1982; Karlsson & Ellis, 1982). Movement confidence, an emerging model, was stressed as an important stage in acknowledging the practical and theoretical facets of children's risk-taking behavior. It was demonstrated that much of the thinking on movement confidence can be applied to risk taking by studying the effect or the relationship to risk taking. The development of an instrument to
measure movement confidence of children using playground experience (Crawford, 1984) is a new contribution to this area of study.

Risk-taking research with handicapped children reveals that, as a group, the impaired displayed many of the characteristics associated with low confidence in movement and in risk taking. One study showed that special programming is effective in raising their level of risk taking (West, Fretz, & MacDonald, 1970). Others have attempted such programming (McManis & Bell, 1968; Shaw, 1976; Roswal, 1979; Griffin & Keogh, 1981). A large portion of this review described studies of risk-taking behavior which employed different methods of risk-taking assessment reflective of the many different theories which influence risk-taking behavior. Variables such as age, sex, birth order, home environment, and culture were described as they seem to be associated with risk taking. Those variables regarding the influence of the environment at an early age were few because of the difficulty in measuring these variables and the lack of assessment instruments.

Modifying and training for risk taking seems to be a promising possibility. It is not sufficient to find that an individual does not possess certain skills and what has caused this condition. Studies demonstrated that modeling of risk-taking behavior for children is effective and it is possible to change one's behavior (West, Fretz, & MacDonald, 1970). Recent risk-taking and sport performance research dealt almost exclusively with questions such as which traits characterize highly motivated athletes to take risks in sports such as hang gliding, parachuting, and other dangerous sport
skills. Ex post facto research studies were surveyed on the effect of birth order and sport performance which also contribute to understanding the nature of the complexities of risk-taking behavior. The last section dealt with the crucial issue of research assessment. Slovic's (1964) classic article categorized types of risk-taking behavior and kinds of measurement used. He pointed to the inherent problem with such assessment. Such problems could be somewhat controlled if the researcher knows the kind of behavior s/he measures. S/he then could select the appropriate tool for his/her research, and at the same time acknowledge their limitations.

Also examined was the significance of differences between chance and skill risk-taking outcomes in experiments (Cohen, 1960; Slovic, 1964; Kopfstein, 1972). It would seem that an investigator should attempt to find the optimal way to induce risk-taking behavior. If possible, it should emerge under "real" conditions, rather than in a game or simulation. Finally, ideas emerging assessment tools and procedures appropriate to measure risk-taking behavior of young children in the gymnasium or play environment, as reflected in their motor behavior, were described (Albers, 1976; Hayes, 1977; Spector, 1980; Keogh, Griffin & Spector, 1981; Crawford, 1984; Crawford & Griffin, 1986). Innovative ideas on measuring children's risk-taking behavior using brain evoked potential were introduced and critiqued.
The major thrust of this investigation is the development of an assessment tool for risk-taking behavior of children as reflected in their motor behavior. Justification was given for the need for such a tool and professionals in the areas of motor learning and development have common interest in development of an instrument of this genre. Observations of comparably aged children found they act differently when asked to perform various voluntarily executed activities such as jumping from heights or climbing. Such variance may also determine the rate of learning new motor skills and participation in various motor activities. It was suggested that these variances in activity performance involving perceived or actual danger to the child may be described as the child's level of risk-taking behavior.

Accurate knowledge of this behavior may help parents and teachers working with young children. Identification of the degree of risk-taking behavior will facilitate programming of children's motor activities and improve appropriate risk-taking behavior in young children. Hence, methods and procedures will be outlined to pursue this goal. The discussion will include: procedure for subject/site selection, description of the proposed instruments,
design of the study, data collection, pilot study, statistical procedures, and data analysis.

To enhance clarity, the investigator employed the following steps in the same order presented:

1. Pilot study and initial investigation:
   A. Boy and girl subjects were chosen as models photographed performing various identical motor activities on different apparatus.
   B. Photographs from these sessions were selected on the basis of clarity, safety, and administrative feasibility for the study. Eight tasks were chosen out of 12 original photographs.

2. Establishing content validity:
   A. The above eight tasks performed by the boy and girl subjects in the photographs were shown to a group of 44 boys and girls enrolled at the Ohio State University Child Care program. The photographs were randomly presented in pairs, with all possible pair combinations presented to each subject.
   B. The subjects were asked to point out which one of the photographs in the pair "is the most scary for you to do" (for example, climbing up the ladder or jumping off the steps to the ground). The experimenter recorded the child's choice for all combinations.

3. Analysis of the above data:
   A. SAS statistical package was used for data analysis regarding the percentage choices made by the subjects.
4. Major study:
A. Subjects were assessed on the Bruininks-Oseretsky Test of Motor Proficiency.
B. Based on results of data analysis and pilot study, the tasks and photographs selected were transformed into illustrations by professional artist to accurately depict the tasks and the apparatus and its functions clearly. Only seven tasks were used and pairs of combinations that were clearly identified by 75% or more of the subjects. These 7 tasks made up the PRTP and LP, and were then used in the major study.
C. The PRTP and LP were presented to all subjects in pairs and they were asked to point out or tell the experimenter "which of the two [tasks] would you like to do the most?" Subjects were presented the PRTP followed by the LP, or vice versa, both in random order to control sequencing effects.
D. At the second session, subjects were reassessed for reliability on the PRTP (which was presented the second time one to three weeks after the initial session).
E. At the second session subjects were asked to perform the tasks on the apparatus set up in the gymnasium, with their behavior videotaped to provide a permanent record.
F. Parents returned the completed Parents' Questionnaire.
5. Judges were trained to observe the MC behavior of the subjects on the videotape and their indications of this behavior
were obtained from the videotaped session taken for the MC. Inter-observer and intra-observer reliabilities were assessed.

6. Data was analyzed by computer.

Subject Selection

A total of 148 subjects, boys and girls aged 3 to 6 years, participated in the study (Tables 1 and 2). Forty-four subjects, boys and girls, took part in the pilot study, and in establishing content validity for the Pictorial Risk-Taking Preference (PRTP), which was later used in the major study. One hundred four subjects, boys and girls, took part in the major study (Table 2).

Table 1

<table>
<thead>
<tr>
<th>Age in Years</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
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<td>3</td>
<td>7</td>
<td>14</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>4</td>
<td>12</td>
<td>16</td>
</tr>
<tr>
<td>5</td>
<td>3</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>14</td>
<td>30</td>
<td>44</td>
</tr>
</tbody>
</table>

The 44 subjects for the pilot study were enrolled at the Ohio State University Child Care Program. Letters were sent to all parents who had children at the center (Appendices B and C). Only the children granted parental permission took part in the pilot study and in establishing the PRTP's content validity.
Table 2

Number of Subjects Participating in the Major Study by Age and Sex

<table>
<thead>
<tr>
<th>Age in Years</th>
<th>Boys</th>
<th>Girls</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
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<tr>
<td>6</td>
<td>12</td>
<td>13</td>
<td>25</td>
</tr>
<tr>
<td>Total</td>
<td>54</td>
<td>50</td>
<td>104</td>
</tr>
</tbody>
</table>

The 104 subjects who participated in the major study were solicited by flyers, letter, articles in local newspapers, flyers sent to area pediatricians, day care centers, community recreation centers, elementary schools, and community public libraries in central Ohio (Appendices G and H). All 104 major study participants were hence volunteered by their parents. Permission for this study was also granted by the Ohio State University Human Subjects Committee (Appendix D).

Subjects taking part in this study were accepted on a "first come, first served" basis, with the goal being to have at least 12 boys and 12 girls per age group for statistical analysis purposes.

Site Selection

The pilot study took place at the Ohio State University Child Care facility, with data collected outside of each subject's classroom (see section on Pilot Study). The major study took place at the Ohio State University Nisonger Center gymnasium. The gymnasium
floor is a cushioned covering consisting of synthetic polyvinyl soft material, allowing safe landing and lessening the possibility of injury as a result of jumping or falling. Although the flooring is soft and does reduce likelihood of getting hurt, the children were not told of this to provide the subject with an objective situation of risk (Slovic, 1964; Walesa, 1977).

The gymnasium contains the slide attached to a gymnastics box, the gymnastic box, ball, balance beam, wooden steps, ladder, and inclined board (bleacher), all placed around the gym in the same order (Figure 4).

All participants in the pilot study received colorful stickers as a reward at the end of the session. Major study participants received colorful stickers at the end of the first session, and a coupon for an Uncle Alligator Meal courtesy of Rax Restaurants, Inc. Results of the Bruininks-Oseretksy Test of Motor Proficiency were shared with the parents after the first session.

Pilot Study

Forty-four subjects enrolled at the Ohio State University Child Care Program took part in the pilot study to establish content validity of the PRTP. The pilot study's purpose was to insure study feasibility and to determine modifications needed prior to inception of the major study. Participants in the pilot study were of similar ages and backgrounds as those in the major study.

To ascertain the nature and child's perception of risk, various gross motor activities with which the children were familiar and
which provided elements of physical risk were selected, i.e., climbing a ladder, walking a balance beam, jumping off a platform or steps to the ground, sliding down a wooden slide, walking up an inclined board, or playing with a ball. The child might perceive the potential for physical harm due to apparatus height, balance loss and falling, or being struck by a ball. These tasks, derived from the child's natural play repertoire and physical education curricula for young children (Dauer & Pangrazis, 1979). Activities selected
reflected availability of familiar equipment, consideration of relevant literature (see Chapter II), as well as the preceding two points.

Instrumentation

This study employed four different instruments and one questionnaire as dependent variables. The instruments include the short form of the Bruininks-Oseretsky Test of Motor Proficiency (Bruininks, 1978), the Pictorial Risk-Taking Reference (PRTP), Live Preference (LP), and Movement Confidence (MC). The PRTP and the LP were developed and content validated during the pilot study prior to their use in the major investigation (see the section on the pilot study in this chapter, and also Appendices A and J for description and illustration of the PRTP, and for the LP, and Appendix L for the MC). The questionnaire for this study (Appendix K) was completed by both parents (when applicable) and provided general background about each subject and parental perception of their child/children.

The Bruininks-Oseretsky Test of Motor Proficiency (BOTMP) (Bruininks, 1978) is the first dependent variable used in this investigation. The short form of this test was used, taking approximately 25-30 minutes per administration. This instrument has well-established reliability and validity, and has been widely used as an assessment tool in clinical settings, physical education classes, and research. The BOTMP assesses fine and gross motor development. Although this instrument is standardized and has established norms for children aged 4½ to 14½ years old, it is well
suited for "normal" children as young as 3 years (Beitel & Mead, 1980). Since the total scoring points were used for statistical analysis, the investigator considered it the most appropriate instrument available on the market at that time.

Scoring of the BOTMP is clearly delineated and well explained in the test manual. The subject's total score was combined from all subtasks in the gross motor and fine motor sections. The reader is referred to Bruininks (1978) for additional information regarding the test. The total per subject on the BOTMP was compared to scores on the PRTP and LP. As previously hypothesized, the investigator assumed that the child's motor proficiency as seen on the BOTMP could influence his/her preference for the activity and ultimately indicate the degree of risk taking of the subject.

The Pictorial Risk-Taking Preference (PRTP) was developed and refined prior to the major investigation, during the pilot study. The PRTP included eight illustrated pictures of eight different activities showing varied levels of risk. In the major investigation, however, only seven pictures were used (Appendix J). Two subjects, one boy and one girl, both aged 5 years, were selected to participate in the photographic sessions as models. The investigator held that a photograph would be more clear, live, and naturally present the task and apparatus realistically. The boy and girl did not participate in either the pilot or major study, and were selected for the photographic sessions only. Neither subject was known by subjects in either the pilot or major study.
Photographs for the PRT were taken separately of the boy and the girl, but tasks depicted were identical. This prevented picture preference because of gender depicted. The boy and girl performed the same tasks in identical fashion, and at the same angle and same lighting conditions as much as possible. Photographs were taken of the performance repeatedly to insure a large selection of good-quality pictures after they were developed, which would clearly portray the activity, the child's facial expression, and relative size of the subject compared to the apparatus. A standard folding chair was placed in the picture to facilitate accurate estimation of the size of the child and apparatus. This "scaling" approach assisted the children in perceiving the nature of the task realistically, especially critical for the younger children (ages 3 and 4).

The original photographs included the boy and girl performing the following:
1. Sliding down a wooden slide;
2. Jumping off a gymnastic box to the floor;
3. Playing with a ball;
4. Walking a balance beam;
5. Jumping off the top of three steps forward to the ground;
6. Climbing a horizontal ladder (inclined at a 45° angle to the wall);
7. Walking an inclined board attached to the wall;
8. Climbing a vertical ladder (standing straight against the wall);
9. Jumping off a diving board of various heights into the pool;
10. Jumping off the side of the pool into the water;
11. Performing a hold on a rope while standing on a gymnastic box and then swinging down away from it;
12. Performing a forward roll on a gym mat;
13. Jumping across and over a low wooden bar.

After repeated photography sessions, the experimenter selected photographs 1 through 8 to use in the pilot study based on the following assumptions:

1. Only photographs which were of good quality and clarity were used;

2. It was decided to use only those tasks in which readily available apparatus appear (such as found in many gymnasiums, schools, day care centers, and recreational facilities where children participate);

3. Only tasks administratively feasible were selected (therefore jumping into the pool was eliminated);

4. Tasks which might represent an obvious danger were eliminated (i.e., jumping into a pool might not be safe for 3-year-olds).

The final eight tasks in the photographs performed by a boy/girl were shown to each of the 44 subjects included in the pilot study, who had received parental permission to take part. The study took place during the morning (9:30 a.m. to 12:00 noon) in winter, 1985.

The experimenter spent time in each of the rooms where the children were in order to establish rapport. The children were taken out one at a time by the investigator to the hall near the child's room, where a table and two chairs were set up. The experimenter
explained that he would show the child a picture of a boy/girl about the child's own age (Appendix E) performing various activities in the gymnasium such as playing with a ball, jumping, climbing the ladder, or walking the balance beam.

To assure clear communication with the subject as to what each picture contains (name of apparatus/equipment and what they see each child doing), the subject was shown each photograph and asked to describe the apparatus and what each child was doing on it. If the subject described the boy/girl's performance of the task correctly, the experimenter repeated what the subject had said (i.e., "the boy is climbing the ladder," "the boy is jumping off the steps to the ground," "the boy is playing with the ball"). If the child incorrectly described the task, the experimenter gave the correct description and asked the child to repeat it and asked the child if he/she had any questions.

Upon completion of the above procedure, each subject was shown randomly a pair of photographs and was asked: "Out of these two [i.e., the ladder or the ball], which one is the most scary for you to do? Show me with your finger." The experimenter then repeated the same question if the child was hesitant. The child's response was recorded on the data collection sheet (Appendix F). Remarks or verbal expressions were also recorded, with these procedures repeated until the subject had explored all possible pairs. Time for this ranged from 11 to 19 minutes, depending on the child's age, comprehension level, and attention span. If the child responded that none of the activities shown were scary for him/her, the experimenter
asked, "Which one is more scary than the other?" Upon completion of each session, each subject was thanked for his/her cooperation and was given a colorful sticker.

The Pictorial Risk-Taking Preference (PRTP) used in the major study was slightly modified from the one initially developed. The differences were:

1. Only seven tasks and combinations of pairs were used (Appendix J).
   A. Slide—used for sliding;
   B. Gymnastic box—used for jumping to the floor;
   C. Ball—used for play, throwing, catching, kicking;
   D. Balance beam—used for walking;
   E. Steps—used for jumping off to the floor;
   F. Ladder—used for climbing up and returning down;
   G. Inclined board (bleacher)—used for walking up and down it.

2. Photographs were transformed by an artist into illustrations which showed the exact tasks identically for boys and girls.

3. Color illustrations were arranged in permanent order in pairs.

4. Because it was determined during the pilot study which activities were perceived as riskier than others, the question posed to participants in the major study was: "Which one of these two would you like to do the most?"

After statistical analysis and evaluation of the pilot study, the number of pairs presented to the subject was reduced from 28 pairs to 10 pairs since the length of time (11 to 19 minutes) was too great for the attention spans of some of the younger children.
Only data pertaining to the percent of time subject selected one task in each pair over the second task of the pair was used, i.e., in pair number 1 (Table 3) going down a slide versus jumping off a gymnastic box were presented. Seven subjects (15.909%) chose the slide as most scary (risky), while 37 (84.091%) selected the gymnastic box as most scary (risky). Based on this analysis, depicted in Table 2, the investigator selected for the major study only those pairs where the majority of the subjects (75% and above) clearly identified one task of the pair as more "risky" or "scary." Those pairs with a choice falling below 75% for one item over the other were not used in the major study, since this could indicate ambiguity and that the choice is not valid or clear enough.

Colored illustrations of the task were chosen over photographs, since they were carefully drawn and approximated the live task and apparatus realistically. This did away with the need for the child models to come for additional photographs. Using photographs during the pilot study elicited responses rating the ball as more "scary" than the ladder, balance beam, and gymnastic box with some of the following reasons given showing the subjects' perceptions:

1. The ball is more scary "because it is rough and I don't like to play with it."
2. "The ball is more scary than the ladder because my brother played basketball and he broke his finger."
3. "The ball may fall on my toes and hurt me."
4. "The ball may hurt my face."
5. "I don't like playing basketball."
<table>
<thead>
<tr>
<th>Pair Number</th>
<th>Apparatus/Task</th>
<th>Number of Subjects</th>
<th>Percent of Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Gymnastic Box</td>
<td>37</td>
<td>84.011*</td>
</tr>
<tr>
<td></td>
<td>Slide</td>
<td>7</td>
<td>15.909</td>
</tr>
<tr>
<td>2.</td>
<td>Gymnastic Box</td>
<td>35</td>
<td>79.545*</td>
</tr>
<tr>
<td></td>
<td>Ball</td>
<td>9</td>
<td>20.455</td>
</tr>
<tr>
<td>3.</td>
<td>Steps</td>
<td>37</td>
<td>84.091*</td>
</tr>
<tr>
<td></td>
<td>Slide</td>
<td>7</td>
<td>15.909</td>
</tr>
<tr>
<td>4.</td>
<td>Balance Beam</td>
<td>40</td>
<td>90.909*</td>
</tr>
<tr>
<td></td>
<td>Slide</td>
<td>4</td>
<td>9.091</td>
</tr>
<tr>
<td>5.</td>
<td>Ladder</td>
<td>34</td>
<td>77.273*</td>
</tr>
<tr>
<td></td>
<td>Slide</td>
<td>10</td>
<td>22.727</td>
</tr>
<tr>
<td>6.</td>
<td>Inclined Board</td>
<td>33</td>
<td>75.000*</td>
</tr>
<tr>
<td></td>
<td>Slide</td>
<td>11</td>
<td>25.000</td>
</tr>
<tr>
<td>7.</td>
<td>Steps</td>
<td>38</td>
<td>86.364*</td>
</tr>
<tr>
<td></td>
<td>Ball</td>
<td>6</td>
<td>13.636</td>
</tr>
<tr>
<td>8.</td>
<td>Balance Beam</td>
<td>40</td>
<td>90.909*</td>
</tr>
<tr>
<td></td>
<td>Ball</td>
<td>4</td>
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<td>9.</td>
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</tr>
<tr>
<td></td>
<td>Ball</td>
<td>10</td>
<td>22.727</td>
</tr>
</tbody>
</table>

6. The ball is more scary than the box "because it's dark" (the background in the photograph was dark since electronic flash was used).

7. "I don't like rough ball."

These examples demonstrate children's perceptions of risk are real and based on their prior experiences, as well as on compounding.
variables which could vary in impact at different times and situations (Walesa, 1977). This induced modification of the photographs, i.e., in the pilot study the boy/girl was shown holding the ball above the head in position as if about to shoot the ball to a basket, and the ball looked like a basketball. This caused young subjects to associate the tasks with basketball and with a rough ball which they feared, a fear of getting hit by the ball, or other fears as listed above. On the more recent illustration, the boy/girl ball's position was at waist level, clearly illustrated for the major study, and colored to look like a soft playground ball. When the picture was described to the child, emphasis was made that it was a soft playground ball.

Illustrations allowed more uniform task presentation, since the pictures were identical in every way with the exception of the sex of the child depicted. A standard folding chair was included in all illustrations to assist the child's perception of all apparatus size.

All illustrations of tasks were in the same order for all subjects and were inserted in a magnetically held album, with pages easily able to be turned (Appendix J). Each page had a clear plastic cover to protect the illustrations. The first page contained uniform instructions read to the children. This page faced in the direction of the experimenter so as not to distract the children. On the opposite page the first pair of illustrations (jumping off a gymnastic box versus sliding down a slide) faced the child, as was the case for the rest of the pairs. Only illustrations were on the page, with no identifiable words or numbers.
Following content validation as to what constituted a risk, and which of the tasks in each pair was perceived more risky (by 75% or more of the subjects), questioning method was changed. For the major study, in presenting the PRTP and LP the question posed was, "Which one of these two would you like to do the most?" replacing the former question of the pilot study, "Which one of these two is most scary for you to do?"

Scoring of the PRTP (Appendix M) entailed the experimenter circling the task selected by each child of each pair. If the child selected the task of the pair rated most risky during the pilot study, one point was allotted. If the less risky task of the pair was selected (as had been rated in the pilot study), then zero points were awarded. Total points from all pairs established each subject's Index of Risk-Taking Preference, wherein the subject could score up to a maximum of 10 points.

Live Preference (LP) is the second instrument used in the study as an independent variable, with the purpose to ascertain if the children's perceptions of risk on the PRTP corresponded to their risk perception of these same tasks presented live in the gym environment (the LP). Were a high correlation between PRTP and LP shown, then validity of the PRTP would be strengthened.

The LP is identical to the PRTP since it presents the same number of tasks and pairs, with the difference being the live versus illustrated presentation. Each subject was given a "tour" of the gymnasium. The tasks/apparatus were explained, enabling the subject to see how high/big each apparatus is, and to get a realistic sense
as to the amount of risk the task poses. Then the subject was shown a pair of tasks at a time in the same order as the PRTP, and the subject's choices were recorded using the same format on the LP as in the PRTP, with point scoring also determined in the same way (Appendix M).

Movement Confidence (MC) is the next instrument used in this study as a dependent variable. Procedures and use of the MC were adapted and modified, based on literature review of Movement Confidence (Keogh, Griffin, & Spector, 1981; Spector, 1980), its feasibility to be used in the gymnasium environment, and relevant data from the pilot study. The MC used the same tasks as in the PRTP and LP (going down the slide, jumping off the gymnastic box, playing with the ball, walking the balance beam, jumping off steps, climbing the ladder, and walking up the inclined board). The MC directly measured physical risk taking of the child by asking the child to perform the tasks in the above order. The child's behavior was videotaped by the experimenter, who was the only one present in the gymnasium with the child, to minimize observer influence. The child who was already familiar with the gymnasium environment from the first session was given the following instructions: "You have already seen all the things in the gym and know what you do on them. Today I am going to ask you to try to use them and I will take your picture on the videotape when you do them. If you are scared, afraid, or don't like to do some of the activities, it's O.K.; you don't have to. On each thing I will ask you if you are ready, so don't start until I tell you. First climb the box here, and if you need help to
climb up it, let me know. Sit down and be ready to slide down." All subjects were videotaped sitting on the box prior to sliding, standing on top of the gymnastic box before jumping, and standing in front of the ball, and the remainder of each apparatus before beginning to perform each task. The child's facial expressions were videotaped, and the microphone clearly recorded verbal remarks. If the subject showed fear, long hesitation, he/she was offered physical assistance for the task, i.e., such as walking the balance beam. Subjects were also made aware that the floor mat is available to land on to avoid possible injury and in giving the subject the opportunity to receive partial points for the task performance (i.e., subjects walking the balance beam with assistance received more points than subjects who refused to walk even when assistance was offered) (Appendix L). Subjects were always given the opportunity to try independently, and only when they refused to do so was help offered.

Sessions were videotaped with professional quality color camera, Panasonic Model WV-3250. All videotapes were viewed immediately after the session to check for clarity, accuracy, and completeness of data. Videotaping sessions took place one to three weeks after the first PRTP and LP session. Subjects' data were not used if more than three weeks had passed between the first and second sessions and the videotaping session was canceled. Videotaping sessions were scheduled between 8:00 a.m. and 1:00 p.m., primarily on weekends.

Scoring of the MC consisted of the experimentor and three judges (observers) who had been trained to identify the videotaped
behavior and accurately record the appropriate behavior which most closely fit the description, rating the recorded behaviors (Appendix L). All four judges independently rated each subject on each task based on the three categories used by Keogh, Griffin, and Spector (1981) and by Spector (1980), modified for this study as follows:

A. Confidence—when the subject has completed the task confidently without sign of fear, hesitance, or concentration on an inappropriate portion of the task or environment as defined by Keogh, Griffin, and Spector (1981) in their Model for Movement Confidence. For this level of performance the judges circled the C for confidence which equals 2 points.

B. Mixed confidence—when the subject shows some signs of confidence as in A above, and some signs of nonconfidence such as fear, hesitance, incompleteness of task, inappropriate focus of attention as defined by the Model of Movement Confidence, or received physical help from the investigator. This category was circled by judges as M for mixed confidence and equals 1 point.

C. Nonconfidence—when the subject refused to perform the task or showed only signs of nonconfidence, e.g., never completed the task, retreated, hesitated and asked for experimenter's extensive help and approval to proceed with the task. This category was circled by judges as N for nonconfidence and equals 0 points.

A videotape of two of the subjects not taking part in the study were used for the training session. This videotape was seen repeatedly and analyzed by the four judges (which included the
experimentor) until observors arrived at 100% agreement. To avoid observor drift, the training session was repeated. If a new behavior not originally classified under any of the categories for scoring emerged, it was discussed and designated to the appropriate category. All points from each task's performance were totaled and the highest possible score was 14.

Parent Questionnaire (Appendix K). The purpose of this questionnaire was to obtain additional information and background regarding the subject's sex, date of birth, birth order, number of siblings, previous experience in swimming and motor skills, the nature of the play environment at home, and the parents' aspirations for their child and how they perceive their children's risk-taking. Information from the questionnaire was used for the statistical analysis, in addition to supporting or explaining some statistical findings of a particular child. Parents' perceptions of their children's risk taking was also used to strengthen the content validity of this study. Parents generally knew their children better than anyone else, and their viewpoint as reported in the questionnaire was compared to their child's scores on the PRTP, LP, and MC. The questionnaire was given to parents prior to the onset of the study, and after they had given their consent for their child to take part in the study.

For the development and validation of the above three instruments the investigator considered incorporation of the following:
1. **Representativeness**—Tasks incorporated in the assessment should be representative of motor and play activities of children in the gymnasium and play environments. Assessment should include adequate representation of risk-taking activities (content validity).

2. **Sufficiency**—There should be a sufficient number of tasks in the assessment tool in order to produce meaningful information and allow statistical analysis from all the tasks combined.

3. **Familiarity**—Subjects should be familiar with the task, which differs from being skilled in it. An innovative or novel task might produce emotional arousal (Slovic, 1964), which could alter the children's judgment and behavior because individuals approach a novel idea in a different manner.

4. **Varied levels**—Tasks should provide varied levels of risk. This could be incorporated into the instrument by selecting tasks, some of which are perceived by the children to be completely safe, like playing ball, and some which are viewed as gradually more risky such as sliding, jumping off a gymnasium box, steps, or walking the narrow beam.

5. **Objectivity**—Tasks should provide real, or approximations to risky situations rather than game-like or pretend risks (Slovic, 1964). However, the experimenter must avoid any possibility of injury, and find an "optimal" level needed to produce objective, risky situations. The investigator decides as to the relative degree of "real" risky tasks based on the children's average performance on similar tasks during the pilot study.
6. **Observable**--The behavior must be overt and observable in order to maintain assessment tool reliability.

7. **Clarity**--Behaviors for each task should be well and clearly defined, and be simple for physical education teachers, parents, and others working with children to differentiate.

8. **Appropriateness**--Tasks should be both age appropriate and not demanding in skill or ability due to sex and physical differences (Slovic, 1966). While not always completely attainable, this goal is one the investigator should strive to achieve and to be aware of the limitations. deCharms and Dave (1965) used pretests to estimate children's ability prior to the experiment, establishing a baseline for each individual. Kamal (1979) simplified and adapted the rules for skill risk-taking using shuffleboard in her testing of young children. Slovic (1966) suggested, therefore, that it is preferable to use chance risk-taking than skill in order to eliminate physical differences between boys and girls. If the skill in the task is too demanding for some, but not for others, skill level may be built into the design as a factor to be statistically controlled.

9. **Product/process**--Tasks may be product, process, or both in orientation. For example, jumping from a high platform to the floor could be measured as a product--if it is from 2 feet, 4 feet, or 6 feet high. But since manifestations of the child's risk-taking behavior could be observed (Griffin & Keogh, 1982), i.e., what the child does prior to, during, or after the task (hesitance, speed of the movement, refusal to perform activity), this type of description is considered a manifestation of the children's movement confidence
(Keogh, Griffin, & Spector, 1981), and can be described as process-oriented.

10. Observer influence—During data collection using the three suggested variables, i.e., the PRTP, LP, and MC, arrangements were be made to insure that other subjects or adults were not present in order to prevent their influence on the child's performance.

11. Gender influence—The PRTP included two sets of pictures of the same task. One set was photographed with a boy as subject, and the other with a girl.

12. The children's information-processing limitations were considered by adapting the task to the subjects. Only one pair of pictures was shown at one time. A statistical procedure then was employed to rank order the children's perception of the pictures to determine which is perceived by the majority of children to be the least risky to the most risky.

13. Scaling—In order to help the subject understand the relative dimensions of the task environment, a standard folding chair is seen on each picture near the apparatus to help in scaling.

Experimental Variables

The independent variables in this study were sex, age, skill level (as indicated by the Bruininks-Oseretsky Test of Motor Proficiency, each parents' perception of their child's risk taking, and birth order). All six are attribute variables, since the experimenter had no control over their occurrence, nor can they be manipulated experimentally by the investigator.
The dependent variables include four measures described before: The PRTP to obtain pictorial risk-taking preference, the LP to obtain live preference of the various tasks, the MC which indicates the child's movement confidence behavior performing the tasks, and the Bruininks-Oseretsky Test of Motor Proficiency. The independent variable of sex has two levels (male and female) and its nominal scale. Age had four levels (3, 4, 5, and 6 years old) and treated as interval scale. The PRTP had 10 pairs of pictures and where 0 to 10 points are possible and it is an interval scale. The LP used the same tasks and scoring, and it is also an interval scale. 10 pictures had two levels. On the MC subject can receive from 0-14 points and it is also an interval scale. Performance was scored with confidence, mixed confidence, or nonconfidence where confidence = 2 points, mixed = 1 point, and nonconfidence = 0 points. The Bruininks-Oseretsky had one level (total points), but for the purpose of this study subjects were assigned to four levels based on their mean performance on the Bruininks-Oseretsky.

Accurate descriptions of the above variables were critical in determining the appropriate statistical method for data analysis.

Reliability

In order to insure the reliability of the dependent variables the following measures were taken by the investigator:

1. The PRTP--using pilot study the experimenter selected only those pictures which clearly depicted the designated task, and that could be seen and understood by the child to be the tasks the
investigator intended. Any picture which showed ambiguity was not be used for the study. This was determined by selection of those pairs of pictures which 75% of the subjects or more had rated one task of the pair as more risky than the other (the most "scary"). In addition, in order to arrive at the same description of the picture, the investigator described the picture to the subject after the subject had described it him/herself. A test-retest procedure was also used during the study to establish instrument reliability. The same subjects were retested after a one- to three-week period.

2. The LP--No test-retest was performed, since it is assumed that the child's first impression of the apparatus in the gymnasium is the "true behavior" regarding task preference. Each child was shown such apparatus and its possible use before the child was asked to express a preference. The experimenter's major concern was in establishing reliability for the major dependent variable, the PRTP.

3. The MC--Videotaping of each subject's MC performance yielded a permanent product subsequently analyzed by four judges. Rater reliability was obtained by carefully defining the behavior to be observed, categorizing each component of the behavior, and determining the scoring system. A judges' training session achieved high reliability (Appendix L). Judges were shown the gymnasium environment, the apparatus, and explained their use. Judges were given a sheet containing all definitions, which was revised when a new behavior was observed. Regular retraining prevented observer drift. A model subjects, whose data were not included in the study, were videotaped with the behavior analyzed to a 100% agreement on MC
performances. Both inter- and intra-observer reliability were measured on the MC. Inter-observer reliability consisted of comparisons of all observations and scores of the four judges per subject. Intra-observer agreement was carried out on a random sample of 10 subjects out of the 104 in the major study. These 10 subjects had their MC performance rated a second time by the same four judges. The MC observation procedure had been previously established (Spector, 1980; Keogh, Griffin, & Spector, 1981) in a similar observation study which had been adapted for this study and was found highly reliable.

Validity

Validity is the prime consideration in instrument evaluation (American Educational Research Association, 1985), ascertaining whether the test measures what it purports to measure. The validation is the process of accumulating evidence to show that inferences made from the test score are appropriate, meaningful, and useful.

Traditional means of accumulation of validity evidence include three main facets described below.

1. Content-related validity--This refers to evidence that a particular sampling of behaviors used to measure a characteristic reflects performance in the entire domain of behaviors constituting that characteristic. It is the representativeness of a sampling of the content-substance, the matter, the topics of a measuring instrument (Kerlinger, 1986). Contents of any given behavior can be
evaluated by a jury of experts or authorities in that area of interest. Content-related validity is an initial logical organization of the test items used in the study.

In this study content-related validity was employed via selection of physical activities recognized by professionals in motor development and physical education as representative of children's physical play activities. These activities were also identified by the children and entail various degrees of elements of risk perceived by the children as "scary" in their preference of one task over another.

2. Criterion-related validity--This:

... refers to the extent to which a measure of an attribute demonstrates an association with some independent or external indicator of the same attribute. This external indicator, called the criterion, often represents the behavior we are actually interested in, and we wish to use test scores, or other measurements to predict status of performance on the criterion. (Walsh & Betz, 1985, p. 58).

In this study a correlational and use of regression analysis approach to criterion-related validity was used (Walsh & Betz, 1985). Subjects' scores on the PRTP were compared to scores on the LP and MC. Of interest was determining whether scores on the PRTP could concurrently predict scores on the LP and performance on the MC. Therefore, a significant relationship between the PRTP, LP, and MC indicates greater criterion validity of the PRTP, the main instrument to be validated for this study.

Criterion-related validity was also strengthened by comparing scores of parents' ratings of their children's risk-taking behavior with other dependent variables, such as the PRTP, LP, and MC. Since
parents are the most knowledgeable source regarding their own children, their judgment when found to correlate highly with the children's performance on the dependent measures will contribute to the validity of the proposed instrument.

3. Construct-related validity focuses on test scores as evidence because they typically reflect real-world phenomena behaviors, characteristics, or constructs. For the test to be valid the experimenter must provide theoretical support for the construct, which is reflected in the test score.

In this study construct-related validity was set up via provision of theoretical support for the test and items on the PRTP, LP, and MC. However, construct-related validity is limited in this study because the absence of empirical and applicable theory for risk-taking behavior, particularly as it is related to children. Even well-established research on risk-taking behavior does not agree on the construct or definitions of risk taking (Slovic, 1964; Carney, 1971). As noted in Chapter II, this study refers to skill risk taking. Properties of risk-taking behavior usually involve:

1. An individual is presented with a task, problem, or dilemma entailing actual or perceived risk;

2. An individual chooses a task to perform;

3. An individual faces uncertain consequences regarding performance or nonperformance of the act, which could either be pleasant or unpleasant. A state of fear or harm might be induced, or the task might entail a gain or loss.
Tasks on the PRTP, LP, and MC are assumed to induce different degrees of risk. The child must decide which of the pair in each pair on the PRTP and LP is to be selected, being uncertain as to the outcome, as is the case in the performance of the MC tasks.

Scoring used on the MC in the study had been previously validated in Movement Confidence studies (Spector, 1980; Keogh, Griffin, & Spector, 1981). The Bruininks-Oseretsky Test of Motor Proficiency (BOTMP) has also been used for many years in research, and has validity coefficients ranging from .57 to .86, depending on the sub-items in the test (Bruininks, 1978). Regression analysis was used to compare performance on the MC and BOTMP, to the scores on the PRTP, and LP in order to establish criterion-related validity.

While the three means of gathering data on validity have been discussed separately, rigorous distinctions between and among them is not possible, as they are interrelated (American Educational Research Association, 1985; Walsh & Betz, 1985; Kerlinger, 1986). Solid validity evidence of an instrument should include all three categories. Content validity evidence, for example, is an efficient means of initiating test development, entailing clear delineation of content (test items) in an organized manner. Criterion validity evidence demonstrates that test scores are systematically related to one or more outcomes (criteria) and the criteria can be accurately predicted from scores on the test. Construct validity is the most important of the three categories, as it is based on theories and scientific investigation which can explain human behavior. In this study, all three components were tested at varying levels.
Scoring Procedure

Procedures for data collection from both the pilot and major studies have been described below in the same order as given to the subjects.

1. Pilot study--Subjects were shown 28 pairs of photographs (using 8 photographs, so that each of the possible 28 pair combinations were presented, i.e., photograph #1 is paired with #2, and then #3 and so one). The subject was asked to select one of the photographs from the pair which was "most scary for you to do." The investigator then circled the photograph selected by the child in each pair.

This data was entered into the computer, which calculated the number of times a particular photograph in each pair was selected by each subject as the most "risky" or "scary" (Table 3). Those photographs selected by 75% or more of the subjects as the most "scary" over the others were then used for the construction of the PRTP (Appendix J).

2. Bruininks-Oseretsky Test of Motor Proficiency (BOTMP)--This standardized test has various motor components in the fine and gross motor categories. Each component had a different score value, which was clearly described in the test manual (Bruininks, 1978). All scores from each component were totaled and sum of these scores of the BOTMP were recorded for use in the study (Appendix O).

3. Pictorial Risk-Taking Preference (PRTP)--The PRTP includes seven different tasks arranged in 10 pairs, wherein some of the tasks in the pairs are used more than once (Appendices J and M).
Each subject was shown one pair at a time and asked to indicate which task of the pair he/she likes to do the most. The child's choice was recorded by circling the task. If the subject selected the task in the pair selected by most (75% and up) subjects to be most "risky" or "scary," the subject received 1 point. If the subject selected the least "risky" or "scary" task of the pair, 0 points were received. Total scores from all the pairs were calculated for each individual, and the total value indicated on the Risk-Taking Index (minimum 0, maximum 10) was used for the data analysis. Higher values are assumed to reflect choices to take higher risks, and vice versa.

4. Live Preference (LP)--The subjects were shown the same 10 pairs as described for the PRTP, and in the same manner, with the difference that the subjects saw the actual apparatus (instead of the pictures) used for the tasks. The same form was used for the LP as was used for the PRTP, and the scoring system was the same.

5. Movement Confidence (MC)--This included the actual performance of the seven tasks used for this study, which were part of the PRTP and LP. Each subject's performance was videotaped on each of the tasks. The videotape was then shown to four judges. Based on the scoring criterion developed for this test, the judges each independently rated the subject on each task as having confidence (C), mixed confidence (M), or nonconfidence (N), which was circled on the Judges' Movement Confidence Recording Form (Appendix L). These three ratings were converted to numerical values:
C = 2 points, M = 1 point, N = 0 points. The total score for each subject was determined by averaging the scores from four judges.

6. Parent Questionnaire--This questionnaire provided information on the child's birth order with the family, and parental perceptions of their child's risk-taking behavior. The last two questions had three components rated separately by father and mother. Each checked only one of the three statements they perceived as descriptive of their child's behavior. Information from both questions was converted into numbers. If part number 1 was checked, a value of 3 points was allocated; if part number 2 was checked, 2 points were awarded; and part number 3 rated 1 point. Scores reflected each parent's perception both separately and together, based on answers to both questions, related to parental rating and risk taking (Appendix K).

Data Analysis

This study employed five different instruments (dependent variables) previously described: Bruininks-Oseretsky Test of Motor Proficiency (BOTMP), Pictorial Risk-Taking Preference (PRTP), Live Preference (LP), Movement Confidence (MC), and Parent Questionnaire. A major goal was to correlate the results of each dependent variable to ascertain the relationship among these variables. For this purpose, correlation analysis was employed.

The degree of predictability of the dependent variable (MC) was assessed from the values of the independent variables (gender, age, skill level as revealed on the Bruininks-Oseretsky Test of Motor Proficiency, fathers' and mothers' ratings of their child's
risk-taking behavior, and birth order). The stronger the predictability, the greater the criterion validity of the measuring instrument. Multiple regression analysis was used to measure the above.

The effect or influence of the independent variables (gender, age, skill level, birth order) on scores as measured by the dependent variables (PRTP, LP, and MC) were assessed using ANOVA. Since this study used ex post facto research design (Kerlinger, 1986), a measure of the relationship between the dependent variable(s) (outcome) and the independent variable(s) that had been hypothesized as factors explaining the variability in the dependent variable(s) was sought. This relationship was expressed as correlation coefficients and multiple regression analysis procedures were used for data analysis. This procedure indicates what percentage of variance in the dependent variable that may be accounted for, or determined by, a set of independent variables.

Summary

This chapter described the study's methods and procedures. All steps in the development and justification of the instruments were delineated.

Instruments used in this study were a major focus, and methods of obtaining evidence regarding reliability and validity were provided. Methods of statistical data analysis were included. A correlational study was used due to the ex post facto research design. Multiple regression analysis was employed. The thrust of the
major hypothesis was to demonstrate the relationship between the PRTP, LP, and MC (dependent variables). The relative effect of sex, age, birth order, level of motor ability, and parental perception (independent variables) (alternative hypothesis) served to explain the variability in the dependent variables (scores).

Results of statistical data analysis will be described in the next chapter, including rejection or failure to reject the hypothesis.
CHAPTER IV
ANALYSIS OF DATA

This chapter deals with analysis of the raw data collected in the study and procedures for data collection described in Chapter III. All previously stated hypotheses are tested and analyzed, with findings reported regarding their rejection or acceptance.

The chapter is divided into five parts which will be reported in the following order:

1. Descriptive statistics--which present the different variables of this study and their means and SD values.
2. Reliability--reports the results test-retest for the PRTP, and of intra- and inter-rater reliabilities of the MC.
3. Sequence effect--control for PRTP and LP order of presentation.
4. Validity--reports statistical methods used in testing/validating each instrument and the results of data analysis:
   A. Correlational Analysis between MC and each method of assessment (PRTP, LP, FR, and MR).
   B. Regression analysis treating MC as a dependent variable and PRTP, LP, FR, and MR as independent variables to determine which best predicts MC. Also in this section the interaction
of sex, age, birth order, motor skill level (all treated as independent variables) were analyzed using Analysis of Variance to see how they affect the score on the dependent variables (PRTP, LP, and MC).

C. Multiple regression analysis to see the degree to which the set of independent variables can explain significant variance in MC, PRTP, and LP.

5. Other data--data/information collected or observed, but not incorporated in the statistical analysis.

Descriptive Statistics

Visual inspection of the means (Table 4) shows that on the PRTP and the BRUN, girls as a group scored slightly higher than boys, while on the LP, FR, MR, and MC, boys scored higher than girls.

Table 4
Means and SD of Risk-Taking Behavior by Sex

<table>
<thead>
<tr>
<th>Instrument</th>
<th>Boys</th>
<th></th>
<th>Girls</th>
<th></th>
<th>Total</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>x</td>
<td>SD</td>
<td>n</td>
<td>x</td>
<td>SD</td>
</tr>
<tr>
<td>PRTP</td>
<td>52</td>
<td>5.25</td>
<td>2.74</td>
<td>48</td>
<td>5.59</td>
<td>2.52</td>
</tr>
<tr>
<td>LP</td>
<td>54</td>
<td>5.31</td>
<td>2.79</td>
<td>49</td>
<td>4.98</td>
<td>2.70</td>
</tr>
<tr>
<td>MC</td>
<td>51</td>
<td>9.70</td>
<td>3.00</td>
<td>47</td>
<td>9.00</td>
<td>2.89</td>
</tr>
<tr>
<td>BRUN</td>
<td>54</td>
<td>28.65</td>
<td>13.27</td>
<td>48</td>
<td>30.56</td>
<td>12.36</td>
</tr>
<tr>
<td>Father's Rating</td>
<td>51</td>
<td>4.51</td>
<td>0.99</td>
<td>47</td>
<td>4.49</td>
<td>1.02</td>
</tr>
<tr>
<td>Mother's Rating</td>
<td>52</td>
<td>4.54</td>
<td>0.96</td>
<td>48</td>
<td>4.42</td>
<td>0.92</td>
</tr>
</tbody>
</table>
When age was considered, visual inspection of the means (Table 5) showed that 4, 5, and 6 years old only showed a pattern of increase in mean for risk-taking behavior as it was measured using the PRTP, while in LP age 3, 4, and 5 showed a similar pattern, where 6-year-olds scored less than 5-year-olds. Both MC and BRUN mean scores for age showed an increment from age 3 to 6. Parents' ratings, which involve personal judgment, fit less into the above pattern.

Table 5  
Means and SD of Risk-Taking Behavior by Age

<table>
<thead>
<tr>
<th>Instrument</th>
<th>3 Years</th>
<th>4 Years</th>
<th>5 Years</th>
<th>6 Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRTP</td>
<td>n 24</td>
<td>$\bar{x}$ 5.19</td>
<td>SD 2.51</td>
<td>n 26</td>
</tr>
<tr>
<td>LP</td>
<td>n 25</td>
<td>$\bar{x}$ 4.20</td>
<td>SD 2.60</td>
<td>n 27</td>
</tr>
<tr>
<td>MC</td>
<td>n 22</td>
<td>$\bar{x}$ 7.14</td>
<td>SD 3.25</td>
<td>n 26</td>
</tr>
<tr>
<td>BRUN</td>
<td>n 24</td>
<td>$\bar{x}$ 14.92</td>
<td>SD 5.32</td>
<td>n 27</td>
</tr>
<tr>
<td>Father's Rating</td>
<td>n 24</td>
<td>$\bar{x}$ 4.42</td>
<td>SD 0.88</td>
<td>n 25</td>
</tr>
<tr>
<td>Mother's Rating</td>
<td>n 25</td>
<td>$\bar{x}$ 4.48</td>
<td>SD 0.96</td>
<td>n 26</td>
</tr>
</tbody>
</table>

As seen in Table 6, the mean for first-born was greater than the mean of later-born except on the Mothers' Rating (MR). This mean, however, refers to first-born versus later-born as a group, and interaction effect of age may be possible. This interaction
could be better explained using analysis of variance (ANOVA), which is forthcoming in this study.

Table 6
Means and SD of Risk-Taking Behavior by Birth Order

<table>
<thead>
<tr>
<th>Instrument</th>
<th>First-Born</th>
<th>Later-Born</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>x</td>
</tr>
<tr>
<td>PRTP</td>
<td>56</td>
<td>5.73</td>
</tr>
<tr>
<td>LP</td>
<td>56</td>
<td>5.54</td>
</tr>
<tr>
<td>MC</td>
<td>54</td>
<td>10.24</td>
</tr>
<tr>
<td>BRUN</td>
<td>56</td>
<td>32.55</td>
</tr>
<tr>
<td>Father's Rating</td>
<td>56</td>
<td>4.55</td>
</tr>
<tr>
<td>Mother's Rating</td>
<td>56</td>
<td>4.45</td>
</tr>
</tbody>
</table>

Reliability

Reliability of the PRTP is crucial for further development of the instrument in establishing consistency of results when the instrument is used. Central to the issue is the fact that some young children's behavior may fluctuate and vary greatly in time and in environmental change. Due to limitations in information processing, it was essential to see if young children, especially 3- and 4-year-olds, could respond realistically and consistently, as would be needed on the PRTP.

The investigator performed test-retest reliability on the PRTP with one- to three-week lapses between the first measurement of
PRTP 1 and the second measurement of PRTP 2. Using Pearson Correlation coefficient for test-retest, \( r = 0.77 \), which is considered high.

Test-retest reliability for the PRTP was also analyzed by age. It was assumed that if test-retest reliability was low, particularly for ages 3 and 4, it may indicate that children at this age are not consistent in their choices and they may not be realistic in their responses to pictures. Analysis, however, did not support that assumption. For all ages reliability for PRTP test-retest was quite high. The following are the reliabilities obtained for age: age 3 \( r = .72 \), for age 4 \( r = .81 \), for age 5 \( r = .72 \), and for age 6 \( r = .85 \).

Both inter-rater and intra-rater reliability for scoring by the four judges for the MC were assessed using the same statistical method as above. Inter-rater agreement on MC was \( r = .98 \), which is extremely high. Results for intra-rater agreement were performed on 12 randomly selected subjects with agreement being 100% for all four judges. Resulting high reliabilities on the MC are attributed to clearly defined behavior and the specifically delineated scoring system, together with observers who were well-trained (see Appendix L for details of judges' training).

Sequence Effect

It was assumed that if subjects are first shown pictures (PRTP), then the real apparatus (LP) in this order, the child's response might be influenced by this sequence. To control this sequence effect, the investigator randomly presented the PRTP and
then the LP to half the subjects, while the other half were first presented the LP and then the PRTP. Mean comparison of both groups with sequence 1 and 2 using t test reveal no significant differences. (Sequence 1 mean = 5.62; while sequence 2 mean = 5.20.) Hence it was concluded no significant sequence effect took place and one can get consistent results no matter what sequence is used.

Validity

Validation of the PRTP is the most important step in the instrument's development. It involves content-related validity, wherein logical steps are taken to select items representative of the behavior of interest in this study, i.e., risk-taking behavior. These items are selected from the literature and are based on expert opinion. This type of validity was the first step taken for this study during the pilot study and was described in the previous chapter.

Since this type of study is relatively new, no research theory is available to support extensive construct-related validity. However, concepts from related research were used in this study to the extent feasible.

The prime concern of this chapter is criterion-related validity, in which applicability and appropriateness for the risk-taking assessment tool is statistically tested. Correlation coefficients were used to establish criterion-related validity. The goal was to see how well the PRTP, LP, and MC, as three dependent variables, correlated with each other, given that one of the dependent variables
(i.e., MC is selected as the criterion variable) is being compared with PRTP, LP, FR (fathers' ratings), and MR (mothers' ratings) to see how well scores on those variables can predict scores on the MC. In this case MC was selected as the criterion variable since MC as a direct measure of behavior is assumed to be the best measure, whereas PRTP, LP, FR, and MR are projective techniques which reflect the variable or behavior of interest. Since practically and administratively MC is the most difficult measure of risk-taking behavior to obtain, if the PRTP were found to correlate highly with MC it could be used to predict behavior on MC. Hence this research examined the accuracy of the PRTP and LP in measuring children's risk-taking behavior compared to the MC. PRTP therefore is the future instrument of interest in measuring risk-taking behavior.

Based on the above assumption and to reach the goal of the study, the statistical analysis can be divided into three parts:

1. The first part would report the correlation coefficient between all the following variables, which are considered dependent in this section of the study, including the PRTP, LP, MC, FR, and MR. This portion also tested which of the risk-taking measurements (i.e., PRTP, LP, FR, and MR), when treated as independent variables, could best predict MC which is considered a dependent variable for this statistical procedure, which used multiple regression analysis.

2. Part two is concerned with the many independent variables, i.e., sex, age, motor skill level, and birth order, which may have some effect on scores of the dependent variables, i.e., PRTP, LP, and MC. Since risk-taking behavior is multi-dimensional, the effect
of many variables in the real world must be taken into account. To measure differences between boys and girls aged 3, 4, 5, and 6 years, motor skill level and birth order as they are reflected in the dependent variables (PRTP, LP, and MC), t-test, and ANOVA were used for each separate independent variable and levels of the independent variables.

This section also dealt with the interaction effect between sex, birth order, and age and how they may effect the scores on the dependent variables. ANOVA was used to analyze the above.

3. The last part for assessing the criterion validity is concerned with the predictability of risk-taking behavior. Given the independent variables of sex, age, birth order, and parents' reports (FR and MR), the degree of predictability is sought for the dependent variables: PRTP, LP, and MC, all risk-taking assessment methods. Also sought is which of these methods predicts best and how well the variance of the dependent variable is accounted for by the best linear combination of the independent variables. To this end, multiple regression analysis was employed.

Testing of Hypotheses

Testing the null hypothesis #1 regarding risk taking and method of assessment: using MC as a criterion to measure risk-taking behavior, there will be no significant relationship between MC and other assessment methods, i.e., PRTP, LP, FR, and MR.

Since PRTP, LP, FR, MR, and MC are continuous variables, Pearson Product Moment Correlation was employed to determine the
degree to which the variables are related. The null hypothesis #1 was rejected.

All correlation coefficients are statistically significant at 0.01 level. PRTP and LP are highly correlated ($r = .85$) which may support the research hypothesis that both assume to measure the same behavior. Fathers' and mothers' perceptions are highly correlated ($r = .73$). The correlation between MC and PRTP, LP, FR, and MR are .48, .54, .41, and .38 respectively. Among the correlation coefficients of other methods with MC, LP shows the highest relationship with MC ($r = .54$) (Table 7).

**Table 7**

Correlation Matrix for PRTP, LP, FR, MR, and MC

<table>
<thead>
<tr>
<th></th>
<th>PRTP</th>
<th>LP</th>
<th>FR</th>
<th>MR</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRTP</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LP</td>
<td>0.85*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR</td>
<td>0.50*</td>
<td>0.49*</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>MR</td>
<td>0.45*</td>
<td>0.43*</td>
<td>0.73*</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>MC</td>
<td>0.48*</td>
<td>0.54*</td>
<td>0.41*</td>
<td>0.38*</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*p < .01.

Testing the null hypothesis #2 regarding the best method of assessment: Among the four methods of assessing risk-taking behavior (PRTP, LP, FR, and MR), there will be one method which is the best indicator of the significant variance in MC.
To ascertain the best or most appropriate method of assessment using MC as the criterion, the other four methods (PRTP, LP, FR, and MR) were used as the predictors. Multiple regression analysis was used to determine the best predictor of the criterion (MC) based on the following model:

$$MC = \beta_1 PRTP + \beta_2 LP + \beta_3 FR + \beta_4 MR$$

<table>
<thead>
<tr>
<th>Variable</th>
<th>Standard Deviation</th>
<th>Regression Weight $\beta$</th>
<th>Standard Regression Weight $\beta$</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRTP</td>
<td>2.63</td>
<td>0.02</td>
<td>-0.02</td>
</tr>
<tr>
<td>LP</td>
<td>2.74</td>
<td>0.50</td>
<td>0.46</td>
</tr>
<tr>
<td>FR</td>
<td>1.00</td>
<td>0.41</td>
<td>0.14</td>
</tr>
<tr>
<td>MR</td>
<td>0.94</td>
<td>0.23</td>
<td>0.17</td>
</tr>
</tbody>
</table>

The standard regression equation is:

$$MC = -.02 \text{ PRTP} + .46 \text{ LP} + 14 \text{ FR} + .17 \text{ MR}.$$  

It is found that among the four methods of assessment, LP ($\beta = .46$) is the best predictor of MC (Table 8).

Null hypothesis #3 was concerned with risk taking and gender differences, and was stated: Boys will not differ significantly from girls on scores measured by PRTP, LP, and MC. Based on the
statistical analysis this hypothesis there was no evidence to reject
the above hypothesis.

ANOVA was used to compare the differences between boys and
girls on scores for PRTP (Table 11), LP (Table 12), and MC (Table 9).
No significant differences were found for the PRTP and LP. However,
for the MC, no significant differences were found when boys and
girls were compared as a group. When age was considered, 3- and
4-year-olds performed similarly, and different from 5- and
6-year-olds, who performed similarly (3 = 4 < 5 = 6) (Tables 9 and
10).

<table>
<thead>
<tr>
<th>Table 9</th>
<th>Analysis of Variance of MC by Sex and Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Source of Variance</td>
<td>df</td>
</tr>
<tr>
<td>Sex</td>
<td>1</td>
</tr>
<tr>
<td>Age</td>
<td>3</td>
</tr>
<tr>
<td>Sex and age</td>
<td>3</td>
</tr>
<tr>
<td>Error</td>
<td>90</td>
</tr>
<tr>
<td>Total</td>
<td>97</td>
</tr>
</tbody>
</table>

N = 98.
*p < .01.

NOTE: Main effect due to age is significant at .01 level
(F = 19.35). Main effect due to sex and sex and age interaction are
not significant.
Table 10
Scheffé Post Hoc Comparison of MC by Age

<table>
<thead>
<tr>
<th>Age Group (Year)</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>22</td>
<td>26</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>Mean</td>
<td>7.14</td>
<td>7.88</td>
<td>10.94</td>
<td>11.31</td>
</tr>
<tr>
<td>A</td>
<td>A</td>
<td>A</td>
<td>B</td>
<td>B</td>
</tr>
</tbody>
</table>

NOTE: Significant difference at .05 level = 1.912. Means with the same letter are not significantly different.

Null hypothesis #4 was concerned with risk taking and age, stating that children aged 3, 4, 5, and 6 years old will not differ significantly in their scores on the PRTP, LP, and MC. Statistical analysis revealed that children aged 3, 4, 5, and 6 did not differ significantly on scores on the PRTP (Table 11).

Table 11
Analysis of Variance of PRTP by Sex and Age

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>2.949</td>
<td>2.949</td>
<td>0.42</td>
</tr>
<tr>
<td>Age</td>
<td>3</td>
<td>26.087</td>
<td>8.797</td>
<td>1.25</td>
</tr>
<tr>
<td>Sex and age</td>
<td>3</td>
<td>14.437</td>
<td>4.812</td>
<td>0.69</td>
</tr>
<tr>
<td>Error</td>
<td>92</td>
<td>640.054</td>
<td>6.957</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 100.

NOTE: Main effect due to sex, age are not significant. Interaction is not significant.
However, when scores on the LP were compared on ages 3, 4, 5, and 6 there were significant differences between the ages ($F = 3.19$) (Table 12).

**Table 12**

Analysis of Variance of LP by Sex and Age

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1</td>
<td>2.888</td>
<td>2.887</td>
<td>0.40</td>
</tr>
<tr>
<td>Age</td>
<td>3</td>
<td>68.602</td>
<td>22.867</td>
<td>3.19*</td>
</tr>
<tr>
<td>Sex and age</td>
<td>3</td>
<td>10.820</td>
<td>3.607</td>
<td>0.50</td>
</tr>
<tr>
<td>Error</td>
<td>95</td>
<td>681.205</td>
<td>7.171</td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>102</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

$N = 103$.

*p < .05.

NOTE: Main effect due to age is significant ($F = 3.19$. Sex and interaction between sex and age are not significant.

However, Scheffe post hoc comparison did not discriminate those differences (Table 13). This might be due to the Scheffe's conservatism in detecting mean differences because of unequal numbers and nonrandomization in selection of subjects in this study.
Table 13
Scheffé Post Hoc Comparison of LP across Age

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>N</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>25</td>
<td>4.20</td>
</tr>
<tr>
<td>4</td>
<td>27</td>
<td>4.48</td>
</tr>
<tr>
<td>5</td>
<td>26</td>
<td>6.04</td>
</tr>
<tr>
<td>6</td>
<td>25</td>
<td>5.92</td>
</tr>
</tbody>
</table>

NOTE: Significant difference at 0.5 level = 2.125.
Means with the same letter are not significantly different.

In regard to MC, statistical analysis showed that there are significant differences between age and scores on MC (Table 9). \( F = 19.35 \). Post hoc comparison was employed to discern which of the means was different (Table 10). Means for ages 3 and 4 differed from means for ages of 5 and 6. These results were similar to those for Hypothesis #3 dealing with gender and score on MC. The similarity in means for ages 3 and 4, and 5 and 6, may be attributed to the arbitrary assignment of children to age groups.

Hypothesis #5 dealt with risk-taking behavior and skill level performance on the Bruininks-Oseretsky Test of Motor Proficiency. The hypothesis stated that there would be no significant differences in level of performance on the Bruininks-Oseretsky and risk-taking behavior as measured by PRTP, LP, and MC. The hypothesis testing was reported in Tables 14 for PRTP, 16 for LP, and 18 for MC.

When skill level was compared to scores on the PRTP (Table 14), significant differences were found (\( F = 4.72 \)).
Table 14
Analysis of Variance of PRTP by Skill Level

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill</td>
<td>3</td>
<td>87.855</td>
<td>29.285</td>
<td>4.72*</td>
</tr>
<tr>
<td>Error</td>
<td>96</td>
<td>595.673</td>
<td>6.205</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>99</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 100.
*p < .01.

NOTE: Main effect due to skill in Bruininks-Oseretsky is significant at .01 level (F = 4.72).

Children who have different skill on Bruininks-Oseretsky will be significantly different in PRTP. Post hoc comparison (Table 15) using Scheffé method revealed significant differences between the Relatively Less skilled group (group 2) and the High skilled (group 4) on scores on the PRTP. Therefore, PRTP does not discriminate well between skill at all levels. Because PRTP is a projective technique, to measure risk-taking behavior subjects, particularly the younger ones may not objectively have reported their preferences. The more realistic the method of assessment is, the higher the discriminative power. This can be seen in the following tables when LP, and then MC, were the methods of assessment, where MC showed most discrimination among the skill levels.
Table 15

Scheffé Post Hoc Comparison of PRTP and Skill Level

<table>
<thead>
<tr>
<th>Skill Level</th>
<th>Relatively Less (1)</th>
<th>Relatively Less (2)</th>
<th>Relatively High (3)</th>
<th>High (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>19</td>
<td>26</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>Mean</td>
<td>4.87</td>
<td>4.17</td>
<td>5.89</td>
<td>6.73</td>
</tr>
<tr>
<td></td>
<td>A</td>
<td>A</td>
<td>A</td>
<td>B</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>B</td>
<td>B</td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Significant difference at .05 level = 2.065. Means with the same letter are not significantly different.

When skill level was compared with LP scores (Table 16), significant differences were found ($F = 6.77$).

Table 16

Analysis Variance of LP by Skill Level

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill</td>
<td>3</td>
<td>131.05</td>
<td>43.672</td>
<td>6.77*</td>
</tr>
<tr>
<td>Error</td>
<td>98</td>
<td>631.779</td>
<td>6.447</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>101</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 102.

*p < .01.

NOTE: Main effect due to skill is significant at .01 level ($F = 6.77$).

Scheffé post hoc comparison was used to find out which of the means were significantly different (Table 17).
Table 17
Scheffé Post Hoc Comparison of LP across Skill Level

<table>
<thead>
<tr>
<th>Skill Level</th>
<th>Less (1)</th>
<th>Relatively Less (2)</th>
<th>Relatively High (3)</th>
<th>High (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>19</td>
<td>27</td>
<td>35</td>
<td>21</td>
</tr>
<tr>
<td>Mean</td>
<td>3.68</td>
<td>4.15</td>
<td>5.80</td>
<td>6.67</td>
</tr>
<tr>
<td>ACC</td>
<td>A</td>
<td>A</td>
<td>C</td>
<td>C</td>
</tr>
<tr>
<td></td>
<td>B</td>
<td>B</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Significant difference at 0.5 level = 2.080. Means with the same letter are not significantly different.

The Less skilled (group 1) differed significantly from the Relatively High skilled (group 3) and the High skilled (group 4); and the Relatively Less skilled (group 2) differed significantly from the High skilled (group 4).

When skill level was compared with MC (Table 18), significant differences were found at .01 level (F = 32.92).
Table 18
Analysis of Variance of MC by Skill Level

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Skill level</td>
<td>3</td>
<td>433.153</td>
<td>144.384</td>
<td>32.92*</td>
</tr>
<tr>
<td>Error</td>
<td>94</td>
<td>412.248</td>
<td>4.386</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>97</td>
<td>7</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 98.

*p < .01.

NOTE: Main effect due to skill level is significant at .01 level (F = 32.92).

Post hoc comparison using Scheffé method revealed significant differences (Table 19).

Table 19
Scheffé Post Hoc Comparison of MC across Skill Level

<table>
<thead>
<tr>
<th>Skill Level</th>
<th>Less (1)</th>
<th>Relatively Less (2)</th>
<th>Relatively High (3)</th>
<th>High (4)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>17</td>
<td>26</td>
<td>35</td>
<td>20</td>
</tr>
<tr>
<td>Mean</td>
<td>5.62</td>
<td>8.55</td>
<td>10.23</td>
<td>12.11</td>
</tr>
</tbody>
</table>

NOTE: Significant different at .05 level = 1.968.
Means with the same letter are not significantly different.

All groups were significantly different from each other, except the Relatively Less skilled (group 2) and the Relatively High skilled (group 3). Skill level on the Bruininks-Oseretsky was significant on
all three methods of assessment (PRTP, LP, and MC). However, because MC measures the behavior most directly, it showed most discriminative power with MC.

Hypothesis #6 is concerned with risk taking and birth order. The hypothesis stated that children who are first-born will not differ significantly from those who are later-born on scores on the PRTP, LP, and MC.

No significant differences in scores were found between first- and later-born children on the PRTP (Table 20).

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth order</td>
<td>1</td>
<td>11.246</td>
<td>11.246</td>
<td>1.73</td>
</tr>
<tr>
<td>Age</td>
<td>3</td>
<td>29.939</td>
<td>9.980</td>
<td>1.53</td>
</tr>
<tr>
<td>Birth order and age</td>
<td>3</td>
<td>25.964</td>
<td>8.655</td>
<td>1.33</td>
</tr>
<tr>
<td>Error</td>
<td>90</td>
<td>585.483</td>
<td>6.505</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>97</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 98.

NOTE: Main effect due to birth order, age are not significant. Interaction is not significant.

Similarly, no significant differences were noted on the LP for birth order. However, there was a significant main effect (F = 3.57) on LP scores when age was assessed (Table 21). No significant interaction of age and birth order was found. Subjects, regardless
of birth order or age, did not significantly differ on scores on the PRTP.

Table 21
Analysis of Variance of LP by Birth Order and Age

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth order</td>
<td>1</td>
<td>20.045</td>
<td>20.045</td>
<td>2.96</td>
</tr>
<tr>
<td>Age</td>
<td>3</td>
<td>72.635</td>
<td>24.212</td>
<td>3.57*</td>
</tr>
<tr>
<td>Birth order and age</td>
<td>3</td>
<td>26.997</td>
<td>8.999</td>
<td>1.33</td>
</tr>
<tr>
<td>Error</td>
<td>91</td>
<td>616.343</td>
<td>6.773</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>98</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 99.
*p < .05.

NOTE: The main effect due to birth order (F = 2.96) is not significant. The main effect due to age is significant (F = 3.57). Interaction is not significant.

Similar to results on the PRTP, no significant differences were found with birth order when LP was used. However, birth order significantly affected scores on MC (Table 22).
Table 22

Analysis of Variance of MC by Birth Order and Age

<table>
<thead>
<tr>
<th>Source of Variance</th>
<th>df</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birth order</td>
<td>1</td>
<td>88.112</td>
<td>88.112</td>
<td>18.88*</td>
</tr>
<tr>
<td>Age</td>
<td>3</td>
<td>285.307</td>
<td>95.102</td>
<td>20.38*</td>
</tr>
<tr>
<td>Birth order and age</td>
<td>3</td>
<td>49.562</td>
<td>16.521</td>
<td>3.54**</td>
</tr>
<tr>
<td>Error</td>
<td>88</td>
<td>410.602</td>
<td>4.666</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>95</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

N = 96.

*p < .001.

**p < .05.

NOTE: The main effect due to birth order (F = 18.88) and age (F = 20.38) are significant at p < .001. The interaction between birth order and age is significant as well (F = 3.59) at p < .05.

The above results indicate that children at the different ages of 3, 4, 5, and 6 years, and first-born or later-born children scored significantly differently on the MC. First-born children scored significantly higher on risk-taking behavior than later-born children, but not for all four levels of age because of significant interaction between birth order and age. Post hoc analysis was used to test which pair was different (Table 23). First-born scores on MC were significantly higher as shown by Scheffé method of post hoc comparison.
Table 23
Scheffé Post Hoc Comparison of MC across Birth Order

<table>
<thead>
<tr>
<th>Birth Order</th>
<th>First-born (1)</th>
<th>Later-born (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>54</td>
<td>42</td>
</tr>
<tr>
<td>Mean</td>
<td>10.24</td>
<td>8.31</td>
</tr>
</tbody>
</table>

Means with the same letter are not significantly different.

NOTE: Significant differences at .05 level = 0.883.

Statistical analysis revealed that young children who are first-born score higher on risk-taking behavior as measured by MC ($\bar{x} = 10.24$) than young children who are later-born ($\bar{x} = 8.31$). The findings about the comparison of risk-taking behavior among the groups with different ages will not be presented here since it is mentioned already on Tables 9 and 10.

The following graph shows interaction between birth order and age.

Figure 5. Graph representation of interaction between birth order and age.
First-born children scored higher on risk-taking behavior as measured by the MC than later-born children at all levels of age, except at the age of 5, where first-born scored lower than 6-year-old first-born.

Birth order in general did not show significance when it was measured by PRTP or LP. But when MC was used, significant differences were found, and an interaction effect between age and birth order was noted. Again it was demonstrated that MC is more powerful discriminating between the various levels of the independent variables compared to PRTP and LP that did not show significance.

Hypothesis #7 states that all the independent variables (sex, age, skill level, birth order, and parental ratings) will not equally account for the significant variance in PRTP, LP, or MC.

The explanation of variance in PRTP, LP, and MC from the set of independent variables (sex, age, BRUN, birth order, fathers' ratings, and mothers' ratings) is depicted in Table 24.
Table 24
Correlation Matrix of Sex, Age, BRUN, Birth Order, Fathers' Ratings, Mothers' Ratings, PRTP, LP, and MC

<table>
<thead>
<tr>
<th></th>
<th>Sex</th>
<th>Age</th>
<th>BRUN</th>
<th>Birth Order</th>
<th>FR</th>
<th>MR</th>
<th>PRTP</th>
<th>LP</th>
<th>MC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sex</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>-.02</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BRUN</td>
<td>-.07</td>
<td>.84*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth Order</td>
<td>-.08</td>
<td>.29*</td>
<td>.27*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FR</td>
<td>.01</td>
<td>.13</td>
<td>.28*</td>
<td>.04</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MR</td>
<td>.07</td>
<td>.08</td>
<td>.24**</td>
<td>-.05</td>
<td>.73*</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PRTP</td>
<td>-.07</td>
<td>.15</td>
<td>.30*</td>
<td>.13</td>
<td>.50*</td>
<td>.45*</td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>LP</td>
<td>.06</td>
<td>.28</td>
<td>.38*</td>
<td>.17</td>
<td>.49*</td>
<td>.43*</td>
<td>.85*</td>
<td>1.00</td>
<td></td>
</tr>
<tr>
<td>MC</td>
<td>.12</td>
<td>.62*</td>
<td>.74*</td>
<td>.33*</td>
<td>.41*</td>
<td>.38*</td>
<td>.48*</td>
<td>.54*</td>
<td>1.00</td>
</tr>
</tbody>
</table>

*p < .01.

**p < .05.

The inter-correlation among variables are presented in Table 24. It is found that the correlation coefficient among the set of independent variables are relatively low, except the correlation between age and BRUN where \( r = .84 \), and between fathers' ratings (FR) and mothers' ratings (MR) \( r = .73 \) which are relatively high. When PRTP is treated as a dependent variable, the correlation between each independent variable and PRTP varies from -.07 to .50. It is revealed that only the correlation between fathers' ratings (FR) and PRTP \( r = .50 \) and between mothers' ratings (MR) and PRTP \( r = .45 \) are moderate; otherwise it seems to be less. Similarly,
the correlation between LP and each of the independent variables are not high. That is, the correlation between fathers' ratings and LP, and between mothers' ratings and LP are .49 and .43 respectively. Finally, the inter-correlations between MC and each independent variable are found to be higher than when PRTP and LP are treated as dependent variables. Only the correlation between MC and sex is very low (r = .12). Based on their correlation matrix, multiple linear regression analysis was employed in order to determine how much variance in MC, PRTP, or LP there is which can be accounted for/explained by the set of independent variables (Table 25).

Table 25

<table>
<thead>
<tr>
<th>Criterion (Dependent Variable)</th>
<th>R²</th>
<th>F</th>
<th>P&lt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>MC</td>
<td>.6384</td>
<td>25.30*</td>
<td>.0001</td>
</tr>
<tr>
<td>PRTP</td>
<td>.3161</td>
<td>6.78*</td>
<td>.0001</td>
</tr>
<tr>
<td>LP</td>
<td>.3387</td>
<td>7.51*</td>
<td>.0001</td>
</tr>
</tbody>
</table>

*p < .0001.

From Table 25, the set of independent variables can explain significant variance in MC 63.84% (R² = .6384), whereas this set can explain about 31.61% of the variance in PRTP (R² = .3161), and about 33.87% of the variance in LP (R² = .3387). This means that the rest of the variance in MC, PRTP, and LP will be explained by other
variables which are not included or cannot be accounted for in this study. MC was again demonstrated to be moderately predictable from the set of independent variables employed in this study. PRTP and LP followed, although both are closely predictable from the same set of independent variables.

Other Observations

Some observations were not intended to be statistically analyzed or planned for, but they add to the understanding of the study. Some of those observations were mentioned previously in Chapter III.

Observation of subjects during the pilot study and the establishment of content-related validity of the PRTP showed that children's previous experience may have affected their choice and preference. Such experience may alter the results of the PRTP. For example, children selected the ball as more risky than jumping off the gymnastic box or walking the balance beam. When children were asked to explain the reason for their choice, they expressed their dislike for rough balls, or games associated with playing with balls, like basketball. This problem was resolved by modifying the pictures and clarifying to the child that the ball on the picture is a soft nerf ball, which does not hurt.

Another observation was of a subject who happened to "voice her thoughts" while she was tested for her preference on the PRTP. The 6-year-old subject seemed to be a high risk-taker and confident, but in her selections of most and least risky she employed a strategy of "trying out" all pictures, not wishing to repeat a previously
selected task, stating, "I did not try this one yet." Therefore, the subject made her selections regardless if the task were more or less risky. This, of course, could affect the test's validity, and children may develop other strategies as well, which are not controlled by the experimenter. This problem could be resolved if one assumed that the proposed instrument is representative of the majority of the subjects. There will always be some individuals who, based on their experience, never follow the expected pattern of the majority.

The last observation is regarding the ability of young children to make accurate judgments of their environments. Some of the 3-year-olds did not initially show any hesitation in tasks such as jumping off the gymnastic box, but after jumping they became apprehensive, which adversely affected their performance on the rest of the tasks, i.e., some of these children then hesitated to perform even less risky tasks. The above may have affected the study and cannot be easily resolved.

Summary

Seven hypotheses were tested in the chapter (Table 26). In Hypothesis #1 all methods of assessing risk-taking behavior were found to be significantly correlated with each other. When MC was designated as the main criterion for assessing risk taking and other methods were compared with it (Hypothesis #2), LP correlated highest with MC ($r = .46$). In Hypothesis #3 regarding sex differences, boys and girls did not differ significantly no matter what method of
<table>
<thead>
<tr>
<th>Hypothesis Number</th>
<th>Hypotheses Variables(s)</th>
<th>Statistical Method</th>
<th>Results/Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Methods of assessment</td>
<td>Correlation coefficient</td>
<td>**MC-PRTP .48</td>
</tr>
<tr>
<td></td>
<td>compared with:</td>
<td></td>
<td>**MC-FR .41</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Best prediction of MC</td>
<td>Multiple regression analysis</td>
<td>LP b = .46</td>
</tr>
<tr>
<td>3</td>
<td>R.T. and gender</td>
<td>ANOVA</td>
<td>PRTP--No significance</td>
</tr>
<tr>
<td></td>
<td>Boys vs. girls</td>
<td></td>
<td>LP --No significance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>LC --No significance</td>
</tr>
<tr>
<td>4</td>
<td>R.T. and age</td>
<td>ANOVA</td>
<td>PRTP--No significance</td>
</tr>
<tr>
<td></td>
<td>3, 4, 5, and 6</td>
<td></td>
<td>*LP --Significant</td>
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<td></td>
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<td></td>
<td>**MC --Significant (3 &lt; 4 &lt; 5 &lt; 6)</td>
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<td>5</td>
<td>R.T. and skill level</td>
<td>ANOVA</td>
<td>**PRTP--Relatively Less (2) different than High (4)</td>
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<tr>
<td></td>
<td>1. Less</td>
<td></td>
<td>**LP --Relatively Less (2) different than High (4) and Less (1) different than Relatively High (3) and High (4)</td>
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<tr>
<td></td>
<td>2. Relatively Less</td>
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<td>**MC --Less (1) different than Relatively Less (2) and High (4). Relatively Less (2) and Relatively High (3) are not significantly different</td>
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<td>3. Relatively High</td>
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<td>4. High</td>
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<tr>
<td>6</td>
<td>R.T. and birth order</td>
<td>ANOVA</td>
<td>PRTP--No significance</td>
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<td>First vs. later</td>
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<td>LP --No significance</td>
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<td></td>
<td>***MC --Significant--first &gt; later Large with 3 and 4 and less with 5 and 6</td>
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<tr>
<td>7</td>
<td>Sex</td>
<td>Multiple regression analysis</td>
<td>The set of independent variables can explain significant variance in</td>
</tr>
<tr>
<td></td>
<td>Age</td>
<td></td>
<td>**MC 63.84% ($R^2 = .6384$)</td>
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<tr>
<td></td>
<td>Brun</td>
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<td>***PRTP 31.61% ($R^2 = .3161$)</td>
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<tr>
<td></td>
<td>Birth order</td>
<td></td>
<td>***LP 33.87% ($R^2 = .3387$)</td>
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<td>FR</td>
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risk-taking assessment was used. However, when age was involved (Hypothesis #4), 3- and 4-year-olds were significantly different from 5- and 6-year-olds only on the LP and MC, but not on the PRTP. When skill level, as measured by the Bruininks-Oseretsky Test of Motor Proficiency was compared to scores on the PRTP, LP, and MC (Hypothesis #5), there were significant differences on scores of the above three methods where PRTP was least discriminative and MC the most discriminative.

When risk taking and birth order were assessed (Hypothesis #6), no significant differences were found between birth order and scores on the PRTP. On LP significant differences were seen. On MC first-born performed significantly higher than later-born, but no differences on PRTP or LP were found.

The last hypothesis (#7) dealt with the amount of variance which each independent variable contributed to each of the dependent variables. Scores on the Bruininks-Oseretsky were highly correlated with age \( r = .84 \), with MC \( r = .74 \). Mothers' and fathers' ratings correlated \( r = .73 \) and LP with PRTP \( r = .85 \). All independent variables contributed 63.84% to the variability in MC, but only 31.61% to the variability in PRTP, and 33.87% to the variability in LP.
CHAPTER V
SUMMARY, CONCLUSIONS, LIMITATIONS,
AND RECOMMENDATIONS

Summary and Conclusions

The major purpose of this study was the development of a valid, reliable instrument to measure the risk-taking behavior of boys and girls aged 3 to 6 years, as reflected in their motor activities.

The development and construction of an assessment tool to measure risk-taking behavior is needed for the following reasons:

1. Although there are instruments to measure risk-taking behavior of adults, no counterpart for children is currently available in the educational market.

2. If this type of instrument were found to be valid and reliable, it could measure the effect of children's participation in physical education activities as to its contribution to risk-taking behavior, which is implied by physical educators.

3. This type of instrument could be available to parents and teachers of young children, who could measure the children's risk-taking behavior. The information provides insight, contributing to a deeper understanding of children's play behavior and motor activities.
4. Handicapped individuals who in general display less confidence and courage in their movements may be low in motoric risk taking. Such an instrument may identify their present level and assess intervention programs' effectiveness.

5. The proposed tool may be used to design playgrounds and play environments for children, and would assess if they are conducive to optimal risk-taking behavior.

6. This instrument may be used to learn about its correlation with other measures of motor skills and risk taking, such as the use of sophisticated computer programs using evoked-potential and brain wave patterns.

7. This instrument may contribute to the interest in risk-taking behavior of young children, stimulate further research, and contribute to the body of knowledge in motor learning and motor development.

In achieving the major objectives of the study, representations of gross motor activities which demand various degrees of risk from children were selected. These activities included sliding down a slide, jumping off a gymnastic box to the floor, playing with a ball, walking the balance beam, jumping off steps to the floor, climbing up the ladder, and walking up the inclined board.

Various elements of risk entailed in the above gross motor tasks were identified from the literature (Wyrick, 1970; Vaughan, 1971). Elements of height, fear, getting hurt, and the probability of their occurrence as a consequence of making a choice were reviewed. These seven gross motor tasks were described in detail and
stated based on the children's understanding of the nature of the task and their perception of the task when shown to them in illustrations.

In determining how children perceive risk from pictures and how they rate the amount/degree of risk in each task, the tasks were arranged in pairs. Children were then shown the pairs and asked to rate which one of the tasks in the pair is the most "scary" (risky) for them to do.

Based on the children's perception of risk from the pictures and their ratings of the pairs, 10 pairs were selected to form the Pictorial Risk-Taking Preference (PRTP). The PRTP then was shown to a group of 104 children, boys and girls, aged 3 to 6 years. Each child was presented with two pictures at a time and asked which one of the tasks in each pair he/she would like to do the most. If the child selected the task which had been previously identified as most risky, 1 point was awarded for the pair; if the less risky task was chosen, then 0 points were awarded. The total score represented the child's Risk-Taking Index. This Risk-Taking Index was then used in the statistical procedures described in Chapter IV.

In addition to the PRTP used as a dependent variable to measure risk-taking behavior, the Live Preference (LP) and Movement Confidence (MC) were used. The LP is identical to the PRTP in format and scoring, with the difference that the actual apparatus depicted on the PRTP were actually set up in the gymnasium. The child was taken to each pair of apparatus and asked to give his/her preference for each item within each pair. The third dependent variable was the
MC. In this assessment, the child's actual performance on the same
tasks presented in the PRTP and LP was videotaped for further
analysis by trained observers who independently rated the child's
level of confidence in performing the tasks.

Scores derived from the PRTP, LP, and MC were statistically
compared to see if they correlated with each other. The assumption
was that if they do correlate significantly then the PRTP, which is
less time-consuming and most feasible from an administrative
viewpoint, could be validated as the future test for assessing
risk-taking behavior of young children.

It was assumed that it is not sufficient to ascertain
statistically significant correlations among the dependent variables
(PRTP, LP, and MC). In actuality, there are many other variables
which may contribute to risk-taking behavior. It was necessary to
statistically control such variables and to assess their interaction
and weight in contributing to risk-taking behavior. Those independent
variables which were controlled in the study include sex, age, motor
skill proficiency level as measured by the Bruininks-Oseretsky Test
of Motor Proficiency, and birth order. Parents' perceptions of their
child's risk-taking behavior was also provided in the parent
questionnaire, which was used to determine parental accuracy in
their ratings of their children when compared to the other dependent
variables.

For the major hypothesis regarding the correlation among PRTP,
LP, and MC, and Father's Rating (FR) and Mother's Rating (MR),
correlation coefficients were all significant at the 0.01 level.
PRTP and LP were highly correlated ($r = .85$). Father's and Mother's Rating correlated significantly with each other ($r = .73$). Correlation between PRTP, LP, FR, MR, and MC were $r = .48$, .54, .41, and .38 respectively. When MC was used as criterion in measuring risk-taking behavior and then compared to the rest of the dependent variables, LP was found to be the most closely correlated with MC ($r = .54$).

The null hypothesis of no difference in sex and risk-taking behavior (Hypothesis #3), as measured by the PRTP, LP, and MC, was accepted. The alternative hypothesis was rejected: that in general there were no significant differences between boys and girls on all the dependent variables (MC, PRTP, and LP). However, there was significant main effect with age on MC and LP. As a group, 3- and 4-year-olds were similar in their performance on the MC, as were 5- and 6-year-olds. Only 3- and 4-year-olds, when compared to 5- and 6-year-olds, were significantly different from each other on the MC.

Null Hypothesis #4 stated that there would be no differences between the different age groups (3-, 4-, 5- and 6-year-olds). However, significant differences were found only for the MC and LP but not for the PRTP, where all ages scored similarly. The hypothesis regarding motor skill proficiency level and performance on the PRTP, LP, and MC demonstrated that there was a statistically significant relationship between scores on the Bruininks-Oseretsky and all the dependent variables. Children who scored high on the Bruininks-Oseretsky scored high on the PRTP, LP, and MC as well, and vice versa.
When birth order was tested for statistical significance (Hypothesis #6), only MC was found to be at that level. First-born were more likely to be higher risk-takers than later born as measured on the MC.

Hypothesis #7 was concerned with prediction of risk-taking behavior. It stated that the independent variables of sex, age, birth order, and parental reports could indirectly explain the significant variance in each of the dependent variables, i.e., PRTP, LP, or MC. Analysis of data showed that the set of the above independent variables can explain the significant variance on the MC, 63.8%, while the remaining 36.2% may be due to chance or other unaccountable variances. The same independent variables can explain the significant variance in PRTP, 31.61%, and LP, 33.9%. From this it is noted that MC is the most reliable and predictable of the child's risk-taking behavior as defined in this study.

Based on the above results and this study, it is evident that the reliability of the proposed instrument is found to be high, while the criterion validity is in the moderate range. However, as suggested, it may be due to nonrandomization, age group homogeneity, and smaller number of subjects per group which in part accounted for the results.

Limitations

Although the three methods used in the study to assess risk-taking behavior were found to be generally significantly and moderately correlated with each other when they were compared,
caution is needed since it is impossible to claim that they are equally valid in measuring the same behavior. As was noted, the above methods were not effected equally when interaction of sex, age, birth order, and skill level were analyzed. MC, which measures the risk-taking behavior directly, is the most appropriate method of assessment. If projective-type assessment of risk-taking behavior is used, such as the PRTP or LP, then the LP is the second best and the PRTP is the least suited to substitute for the MC. However, correlational differences between PRTP and LP are negligible.

This research is interesting since it is the first attempt to examine this topic and the way risk-taking behavior may be perceived by children and ways to measure it. The results of the study did not always fall within expectations and other assumptions discussed throughout the study. Particularly, the dependent variables PRTP, LP, and MC did not always uniformly discriminate between and among the independent variables, particularly age. It was expected that if all dependent variables used in this study were measuring the same behavior, then no differences could be found, except when other variables were involved such as age, sex, birth order, and skill level.

However, these results may be expected when dealing with populations of young children, since the level of functioning and rate of information processing (Gallagher, 1984) and making choices (Hommers, 1980) may greatly differ. This fact is recognized by professionals and variability in performance of young children on well-established development/cognitive assessments is expected. This
was confirmed in this study as well. Children of the same chronological age who viewed the pictures on the PRTP or expressed their feeling regarding their preference on the LP probably acted and perceived the illustrated or live event differently. Some may not have grasped objectively what was on the picture or the consequence of harm as a possibility resulting from their choice. It is particularly possible that some of the younger children made choices purely by chance, regardless of the consequences. This phenomenon was previously described in the literature review (Kass, 1964). Even with the older subjects, the use of projective devices, i.e., pictures, may be influenced by personal choice and cognitive style, and uniform pattern due to age may not emerge (Walesa, 1977). In his study, Walesa found an inverted U-shape when he recorded the responses to pictures according to age. In his study, youngest age group and oldest score high on responding to pictures, while the middle group scored low.

Subjects also may develop a response mode of trying to give the experimenter the answer which they think the experimenter wants to hear, or modes which are influenced by the child's experience and cognitive style (Hommers, 1980; Gallagher, 1984). In this study, for example, a 6-year-old girl was asked to make a choice for the tasks on each pair of the PRTP as to which one she would like to do the most. She appeared to be a high risk taker and it was expected that she would select the most risky choices. However, she selected tasks in such a fashion as to insure that she would have "tried" each task regardless of risk, stating that she had already "picked" that one
before and therefore was selecting the other task regardless of preference for risk.

Scores on the PRTP and LP did not differ significantly, but when MC was involved there were significant differences. This may be explained by the fact that objective behavior of risk taking may not emerge because of the children's information processing and cognitive development, but when physical movement as in the MC is used, a more objective behavior which may represent the degree of risk taking emerged. For this reason, cognitive tests such as the Bayley Scales of Infant Development and the McCarthy Scales of Children's Abilities rely more heavily on motor items than do intelligence tests for older children. MC was also more discriminative of the various ages, especially 3 and 4 from 5 and 6 years. Because these ages were arbitrarily selected to separate the groups for statistical purposes, in reality very young children are still greatly different in motor, social, and cognitive development regardless of age. To demonstrate greater statistical significance, one needs larger numbers of subjects of the same age group.

In some of the hypotheses it was demonstrated that the instruments used in this study did discriminate between the ages 3, 4, 5, and 6. However, because children were arbitrarily assigned for age groups according to their birthday, some children who were, for example, 4 years old and three days assigned to 4-year-old age group. Other children who were a week or two short of being 4 years old were assigned to age 3. For this reason, age 3 and 4 were found to be similar in their mean scores on the dependent variables, and
same for ages 5 and 6 or 4 and 5. The researcher believes that larger number of subjects who are randomly selected and assigned to definitive age groups may show a more discriminative means for various age groups.

Due to nonrandomization and non-equally selected age groups in this study, the relationship between various methods of measurement were only in the moderate range. Also, the degree of predictability and the effect of the independent variables on the variance in the dependent variables were not very high. However, due to the limitations discussed above, one may assume that the results of this study are significant.

Language and wording used in this instrument may also have been critical to outcome. Although it was used uniformly throughout the testing for all subjects, the level of understanding of the meaning and interpretation may vary from child to child. Depending on their level of cognitive development and experience, children may respond differently to the identical instructions (Reingen, 1976).

The number of items on the PRTP, LP, and MC may also influence the result of this data. Because the number of items may not be sufficient overall representation of the tasks and the risk-taking behavior they reflected may have been insufficient, especially when the average score for all items is used in analyzing the data, as was done in this study.

Boys and girls did not perform significantly differently on all the dependent variables (PRTP, LP, and MC). This is not surprising although the literature regarding differences between boys' and
girls' risk-taking behavior is divided as to sex effect (Kagan & Wallach, 1967; Anifant, 1972; Krzesni, 1973). Most studies also dealt with older children than those used in this study. Young children aged 3, 4, 5, and 6 years old may not as yet have developed strong sex role behavior. As society becomes more nonsexist, they are not encouraged to do so and differences between boys and girls are likely less than a decade ago. Also, because of the young age, physical performance as on the MC was not significantly different since physical development at this age (3, 4, 5, and 6) may not differ greatly between sexes (Loy & Ingham, 1973; DiNucci, 1976; Malina, 1980).

Finding significant differences between first-born and later-born was surprising, particularly where first-born performed better on MC, and is contrary to some research studies (Lander, 1971; Albert, 1976). It is possible to explain this since the study deals with very young children who may not as yet have developed strong and stable personality traits such as those seen in older children and adults. Hence this trait may not have strongly emerged as yet. Also, other variables that may contribute to risk taking because of order of birth (Ernst & Angst, 1983) were not assessed in this study: such variables as family size, only-born, social strata, and environment.

The parental questionnaire used for this study was intended to provide personal data on the child, but most important was the parents' perception of their child's risk-taking behavior. Fathers' ratings and mothers' ratings of the same child correlated highly
It was also found that parents may be moderately as good predictors of the child's risk-taking behavior on dependent variables measuring risk-taking behavior used in this study. Fathers' ratings correlated ($r = .73$) with MC ($r = .50$) with PRTP, and ($r = .55$) with LP. Mothers' ratings were similar: ($r = .41$) with MC, ($r = .45$) with PRTP, and ($r = .85$) with LP. From the above analysis, it appears that parental ratings are more in line with PRTP and LP rather than with MC, which suggested that it is the direct measure of the actual risk-taking behavior. If one agrees that parents are experts and most knowledgeable about their child's behavior, then these study results are not strongly in support of the above statement.

Another concern of this study was the assumption based on professional intuition of physical educators (Herkowitz, 1977; Riley, Barrett & Martinek, 1980; Gallahue, 1982; Heston, Masla & Gallahue, 1982; Philipp, 1986) that physical education and motor activities can encourage and "contribute" to healthy risk taking in children. Based on the results of this study, one can say that this intuition is correct. Children who demonstrated higher scores on the Bruininks-Oseretsky Test of Motor Proficiency scored significantly higher on PRTP, LP, and MC as employed in this study.

Since this study involved nonrandom selection of subjects, one cannot generalize the finding to other groups. Random selection of subjects would have created a serious problem in obtaining subjects for this study. However, if one assumes the "stickiness principle" (Campbell & Stanley, 1963), this study does have some merit in generalization.
Recommendations

It was demonstrated in this study that children’s actual risk-taking perception is very complex and cannot be measured simply to answer all hypotheses and assumptions discussed in this study. There are many interacting variables and dimensions to risk taking, and many are outside the control of the investigator as is apparent in many social sciences. This complexity of interaction as discussed in this study was reflected in the data analysis wherein a pattern of uniformity was not consistently present. However, this is the first time such behavior is dealt with with young children in this fashion. This is of interest since it provides a starting point for insight into the process, methodology, and initial answers to many of the questions posed. Findings, however, did answer some questions derived from research hypotheses.

Beyond improving methods of approaching this topic of study, basic assumptions were answered, i.e., all measures of PRTP, LP, MC, FR, and MR correlate significantly at different levels and may be measuring the same behavior of interest. Had random selection of subjects been used as well as large numbers, it is possible that correlations would have been higher, as well as independent variables used in this study could have greater contribution to the explanation of the variance in MC (Table 25).

Based on the investigation of risk-taking behavior from literature, contact with other investigators, and results of this study, the following recommendations are submitted:
1. Although all assessments used in this study are found to be correlated at different degrees despite limitations (nonrandomized groups, small number per age group, nondistinctive age group, and possible children's limited information processing and level of cognitive development), one can still propose to use some of the instruments to measure risk-taking behavior as defined in this study, subsequent to instrument refinement.

2. Refinement of the instrument may include the following:
   A. Add items to PRTP from 10 pairs to a maximum 18 pairs, which should include more tasks from the children's play repertoire as well should be content validated.
   B. Select subjects randomly.
   C. Have a large group of subjects in each sex and age category (i.e., 50 or more subjects in each group).

3. Data may be analyzed differently. For example, reliability measure should be done item by item instead of using the average score as used in the study. Also, item analysis for internal consistency could be used to increase internal validity.

4. Because of nonrandomized selection of subjects, one cannot generalize the findings to other groups.

5. Among the methods of assessment used in this study, MC was believed to be the more accurate measure of risk-taking behavior because of the direct measurement of the behavior. However, LP was found to be significantly correlated with MC and less with PRTP. With refinement of the PRTP, higher correlations might be obtained. Hence the PRTP could be used for this type of research to project
the child's risk-taking behavior. This assumption is held only when all other interacting variables are held constant.

6. This study could be duplicated in the same manner/procedure to see if consistent results would be achieved. To this end, detailed procedures for implementation of this research were described in Chapter III.

7. A theory or modification of an existing theory which could empirically define and describe children's risk-taking behavior should be devised, taking into account the nature of children's development. Such a theory may test the construct validity of the PRTP or proposed similar instrument.

8. Risk-taking behavior may be measured in a unique way using sophisticated computer analysis. Fear, courage, and confidence could all be measured physiologically using evoked potential, as discussed in the literature review. Brain wave pattern responses while looking at the same tasks and items in the PRTP projected on a slide for a few seconds could be used. The subjects' physiological reaction to the tasks in the pictures could then be analyzed to see if they do form a distinctive brain wave pattern which corresponds to degrees of risk taking. Scores on the PRTP can also be compared with evoked potential scores to see if they correlate.

9. The PRTP may be used for ages 4, 5, and 6 because it was observed that 3-year-olds may be less consistent in their perception of risk-taking behavior. As a group, 3-year-olds also have the most difficulty realistically reporting their feelings or preferences for
the illustrated activity. Three-year-olds also tended to prematurely withdraw from the study, and respond less.

10. This research should provide a basic methodology and impetus for researchers performing similar studies. Various approaches to this topic by different investigators will expand the knowledge and provide insight into children's risk-taking behavior.

11. Based on the findings of this study, children who score high on the Bruininks-Oseretsky Test of Motor Proficiency usually score higher on the PRTP, LP, and MC. This indicates that systematic provision of experience for motor development and physical education for young children is essential in contributing to their risk-taking behavior. Risk-taking behavior, as discussed by other investigators (Krzesni, 1973; Abroms, 1982), appears to contribute to the child's academic success in school. Particularly with the young child, if he/she demonstrates courage and confidence in movement, the child is more likely to feel good about play, school work, and class participation. Results from this study could provide evidence to school administrators to justify physical education programming or strengthen the program for young children. Similarly, these results might encourage parents to enroll their children in stimulating continuance of physical activities in community settings at an early age.

12. Since this research dealt with behavior which had already occurred in the past, no reporting of independent variables in terms of effects of experimental intervention were described. Only their possible association/contribution to the variance on assessment
method was delineated. No attempt was made to define all other extraneous variables which are believed to effect risk-taking behavior, such as genetics, home environment, social strata, and others. This study related only to the variables described therein. Additional variables were mentioned in the literature review. Therefore, such variables as were described above need to be delineated in future studies on children's risk-taking behavior and physical activities. Longitudinal study of the effect of the environment and early training's influence on risk-taking behavior are recommended.

The use of Tukey post hoc analysis also may provide more discriminative results between group means. Since the Scheffé post hoc analysis which was used in this study is more conservative, some differences did not clearly emerge.

This chapter summarized the main results of this study, especially those related to the development of the PRTP and assessing its criterion validity via comparison with other assessment methods, i.e., LP, MC, FR, and MR. All variables which may have effected scores on the assessment methods, i.e., sex, age, motoric skill level, and birth order, were statistically analyzed in determining their rate of contribution to variance in the dependent variables.

The process of PRTP development as a useful instrument was detailed to allow other investigators to replicate the study or improve methodology. It was recommended that the PRTP be refined and its validity and reliability be strengthened via testing on large numbers of randomly selected subjects. Study limitations and
recommendations for further studies on this topic were described. The value and importance of stimulating further research with different approaches to broaden the knowledge base was stressed. Paramount was the investigator's attainment of his objective of developing a research strategy, answering the questions posed, and contributing to the understanding of children.
APPENDIX A

APPARATUS DESCRIPTION
PHYSICAL DESCRIPTION OF GYMNASIUM APPARATUS USED FOR 
THE PRTP PHOTOGRAPHS, THE LP, AND THE MC

1. Horizontal ladder--Constructed of wood 13'9" long and 19" wide. Rungs are round with 1" spacing between each rung. The top part of the ladder is supported by the wall and is approximately 8' from the floor (Figure 1).

![Figure 1](image1)

2. Vertical ladder--Constructed of wood and stands vertically attached permanently to the wall. This ladder could slide and be adjusted for varied distances from the wall. For this study it is fixed to the wall and be standing at a 90° angle from the floor. The height is 14', and 14" wide. There is 11' between each round rung.

![Figure 2](image2)
3. Balance beam--The balance beam is a metal trestle apparatus which could be constructed to form different configurations, including the balance beam. The balance beam used for this study is 47" high, 3" wide, and 13'4" long.

![Figure 3](image)

4. Steps--The steps are portable wooden construction, painted yellow. The steps apparatus has three equally graded steps with measurements. The base is 57" long and 20" wide. The height of the lower step is 14", the middle step is 28", and the higher step is 32" respectively (Figure 4).

![Figure 4](image)

5. Slide--The slide is a flat wooden construction covered with heavy shellac, with S-shaped attachment at one edge so it can be easily, securely attached to the gymnastic box. The length of the slide is 6' and 17" wide. It was attached to the edge of a vaulting box 4' high from the ground (Figure 5).
6. Platform--A wooden vaulting gymnastic box with three sections attached used for the jumping platform. The height of the vaulting box is 4', and the top plank's width is 14". The vaulting box is used for jumping down and landing on the floor.

7. Ball--A playground, coated foam nerfball colored bright yellow and $8\frac{1}{2}''$ in diameter.

8. Incline board--Uses a wooden vertical balance bench 10' long and 1' wide. One edge of the bench is secured to a wall with 4'4" height from floor, while the other edge was touching the floor.
APPENDIX B

THE OHIO STATE UNIVERSITY, CHILD CARE PILOT PROGRAM
RESEARCH PROJECT DESCRIPTION
THE OHIO STATE UNIVERSITY
CHILD CARE PILOT PROGRAM

RESEARCH PROJECT DESCRIPTION

Date of Research: Winter quarter 1985, M-F, 9:30-11:00 A.M. (flexible)
Name of Researcher: Hezkiah Aharoni/ home 252-5666, OSU 422-9572
Name of Advisor: Seymour Kleinman, Ph.D.
Department: Health, Physical Education, & Recreation

Description of Research Project:

Procedure: Experiment ___________ Test ___________
Observe X ___________ Use records ___________
Contact parents ___________ Teacher ratings ___________

Description of Children's Involvement: Children (aged 3-6) will be individually shown 8 pairs of photographs of various gymnasium and playground activities, and asked to indicate which of the activities depicted they would most like to do if given the opportunity. Time of experiment will last 8 to 15 minutes, and will be carried out next to the child's room.

Description of Parent's Involvement: None

Description of Teacher's Involvement: None

Purpose: To learn whether children's physical/motor risk-taking behavior could be determined through pictures. This information could be used by parents and educators to help the child acquire motor skill with ease and confidence.

Signature of Advisor

Signature of Director
Child Care Pilot Prog
APPENDIX C

THE OHIO STATE UNIVERSITY, CHILD CARE PILOT PROGRAM

PARENTAL PERMISSION FOR RESEARCH PARTICIPATION
THE OHIO STATE UNIVERSITY
CHILD CARE PILOT PROGRAM

PARENTAL PERMISSION FOR RESEARCH PARTICIPATION

I give my permission for my child __________________________ (NAME)
to participate in the research project described below. This project
has been approved by the Child Care Pilot Program staff.

Signed: __________________________

Date of Research: Winter Quarter 1985, M-F, 9:30-11:00 A.M. (flexible)
Name of Researcher: Hozkiah Aharoni
Name of Advisor: Seymour Kleinman, Ph.D.
Department: Health, Physical Education, & Recreation

Description of Research Project:

Procedure: Experiment _____________ Test _____________
Observe x _____________ Use records _____________
Contact parents ______ Teacher ratings ______

Description of Children's Involvement: Children will be shown 8
pairs of photographs of various gymnasium and playground activities,
and asked to indicate which of the activities depicted they would
most like to do if given the opportunity. Time of experiment will
last 8 to 15 minutes.

Description of Parent's Involvement: None

Description of Teacher's Involvement: None

Purpose: To learn whether children's physical/motor risk-taking
behavior could be determined through pictures. This information
could be used by parents and educators to help the child acquire
motor skill with ease and confidence.

Please return by 1/23/85 __________________________

Thank you.
APPENDIX D

REVIEW OF RESEARCH DEVELOPMENT, OR RELATED ACTIVITIES INVOLVING HUMAN SUBJECTS--SUMMARY SHEET
When submitting a proposal to the Behavioral and Social Sciences Human Subject Review Committee, we would appreciate your supplying the following information in summary form. Having the details prior to reading and reviewing the protocol can expedite the process. Please be as specific as possible so that the reader can have a rather complete and accurate idea of exactly what your subjects will experience when they participate in your research, as well as know the protections that have been included to safeguard the subject against adverse consequences (e.g., are they free to not participate if they choose, do they or their parents know exactly what they are getting into before they are committed to participate, will both their participation and any collected data be completely confidential).

1. In a sentence or two, briefly describe why the proposed project is of interest. The intent of this question is to give the reviewer a brief idea of the background and purpose of the research.

   Currently no assessment tool exists to reliably measure risk-taking behavior in young children. Parents and educators are interested in such a tool which can provide understanding of children's motor behavior, and help in planning activities, developing confidence and courage in children, and increase efficiency of motor skill acquisition.

2. Briefly describe each of the different conditions or manipulations to be included within the study.

   1. Children's perception responding to pictures of various motor tasks.
   2. Children's perception responding to live presentations of those same tasks.
   3. Children's performance of tasks in #1 and #2 above.

3. What is the nature of the measures or observations that will be taken in the study?

   Children's perceptions of various degrees of motoric risk will be assessed using pictures, live tasks, and actual performance of the same tasks. Their behavior (responses) will be collected and analyzed according to age, sex, and ability level.

4. If any questionnaires, tests, or other instruments are to be used, please provide a brief description and either include a copy or indicate approximately when a copy will be submitted to the committee for review.

   Yes. See attached description of tests and parent questionnaire.
5. Will the subjects encounter the possibility of either psychological, social, physical or legal risk? [ ] Yes [ ] No If so, please describe. The main thrust of the study is to learn about the child's response to physical (i.e., climbing a ladder, walking the balance beam, jumping off a 4'-high platform, etc.) and psychological risk (i.e., does the child show confidence, courage, or fear perceiving or performing the activity?). All tasks used are within range of safety and are familiar to the children. Child has the option of not performing when s/he feels s/he cannot perform safely or easily.

6. Will any stress be involved in the study? [ ] Yes [ ] No If so, please describe. Child will be faced with choice to perform or not perform certain tasks which carry varying degrees of psychological or physical risk. This kind of stress is normally encountered by children in their daily play activities in the gymnasium and on the playground.

7. Will the subjects be deceived or misled in any way? [ ] Yes [ ] No If so, please describe and include a statement regarding the nature of the debriefing.

8. Will there be any probing for information which an individual might consider to be personal or sensitive? [ ] Yes [ ] No If so, please describe.

9. Will the subjects be presented with materials which they might consider to be offensive, threatening or degrading? [ ] Yes [ ] No If so, please describe.

10. Approximately how much time will be demanded of each subject?

75 to 90 minutes, and will be divided into two or more sessions, depending on the child.

11. Who will be the subjects in this study? How will the subjects for this study be solicited or contacted?

Boys and girls, aged 3 to 6 years, will be solicited from central Ohio community day care centers, including the OSU Child Care and Home Economics programs. Children will be solicited by posting flyers, personal letters to parents and educators.

12. What steps will be taken to insure that the subject's participation is voluntary? What, if any, inducements will be offered to the subjects for their participation?

No subject will be forced to participate, can withdraw at any time. Parents can withdraw their children also at any time. Subjects will receive colorful stickers after each session. All participants will receive a coupon for a free meal at one of the local restaurants.

HS-008C
13. It is important that a subject be informed regarding the general nature of what he will experience when he participates in a study, including particularly a description of anything he might consider to be either unpleasant or a risk. Please provide a statement regarding the nature of the information which will be provided to the subject prior to his volunteering to participate.

Written information will be provided to subjects' parents regarding nature of the study, and information in questions 2, 3, 5, and 6. In addition, each subject will be told s/he is free to select the tasks s/he feels confidence in performing, and may stop at any time or ask for help if needed.

14. What steps have been taken to insure that the subjects give their consent prior to participating? Will a written consent form be used? □ Yes □ No If so, please include the form and if not, please indicate why not.

Sample of consent form is included.

15. Will any aspect of the data be made a part of any permanent record that can be identified with the subject? □ Yes □ No

Children's actual performance of the various motor tasks will be videotaped. Data will be used only for this study, without indicating subject's identity.

16. Will whether or not a subject participated in a specific experiment or study be made a part of any permanent record available to a supervisor, teacher or employer? □ Yes □ No Only to parents if they wish.

17. What steps will be taken to insure the confidentiality of the data?

No mention or reference to individuals will be used. A reference will be made in the study as to the group. All videotapes will be erased after their use in the study.

18. If there are any risks involved in the study, are there any offsetting benefits that might accrue to either the subject or society?

As mentioned previously (questions 5 and 6), the nature of this study is to measure overt motor or psychological risk observed during viewing pictures, live preference, and actual performance of the tasks. This risk is within safe and acceptable levels of children's normal play repertoire. Benefits from such a study are recognized by parents and professionals.

19. Will any data from files or archival data be used? □ Yes □ No
RESEARCH PROTOCOL:

85B007I ASSESSMENT OF CHILDREN'S RISK-TAKING BEHAVIOR AS REFLECTED IN MOTOR ACTIVITY, Seymour Kleinman, Hezkiya Aharoni, Health, Physical Education and Recreation

presented for review by the Behavioral and Social Sciences Review Committee to ensure proper protection of the rights and welfare of the individuals involved with consideration of the methods used to obtain informed consent and the justification of risks in terms of potential benefits to be gained, the Committee action was:

_____ APPROVED  DEFERRED*
X APPROVED WITH CONDITIONS* _____ DISAPPROVED

_____ NO REVIEW: NECESSARY

*CONDITIONS/COMMENTS:

Subjects were deemed AT MINIMAL RISK and protocol was unanimously APPROVED WITH THE FOLLOWING CONDITIONS:

1. Inform the Committee as to what safety precautions have been made to minimize the possibility of injury.

2. Provide a copy of the assent script for the children written on their level of understanding and stressing the participation is voluntary.

3. In the letter to the parents, Page 2, first line, change to "We hope you share our interest in this study".

4. Investigator Aharoni's signature is required on the Summary Sheet.

If you agree to the above conditions, please sign this form in the space provided below and return with any additional information requested to Room 205, Ohio State University Research Center, 1314 Kinnear Road, Columbus, Ohio 43212, within one week. Upon such compliance, the approval form will be mailed to you. (In case of a deferred protocol, please submit the requested information at your earliest convenience. The next meeting of the Committee will be two weeks from the meeting date indicated above.)

DATE 5/10/1985  Signature(s)  

(Principal Investigators)

178
Research Involving Human Subjects

ACTION OF THE REVIEW COMMITTEE

With regard to the employment of human subjects in the proposed research protocol:

85B0071 ASSESSMENT OF CHILDREN'S RISK-TAKING BEHAVIOR AS REFLECTED IN MOTOR ACTIVITY, Seymour Kleinman, Hezkiah Aharoni, Health, Physical Education and Recreation

THE BEHAVIORAL AND SOCIAL SCIENCES REVIEW COMMITTEE HAS TAKEN THE FOLLOWING ACTION:

APPROVED

X APPROVED WITH CONDITIONS*

DISAPPROVED

WAIVER OF WRITTEN CONSENT GRANTED

* Conditions stated by the Committee have been met by the investigator and, therefore, the protocol is approved.

It is the responsibility of the principal investigator to retain a copy of each signed consent form for at least four (4) years beyond the termination of the subject's participation in the proposed activity. Should the principal investigator leave the University, signed consent forms are to be transferred to the Human Subject Review Committee for the required retention period. This application has been approved for the period of one year. You are reminded that you must promptly report any problems to the Review Committee, and that no procedural changes may be made without prior review and approval. You are also reminded that the identity of the research participants must be kept confidential.

Date May 10, 1985

Signed

HS-025B (Rev. 3/85)
CONSENT TO INVESTIGATIONAL TREATMENT OR PROCEDURE

1. I, ______________________________________, hereby authorize or direct Seymour Kleinman, or associates or assistants of his or her choosing, to perform the following treatment or procedure (describe in general terms): responding to pictures of motor tasks; responding to live presentation of same tasks; performing motor tasks on gymnasium apparatus; assessment of children's motor ability.

The experimental (research) portion of the treatment or procedure is: responding to pictures, live presentations of, and performance of motor tasks on gymnasium apparatus; assessment of children's general motor ability.

This is done as part of an investigation entitled: Assessment of Children's Risk-Taking Behavior as Reflected in Motor Activity.

1. Purpose of the procedure or treatment: To identify different levels of children's motor risk-taking and possible sex, age, and ability differences.

2. Possible appropriate alternative methods of treatment: not applicable.

3. Discomforts and risks reasonably to be expected: any risk that is normally encountered by children in physical education or in their daily play activities.

4. Possible benefits for subjects/society: to construct an assessment tool of children's motor risk for use by parents and educators; could be used for research on children's performance; child's results to be shared with own parent.

5. Anticipated duration of subject's participation: 75 to 90 minutes divided into 2 or more sessions—depending on the child.

I hereby acknowledge that H. Aharoni has provided information about the procedure described above, about my rights as a subject, and he/she answered all questions to my satisfaction. I understand that I may contact him/her should I have additional questions. He/She has explained the risks described above and I understand them; he/she has also offered to explain all possible risks or complications.

I understand that, where appropriate, the U.S. Food and Drug Administration may inspect records pertaining to this study. I understand further that records obtained during my participation in this study may be made available to the sponsor of this study and that the records will not contain my name or other personal identifiers. Beyond this, I understand that my participation will remain confidential.

I understand that I am free to withdraw my consent and participation in this project at any time after notifying the project director without prejudicing future care. No guarantee has been given to me concerning this treatment or procedure.

In the unlikely event of injury resulting from participation in this study, I understand that immediate medical treatment is available at University Hospital of The Ohio State University. I also understand that the costs of such treatment will be at my expense and that financial compensation is not available. Questions about this should be directed to the Human Subject Review Office at 422-5046.

I have read and fully understand the consent form. I sign it freely and voluntarily. A copy has been given to me.

Date: ___________________ Time AM/PM ___________ Signed __________________________________________________________________________

(Witness(s)) ___________ ___________ (Person Authorized to Consent for Subject - if Required) ___________

I certify that I have personally completed all blanks in this form and explained them to the subject or his/her representative before requesting the subject or his/her representative to sign it.

Signed: __________________________________________________________________________

(Signature of Project Director or Other Authorized Representative)

Form HS-028A (Rev. 12/83)
APPENDIX E

INSTRUCTIONS GIVEN TO THE SUBJECTS FOR THE PILOT VERSION OF PRTP
INSTRUCTIONS GIVEN TO THE SUBJECTS FOR
THE PILOT VERSION OF PRTP

For the PRTP--The investigator at random will present a series of 28 paired combinations of pictures taken from the total of eight pictures. The investigator will then read the following instructions.

I have 8 pictures to show you. All the pictures are of a boy/girl who is about your age. In the pictures you see him/her doing different activities in the gym like jumping, sliding, walking, climbing, and playing ball.

I am going to show you 2 pictures at a time. I want you to look at them carefully and tell me what you see. (After child describes each picture, the investigator then repeats the correct form: "Child is climbing up the ladder," "Child is walking on the balance beam," "Child is jumping over three steps to the floor," "Child is jumping off the box to the floor," "Child is playing ball," "Child is walking up the bleacher."

Tell me which of the 2 things on this picture (investigator shows picture X) or this picture (investigator shows picture Y) is the most scary for you to do.

The investigator continues showing the rest of the pairs randomly selected using the same procedure as above. The investigator checks off each picture the subject selected from the two possibilities—until all 28 pairs are identified. In case subject shows fatigue or is inattentive to task, the investigator will continue the testing 1 to 2 days later.
APPENDIX F

DATA COLLECTION FORM FOR THE PILOT VERSION PRTP
DATA COLLECTION FORM FOR THE PILOT VERSION PRTP

Subject's Name _______________________________ Sex __________________________

Date of Birth __________________________________________

Testing Date _______________________________ Time ________________________

Child's School __________________________________________

Instructions: Show the subject all photographs and ask him/her to tell you what he/she sees. Repeat to the child if correct or add your explanation and ask the child to repeat it. Then show the subject the pair of photographs randomly and ask, "Out of these two, which one is the most scary for you to do? Show me with your finger." Indicate the pair of pictures presented and the picture chosen by the subject, by writing in the pair and circling the choice. Also add any comments which might add insight into the child's preference (child's verbal expression and comments).

Pair                     Comments
1. 1 2
2. 1 3
3. 1 4
4. 1 5
5. 1 6
6. 1 7
7. 1 8
8. 2 3
9. 2 4
10. 2 5
11. 2 6

184
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<td>7 8</td>
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APPENDIX G

COVER LETTERS TO PARENTS/TEACHERS
Dear Parent/Teacher,

As part of my Ph.D. studies, I am conducting research on the Assessment of Children's Risk-Taking Behavior as reflected in Motor Activity. The purpose of the study is to learn about children's play/motor behavior in the gymnasium. Some of the interesting questions this research may answer are: Is there a reliable way to describe which child is considered higher or lower risk taker compared to other children of the same age and skill level? What, if any, age differences exist (between 3- to 6-year-olds), and differences between boys and girls?

Children participating in the study will be involved in 4 tasks:

1. Viewing Pictures: Pictures of motor activities such as jumping, climbing, walking the balance beam, playing ball, and sliding will be shown to the child, who will indicate which of the activities s/he is not afraid to execute, and wherein s/he feels confident to perform, if the opportunity were presented (8-10 minutes).

2. Live Preference: This task entails the same activities as in #1, but the apparatus will be physically present in the gymnasium, rather than the pictures. The child will be asked to tell which activities s/he can perform without being afraid (12-20 minutes).

3. Actual Preference: This task entails the activities identical to those in #2, which will be set up in the gymnasium, and the child will be asked to use/do each one, and the performance will be videotaped (approximately 25 minutes).

4. Motor Assessment: Each child will be given the Bruninks-Oseretsky Test of Motor Proficiency to determine motor ability (40 minutes).

5. Parental Questionnaire: This informal questionnaire will ask parents for information regarding the child's play behavior at home, and relevant information as to sibling order, date of birth, address, etc. (7-10 minutes).

The above research will take between 2 to 3 sessions, and will entail time and date flexibility. This study has been approved by The Ohio State University Human Subjects Committee, and will be closely and carefully supervised by Dr. Seymour Kleinman, Advisor and Professor in the Physical Education Department. The children's safety, health, and welfare will be paramount. Parents and children have the right to withdraw from the study at any time.
We hope you share our interest in this study. We are looking forward to hearing from you. Please feel free to call me or Dr. Seymour Kleinman if you have questions.

Thank you.

Sincerely,

Hezi Aharoni
Ph.D. Candidate/Investigator
April 28, 1986

Dear Parents,

We have been developing a tool to assess Risk-taking Behavior of children, age 3 to 6 years. We thank all of you who allowed your children's participation in the pilot study over a year ago. Currently more than 75 boys and girls from Central Ohio have taken part in the main study, which is still going on. We need approximately 25 additional children aged 5 and 6 years to complete the study.

We trust you will continue to support our study and allow your child to take part in it.

In addition to assisting us learn about children's needs, your child will be assessed in fine and gross motor skills, - important data which will be shared with you. Your child will enjoy the activities, and will receive a free coupon for an Uncle Alligator meal courtesy of Rax Restaurants.

Participation in the study takes two sessions totaling 60 minutes, which take place at Ohio State University mostly on Saturdays and Sundays.

If you have questions, please call me at OSU, 422-9572 or at home, 252-5666. Thanks again for your support.

Sincerely,

Hezi Aharoni
Ph.D.

Please check ( ) one of the options below and return this part to the Day Care Center.

_____ Yes, we want our child to participate in the study.

_____ No, we do not want our child to participate in the study.

Parent's Name ________________________________

Telephone Number ___________________________
APPENDIX H

FLYER
ATTENTION
PARENTS AND TEACHERS

Young children, girls and boys 3 to 6 years old needed for research study. Research goal is construction of an assessment tool to learn about children's play/motor behavior and how it could relate to children's perception and performance of motor activities (courage, confidence).

Research will take two to three sessions at the Ohio State University. Findings on each child will be shared with his or her parents. All children participating will receive a coupon for a free meal at a local restaurant.

For information please call Hezi Aharoni, Principal Investigator at OSU 422-9572, or 252-5666 or contact Dr. Kleinman, Faculty Advisor at 422-4311 or 422-6787.
APPENDIX I

INSTRUCTIONS GIVEN TO SUBJECTS FOR THE LP
INSTRUCTIONS GIVEN TO SUBJECTS FOR THE LP

All seven apparatus illustrated on the PRTP were set up in the gym in the following order: slide attached to gymnastic box, gymnastic box, ball, balance beam steps, ladder, and inclined board (bleacher). See attached gym diagram. The child was first given a "tour" of the gymnasium and all apparatus and tasks to be performed on them were described to the subject as follows:

"Today I am going to show you all the things you have seen in the pictures" (if the child had first been presented the PRTP) (or if the child is initially presented the LP, omit the underlined words and say, "... all these things to do in the gym like going down the slide, jumping off the gymnastic box, playing with the ball, walking the balance beam, jumping off the steps, climbing up the ladder, and walking up the bleacher." ) "I am going to take you around the gym and show you two things at a time. I want you to look carefully at them and tell me which one of the two you would like to do the most: this one [investigator shows first apparatus in presented pair] or that one [investigator shows a second apparatus of presented pair]."

Investigator continues in this fashion in order until all 10 pairs on the PRTP and LP recording form are explored.
APPENDIX J

PICTORIAL RISK-TAKING PREFERENCE--TESTING MANUAL,
DATA COLLECTION FOR THE PRTP AND LP
PICTORIAL RISK-TAKING PREFERENCE

BOYS

All Rights Reserved

1986
INSTRUCTIONS FOR THE PRTP

"I have 7 pictures to show you. In these pictures you will see a boy about your age doing different things in the gym, like: jumping, sliding, walking, climbing, and playing with the ball.

"First I am going to show you each picture and would like you to tell me what you see. [After child describes each picture, the investigator repeats the correct form, i.e., "The boy is jumping off the steps," "The boy is going down the slide," etc.]

"Now I am going to show you 2 pictures at a time. Out of these 2 pictures, which one would you like to do the most? This one [experimentor points to one of the pictures] or that one? [experimentor points to the other picture]." The above process will be repeated until all pairs of pictures have been presented to the subject.

"Which of the things in the two pictures would you like to do the most--___________ or __________?"
Pair 8
PICTORIAL RISK-TAKING PREFERENCE

GIRLS

All Rights Reserved

1986
INSTRUCTIONS FOR THE PRTP

"I have 7 pictures to show you. In these pictures you will see a girl about your age doing different things in the gym, like: jumping, sliding, walking, climbing, and playing with the ball.

"First I am going to show you each picture and would like you to tell me what you see. [After child describes each picture, the investigator repeats the correct form, i.e., "The girl is jumping off the steps," "The girl is going down the slide," etc.]

"Now I am going to show you 2 pictures at a time. Out of these 2 pictures, which one would you like to do the most? This one [experimenter points to one of the pictures] or that one? [experimenter points to the other picture]." The above process will be repeated until all pairs of pictures have been presented to the subject.

"Which of the things in the two pictures would you like to do the most--__________ or _________?"
APPENDIX K

PARENT QUESTIONNAIRE
Children's Risk-Taking Behavior as Reflected in Motor Activity

PARENT QUESTIONNAIRE

Please fill in the requested information on this questionnaire. Results will be used to better understand the outcome of the study. All the information you provide will be strictly confidential and no names will be mentioned in the study. Thank you.

I. Parents' Names

Mother: ____________________________  Father: ____________________________

Child's Name: ____________________________  Date of Birth: ____________________________  Sex: __________

Sibling's Name (1): ____________________________  Age: ____________________________  Sex: __________

Sibling's Name (2): ____________________________  Age: ____________________________  Sex: __________

Sibling's Name (3): ____________________________  Age: ____________________________  Sex: __________

Sibling's Name (4): ____________________________  Age: ____________________________  Sex: __________

II. Child's Previous Experience

Has your child participated in organized classes in movement, gymnasium, or in sport activities? Please place a check ( ) at the appropriate activity and give location, i.e., YMCA, OSU, day care center. If the activity is not listed, please fill in the spaces marked "other."

( ) Activity  Location

1. ( ) Swimming  Location ____________________________
2. ( ) Movement ed., dance, ballet  Location ____________________________
3. ( ) Gymnastics  Location ____________________________
4. ( ) Motor development  Location ____________________________
5. ( ) Other--please list  Location ____________________________
6. ( ) ____________________________  Location ____________________________
7. ( ) ____________________________  Location ____________________________
Please list sport and play activities your child does at home or outside such as swimming, playing ball, playground—i.e., bicycling, climbing trees, etc.

Home/outdoor activity

1. ____________________________________ 4. ____________________________________

2. ____________________________________ 5. ____________________________________

3. ____________________________________ 6. ____________________________________

Parental Ratings (Father and Mother). Please fill in the ratings separately for each parent. How do you rate your child’s play, motor and physical activities (such as jumping, swimming, sliding, etc.)? Please check ( ) the statement which best describes your opinion. Check the appropriate box as well to indicate who completed these items, mother ( ) or father ( ).

Mother Father

1. _____ _____ My child can do most motor and physical activities independently without fear of falling or getting hurt.

2. _____ _____ My child needs some help and sometimes s/he shows some fear of heights when jumping off a high platform, climbing a high ladder, or sliding down a long slide.

3. _____ _____ My child shows fear of most motor and physical activities, is afraid to jump, climb, slide, and is afraid of getting hurt.

Risk-taking (Father and Mother). Please fill in the ratings separately for each parent. How will you rate your child in regard to motor and physical activities? Please check ( ) mother or father space to indicate whose opinion is noted, and also check ( ) the item you feel most accurately describes your child.

Mother Father

1. _____ _____ S/he is a high risk-taker.

2. _____ _____ S/he is a medium risk-taker.

3. _____ _____ S/he is a low risk-taker.

Thank you for your help.
APPENDIX L

JUDGES' TRAINING
JUDGES TRAINING OUTLINE

1. Select 3 judges and the investigator: Ph.D. students in Physical Education.

2. Explain to the judges the general purpose of the evaluation.

3. Familiarize the judges with the tasks in the gym. Show the apparatus and explain the tasks to be performed to the judges (use handouts).

4. Take one videotape involving a subject's performance, view it with the judges, and analyze it together (show what things to look for). Provide handout.

5. Explain the scoring system and definition of the behavior to be observed.

6. Let all judges evaluate a sample of one subject's videotaped session, and strive for high inter-observer agreement (90% and above).

7. After obtaining high inter-judge agreement, request all judges to meet regularly to observe each videotaped session, to evaluate it--each judge independently.

8. Periodically review the scoring procedure in order to avoid observer drift.

9. When a problem of a new observed behavior arises which was not described or defined before the observation, assess the behavior, and determine into which category to place this behavior.
INSTRUCTIONS GIVEN TO THE SUBJECT FOR THE MC

1. Today I am going to ask you to use the things yourselves in the gym like going down the slide, jumping to the ground, playing with the ball, walking the balance beam, climbing the ladder, and walking the incline board. You do not have to do any of the things if you are afraid or scared to do them.

2. You may ask me for help if you are afraid and you may stop at any time if you feel you can't do it.

3. If you are scared or afraid jumping to the floor you may ask me to put a gym mat, so you can jump and land on it. (Tell the child after he/she stands on the gymnastic box)

4. Try to climb all the way up the ladder, or as far as you can, and then get down.

5. Try to climb all the way up the incline board, and you may get down any way you want.

6. I want you to stand in front of and be ready; don't start until I tell you.
GENERAL THINGS TO LOOK AT WHEN OBSERVING
THE CHILDREN PERFORMING THE TASKS

1. Observe subject's behavior before, during, and after task performance.

2. Does the child refuse to do the task?

3. Note facial expression (smile, cry, scared, etc.).

4. Listen to verbal expression ("I can't do it," "I'm scared," "It's easy," etc.).

5. Note if subject asks investigator for help (to hold hands, help in climbing, etc.).

6. Note if the subject requested a gym mat to be placed in landing area (during jump off the gymnastic box and the steps).

7. Note if subject rushes to do the task (get it over with) or slows down movements (because of possible nonconfidence) (in order to lessen the impact of getting hurt).

8. Note if subjects completed their tasks (climbing all the way up on the ladder to the last rung and coming down, walking the incline board [bleacher] all the way up, completing the walk on the balance beam).

9. Note if the child started the task immediately after being given the signal by the investigator or demonstrated hesitance, asked questions, etc.

10. Note changes in body position approaching the task and finishing it.
SPECIFIC THINGS TO LOOK FOR AT EACH APPARATUS

1. Slide. Does the child slide down straight or slow down movement by holding hands on side of slide? Does child sit and slide or slide on stomach?

Score C: When child independently slides down smoothly with no apparent fear.

Score M: Slides but shows fear by verbal or facial expression. Uses hands to hold the side of the slide initially in order to slow the movement and reduce impact of getting hurt. When child is helped by holding instructor's hands.

Score N: Refusal, only initial attempt to slide followed by retreat.

2. Gymnastic Box. Does the child stand up straight, ready to jump, or crouching slightly down? Is the child looking at the task or the instructor? Is child requesting a floor mat to be placed in landing area? Does child jump right away or wait for a long time?

Score C: When child smoothly and independently performs the jump with no apparent fear expressed facially, physically, or verbally.

Score M: When child performs the jump but shows fear, crouched too much before jumping or bends knees significantly to lower body to the ground. Uses mat for landing or when assisted by instructor, such as holding hands.

Score N: When child refuses to do the task. Initially stands on top of the box, but does not jump.

3. Ball.

- Score C: When child lifts the ball and plays with it in any form.

- Score M: When child lifts the ball, kicks it, etc., but indicates dislike for the ball, or verbally states fear of getting hit by the ball.

- Score N: When child refuses to touch the ball, or to initiate any type of play with the ball.
4. Balance Beam. Does child walk the beam or crawl on it? Does child walk beam independently or with instructor assistance? Does child walk the entire length? Does the child walk it forward or sideways?

Score C: Child walks the beam smoothly and independently, including when the child fails to walk all the length and makes it after additional attempts. Walks more than half the length smoothly and independently. Shows no apparent fear.

Score M: When child is assisted by the instructor holding hands, walking more than half of its length.

Score N: When child refuses to walk the beam. Crawls on stomach instead of walking. When child is assisted but walks only half of the beam or less.

5. Steps. Which steps does child select to jump from--top, middle, or bottom--or does child refuse to jump any of them?

Score C: Child jumps smoothly and independently from the top step forward to the floor without use of floor mats, and shows no apparent fear.

Score M: Child jumps smoothly and independently from the middle step forward to the floor, using floor mat. Child jumps from the top step with assistance, or using floor mat. Child jumps from the top step, but with significant crouching or showing apparent fear.

Score N: Child jumps from the lowest step, or refuses to jump, and makes no effort to try. Child jumps from middle step with instructor assistance, or with floor mat.

6. Ladder. Does child climb all the way up to the last rung? Does child get back down? Does child look up or at his/her feet? Does child hug his/her chest to the ladder or is his/her chest free of the ladder?

Score C: When child climbs the ladder all the way to the top smoothly and independently without apparent fear, and reaches the designated bar on the wall above the ladder, and goes back down in the same fashion.

Score M: When the child climbs up smoothly and independently and passes the 7th (middle) rung with his/her feet, but does not reach the top bar, and returns down in the same fashion. When the child climbs all the way up and then back down independently, but shows apparent fear, such as verbally expressing fear, stopping very often, and slowing the climbing
movement, climbing or getting down with body dragging or closely supported on the ladder.

Score N: When the child climbs smoothly and independently but does not touch the 7th rung with his/her feet. When the child refuses to do it, or starts initially, but retreats.

7. Incline Board (Bleacher). Does child walk it without hand support, with straight body, or does child crawl, using hands and legs? Does he/she drag or pull his/her body up, lying on his/her stomach? Does child reach all the way up? Does child get down, walking or sliding, on back or stomach? Does child get off looking forward or backward?

Score C: When child walks it all the way up (touching the designated bar above it) independently then walks or slides down it in any fashion.

Score M: When child walks up it independently, past the halfway point of the incline board, but does not reach the top touching the designated bar. When the child walks all the way up with experimenter's assistance.

Score N: When child refuses to do the task. Initially starts and then retreats. Child does not pass the halfway mark and then returns down.
JUDGE'S MOVEMENT CONFIDENCE RECORDING FORM

Judge's Name ___________________________ Date ___________________________

Subject's Name ___________________________ First Initial of Last Name ______

Subject's Sex ___________________________ Age ___________________________

Please view the videotape of the subject and, based on your own evaluation, rate the subject's movement confidence using the following categories:

1. Child is scored as having Confidence when subject displays no apparent fear (emotional, verbal, facial, or physical), shows courage and confidence in performing the task and completing it smoothly.

2. Child is scored as having Mixed Confidence when subject shows both signs of confidence as well as some nonconfidence, such as performing only part of the task, or completing the task but showing some verbal and physical indications of fear and nonconfidence, such as a change in body position.

3. Child is scored as having Nonconfidence when child does not make any attempt to do the task, refuses, or when he/she makes an initial attempt to perform the task, and then retreats.

Please circle appropriate letter: C for confidence, M for mixed confidence, and N for nonconfidence. Also add any remarks you wish to support your opinion, or questions you may have.

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<tr>
<th>Apparatus</th>
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<td>2. Jumping Platform</td>
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<td>7. Incline Board</td>
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Total Score MC __________

*Scores are transposed to numbers: 2 points for C, 1 point for M, and 0 points for N.
APPENDIX M

DATA COLLECTION SHEET FOR THE PRTP AND LP
DATA COLLECTION SHEET FOR THE PRTP AND LP

Subject's Name ____________________________ Subject # _____ Sex _____

Date of Birth _______________________________________________________________________

Testing Date __________________________________________ Time ______

Child's School _______________________________________________________________________

Circle the task the subject selected in the presented pair.

Scoring: Give 1 point if subject selected the most risky of the pair and 0 for choosing the least risky.

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<td>10. Incline Board--Ball</td>
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Total for Risk-Taking Index _______
APPENDIX N

FOLLOW-UP THANK YOU LETTER
Dear Parents and Children,

Thank you for participating in the research project "Assessment of Children's Risk-Taking Behavior as Reflected in Motor Activity."

Working with the children was the most rewarding and enjoyable part of the study. The insight gained into their world was a wealth of learning. The skills and creativity demonstrated by the children was entrancing and impressive.

Without exception, every child showed some degrees of strength and courage in performing and responding to the activities in his/her unique way. The combined results of this study speak well of your parenting.

Comments are provided to share with you the major results of the study based on observation and assessment of your child. Please understand that comments are based on the limited contact with your child.

Major findings of interest to you based on this study include:

1. Parents like you are good predictors of their child's risk-taking behavior.

2. Tests using pictures of motor activities of varied levels of risk may be used to assess risk-taking behavior, but additional research and refinement are needed to strengthen validity.

3. Physical activities do contribute to higher levels of risk-taking behavior. This implies it is beneficial to encourage your child to participate in physical activities regularly, to enroll the child in good motor development programs, and to determine whether your child receives systematically planned physical education at school or the child care center.

Should you wish to discuss your child's results, please feel free to call me at home, (614) 252-5666.
Thank you and your child again for participating in the study.

Sincerely yours,

Hezkiah Aharoni, Ph.D. candidate
Dr. Seymour Kleinman, faculty advisor

Note: If you wish to read the study, you may find it at the Ohio State University library under the name and title as follows:

APPENDIX 0

SUMMARY FOR DATA COLLECTION
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APPENDIX P

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240


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