

PROBLEM-SOLVING ABILITY
IN CLINICAL SAMPLES OF
AGGRESSIVE AND NONAGGRESSIVE
BOYS

by

© David W. Cox 1986

A Thesis Submitted to the Department of Psychology
in Partial Fulfillment of the Requirements
for the Degree of
Master of Science.

Saint Mary's University
Halifax, Nova Scotia, Canada

Approval:

Kenneth A. Hill

Faculty Advisor

Approval:

Robert James Kinpas

Thesis Committee Member

Approval:

John Swaine

Thesis Committee Member

Date:

January 29, 1986

Permission has been granted to the National Library of Canada to microfilm this thesis and to lend or sell copies of the film.

The author (copyright owner) has reserved other publication rights, and neither the thesis nor extensive extracts from it may be printed or otherwise reproduced without his/her written permission.

L'autorisation a été accordée à la Bibliothèque nationale du Canada de microfilmer cette thèse et de prêter ou de vendre des exemplaires du film.

L'auteur (titulaire du droit d'auteur) se réserve les autres droits de publication; ni la thèse ni de longs extraits de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation écrite.

ISBN 0-315-31050-2

ABSTRACTProblem-Solving Ability in Clinical Samples
of Aggressive and Nonaggressive Boys

David W. Cox

April 18, 1986

The principal objective of this study was to examine the hypothesis that maladaptively aggressive elementary-school-age boys would show specific deficits in cognitive problem-solving ability.

A pilot study using the Purdue Elementary Problem-Solving Inventory (PEPSI) was first conducted with 123 Grade 2 to Grade 6 children in two schools which differed in the probable socioeconomic status (SES) of their pupils. Scores also tended to be greater in the higher SES school, although the effect of SES was inconsistent and accounted for a small proportion of the variance in scores.

The PEPSI was then administered to 12 clinically identified aggressive boys, a second clinical sample of 12 boys whose behavior problems were judged not to be aggressive in nature, and 12 controls from the classrooms of the clinical subjects. Subjects were also given a self-report behavioral rating measure. Teacher ratings were obtained using a standardized behavior checklist. A peer-nomination sociometric procedure was carried out in the

classrooms (Grades 3 to 6) of all subjects.

No significant differences in PEPSI scores were found among the subject groups. Thus the results did not support the hypothesis of problem-solving deficits in aggressive boys. The clinical aggressive boys obtained significantly higher aggressiveness scores than the controls on the self-report measure. This replicates findings from other studies which have demonstrated a preference for aggressive problem solutions in aggressive boys. Teacher-rated aggressiveness was also higher for aggressive boys relative to controls. Only the aggression scores on the sociometric measure discriminated between the clinical aggressive and clinical nonaggressive groups. The pattern of results from this research did not change appreciably when subjects were regrouped according to peer- and teacher-rated aggressiveness.

The implications of the findings for further research and clinical interventions are discussed.

iv

ACKNOWLEDGEMENTS

This thesis owes its completion to the contributions of an especially large number of people.

First, I would like to express my appreciation to my Thesis Supervisor, Dr. Kenneth Hill, and to Thesis Advisory Committee members Dr. Robert Konopasky and Dr. John Swaine, for their advice and support. I also wish to thank Drs. Peter Dodd and William Hayes for their help with research design and data analysis. Further thanks are extended to Dr. William Roberts, who served as External Evaluator.

I wish to thank the Halifax County and Bedford District School Board, and the Halifax District School Board, for permission to conduct this study. I am particularly indebted to the Special Education and Services staff members of both School Boards for their assistance in locating subjects for this research. My thanks also to the principals, teachers, pupils, and parents who were involved in the collection of data.

I am very grateful to Dr. Gerald Gordon, Mr. Wayne Hollett, and the Board of the Atlantic Child Guidance Centre, both for permission to conduct this research with some of the Centre's clients, and for so readily allowing the accommodations in my work responsibilities which were necessary for its completion. Thanks are due also to my friends and colleagues at ACGC for referring potential subjects from their caseloads, acting as consultants and raters, and especially for their constant encouragement and interest.

Madelyn Bruhm deserves special credit, not only for typing the thesis, but for masterminding the preparation and assembly of research materials throughout this project.

Finally, I wish to express my appreciation to my wife, Lynn Johnston, M.D., for her support and patience during a protracted period of part-time study.

v.

TABLE OF CONTENTS

| | <u>Page</u> |
|--|-------------|
| Abstract..... | ii |
| Acknowledgements..... | iv |
| List of Tables..... | viii |
| List of Figures..... | ix |
| INTRODUCTION..... | 1 |
| A Problem-Solving View of Human Adjustment..... | 1 |
| Aggression and Cognition..... | 2 |
| REVIEW OF THE LITERATURE..... | 13 |
| Definitions..... | 13 |
| The Nature of Problem Solving..... | 14 |
| Component Problem-Solving Abilities: Verbal Mediation..... | 21 |
| Component Problem-Solving Abilities: Interpersonal Cognitive Problem-Solving (CPS) Abilities..... | 30 |
| Social and Nonsocial Problem Solving..... | 37 |
| Problem-Solving Ability in Middle Childhood..... | 46 |
| Problem-Solving Ability and Behavioral Adjustment..... | 50 |
| The Process of Problem Solving..... | 67 |
| Measurement of Problem-Solving Ability..... | 80 |
| The Purdue Elementary Problem-Solving Inventory..... | 82 |
| Summary of Literature Review and Research Problem..... | 89 |
| HYPOTHESES..... | 97 |
| PILOT STUDY..... | 100 |
| INTRODUCTION..... | 100 |
| METHOD..... | 100 |
| Subjects..... | 100 |
| Procedure..... | 102 |
| RESULTS..... | 104 |
| Total Scores..... | 104 |
| Presolution Scores..... | 106 |
| DISCUSSION..... | 107 |
| PRINCIPAL STUDY..... | 108 |
| METHOD..... | 108 |
| Subjects..... | 108 |
| Equipment and Materials..... | 116 |
| Procedure..... | 121 |

TABLE OF CONTENTS (continued)

| | |
|---|-----|
| RESULTS..... | 126 |
| Overview of the Results Section..... | 126 |
| Subject Characteristics..... | 128 |
| Purdue Elementary Problem-Solving Inventory..... | 130 |
| School Behavior Checklist..... | 134 |
| Children's Action Tendency Scale..... | 139 |
| Pupil Evaluation Inventory..... | 143 |
| Relationships Among Measures..... | 151 |
| Evaluation of the Classification of Subjects..... | 156 |
| DISCUSSION..... | 160 |
| Problem-Solving Findings..... | 160 |
| Sociometric Findings..... | 167 |
| Teacher Ratings..... | 174 |
| Self-Ratings..... | 175 |
| Comparison of Behavior Rating Measures..... | 179 |
| Limitations of the Present Research..... | 181 |
| Conclusions..... | 186 |
| FOOTNOTES..... | 195 |
| REFERENCES..... | 198 |
| APPENDIXES..... | 213 |
| A. Referral Sources of Potential Subjects..... | 213 |
| B. Reasons for Exclusion from Final Sample of Boys Referred as Potential Subjects..... | 214 |
| C. Purdue Elementary Problem-Solving Inventory - Sample Items..... | 215 |
| D. Children's Action Tendency Scale - Test Items and Record Form..... | 217 |
| E. Pupil Evaluation Inventory - Test Items..... | 221 |
| F. School Behavior Checklist - Subscales and Sample Items..... | 222 |
| G. Instructions to Subjects - Purdue Elementary Problem-Solving Inventory..... | 223 |
| H. Instructions to Subjects - Children's Action Tendency Scale..... | 224 |
| I. Instructions to Subjects - Pupil Evaluation Inventory..... | 225 |
| J. Pupil Evaluation Inventory - Scoring Procedure for Answer Booklets..... | 226 |
| K. Memorandum to Subject Referral Sources..... | 227 |
| L. Memorandum to Principal and Teacher..... | 229 |
| M. Referral and Information Form..... | 231 |

TABLE OF CONTENTS (continued)

| | | |
|----|--|-----|
| N. | Instructions to Raters - Pupil Evaluation Inventory - Aggression-Modified Scale..... | 234 |
| O. | Parent Consent Form - Pilot Study..... | 236 |
| P. | Parent Consent Form - Pupil Evaluation Inventory..... | 237 |
| Q. | Parent Consent Form - Clinical Aggressive and Clinical Nonaggressive Subjects..... | 238 |
| R. | Parent Consent Form - Control Subjects..... | 240 |
| S. | Parent Questionnaire..... | 241 |
| T. | Mean Test Scores and Subject Characteristics - Subjects Reclassified by Pupil Evaluation Inventory (PEI) and School Behavior Checklist (SBCL) Aggression Scores..... | 242 |
| U. | Summary of Analysis of Variance Under Alternate Methods of Subject Classification..... | 243 |

LIST OF TABLES

| | <u>Page</u> |
|--|-------------|
| 1. Subskills Measured by the Purdue Elementary Problem-Solving Inventory (PEPSI)..... | 83 |
| 2. School, Grade Level, Age, and Sex of Subjects - Pilot Study..... | 103 |
| 3. Scores on the Purdue Elementary Problem-Solving Inventory (PEPSI) - Pilot Study..... | 105 |
| 4. Subject Group Composition by Age and Grade Level..... | 115 |
| 5. Peabody Picture Vocabulary Test-Revised (PPVT-R) Scores and Socioeconomic Status (SES)..... | 129 |
| 6. Scores on the Purdue Elementary Problem-Solving Inventory (PEPSI) - Principal Study..... | 131 |
| 7. Summary of the Analysis of Variance and Covariance of the Purdue Elementary Problem-Solving Inventory (PEPSI) Scores..... | 132 |
| 8. Scores on the School Behavior Checklist (SBCL)..... | 135 |
| 9. Summary of the Analysis of Variance of the School Behavior Checklist (SBCL) Subscores..... | 138 |
| 10. Scores on the Children's Action Tendency Scale (CATS)..... | 141 |
| 11. Scores on the Pupil Evaluation Inventory (PEI)..... | 146 |
| 12. Intercorrelations of Subscale Scores on the Pupil Evaluation Inventory (PEI)..... | 150 |
| 13. Intercorrelations of Test Score and Subject Characteristic Data..... | 153 |

LIST OF FIGURES

| | <u>Page</u> |
|---|-------------|
| 1. Mean <u>T</u> Scores of Target Groups on the School Behavior Checklist..... | 137 |
| 2. Mean Scores of Target Groups on the Children's Action Tendency Scale..... | 142 |
| 3. Mean <u>Z</u> Scores of Target Groups on the Pupil Evaluation Inventory..... | 147 |

INTRODUCTION

A Problem-Solving View of Human Adjustment

Human adjustment problems may be conceptualized in terms of mental disorders, emotional instability, behaviors learned or not learned, or in relation to statistical or social norms. Regardless of which of these views is taken, individual maladjustment could also be seen as the repeated failure to achieve effective solutions to problems, especially those encountered in interpersonal or social situations.

Jahoda (1953, 1958) was among the first to redefine mental health in terms of problem solving. A "healthy" individual was defined as characteristically approaching problems in orderly stages, with an appropriate feeling tone (positive and change-oriented), as directly as possible, and in a manner which maximizes the probability of success. D'Zurilla and Goldfried (1971) and Goldfried and Goldfried (1975) have proposed that much of the "abnormal" behavior encountered by clinicians might be seen as ineffective behavior, together with its situational and emotional consequences. Spivack and Shure (1974), whose work is discussed below, have also adopted a problem-solving conceptualization of mental health, which was well summarized by Shure (1981):

An individual who plans his or her actions, can weigh the pros and cons, and consider the effects of interpersonal acts upon others is less likely to fail and make impulsive mistakes, and thereby suffers less frustration. If problem after problem should remain unsolved, and interpersonal needs remain consistently unsatisfied, maladaptive behavior and other social difficulties could subsequently ensue. (p. 159)

If one views human adjustment in problem-solving terms, the nature and development of problem-solving ability in childhood is of major theoretical, clinical, and research interest. The influences upon problem-solving ability of cognitive and emotional development; and of experience and learning, are of great importance. Of particular relevance to the research reported here is the need to specify the relationship between problem-solving ability and emotional and behavioral maladjustment in children.

Aggression and Cognition

As individuals are faced with problematic situations, alternative courses of action must be generated, evaluated, and chosen for implementation. Aggression is one such alternative solution which may be considered or attempted. However, the aggressive behavior of some individuals can be repeatedly maladaptive, either because it is ineffective in solving problems, or because of the counterreactions it elicits. A high level of aggressive behavior has been shown to be an important antecedent of active rejection by peers (Dodge, 1983). Children whose aggressive behavior

dominates their behavioral repertoires are frequently encountered by clinicians (Patterson, Reid, Jones, & Conger, 1975), and highly aggressive children have among the poorest prognoses in terms of later behavioral adjustment (Conger & Keane, 1981; Lefkowitz, Eron, Walder, & Huesmann, 1977). It is with such problem aggression that this thesis is concerned.

A number of explanations have been proposed to account for aggressive behavior. At the most fundamental level, aggression may be regarded as an impulse with which all individuals must gradually learn to contend (Hartup, 1976; Williams & Stith, 1974). As Feshbach (1970) pointed out:

The control of aggressive behavior poses a fundamental developmental problem for the child, who must learn to inhibit his rage; to discriminate between those situations in which it is appropriate or inappropriate to behave aggressively; and to modulate his aggressive response to match the degree of frustration or provocation to which he may be subjected. (p. 159)

However, developmental changes in the ability to manage aggression are not well documented in the literature (Parke & Slaby, 1983). The bulk of research evidence concerns the characteristics of aggression in preschool children; for example, the proportions of verbal and physical aggression, the frequency and duration of aggressive outbursts, and the stimuli and events eliciting aggression at various ages. The greater frequency of instrumental (object-oriented) relative to hostile (person-oriented) aggression in preschoolers, when compared to school-age children, has also been reported (Feshbach, 1970; Hartup, 1974; Shaffer,

1979).

Generally, though, there appears to be little information about the development of aggressive behavior or its regulation in middle childhood (Feshbach, 1970; Hartup, 1974; Shaffer, 1979; Williams & Stith, 1974).

A decline in the frequency of aggressive behavior around the ages of 6 to 9 has been reported (Hartup, 1974). There is some evidence of a further decline in aggressive behavior between 10 and 14 (Kagan & Moss, 1962, cited in Williams & Stith, 1974), suggesting another basis for considering high levels of aggression to be an important clinical problem in this age period.

Although there has been a lack of recent attention to developmental processes related to aggression, Freud's work in the 1920s and 1930s emphasized the individual's development of controls and outlets for aggressive impulses. Subsequent psychodynamic formulations of aggression, while tending to accept Freud's notion of a basic aggressive drive, also recognized that aggression was a response to external events. Post-Freudian theories also paid greater attention to the mechanisms by which aggressive energy is controlled and neutralized, and the role of adaptive ego functions (Feshbach, 1970).

Other early psychological theories of aggression were dominated by the frustration-aggression hypotheses of Dollard, Miller, and others (Dollard, Doob, Miller, Mowrer,

& Sears, 1939). These writers disputed the psychodynamic notion of an aggressive instinct, and instead viewed aggression as the result of a frustrating experience instigating an aggressive drive. The theory proposed a number of factors governing the strength of instigation to aggression, such as the degree of interference with a frustrated response and the number of responses which are frustrated. Similar explanations were hypothesized for the inhibition, displacement, and reduction of aggression (Bandura, 1973; Feshbach, 1970). While elaborations of the frustration-aggression hypothesis took into account the role of experience and learning (Miller & Dollard, 1941), the major focus was still upon motivational rather than experiential factors. From the large body of research generated by the frustration-aggression hypothesis, Feshbach (1970) and Bandura (1973) concluded that this theory has not accounted adequately for the maintenance, acquisition, and modification of aggressive behavior. They also contended that the frustration-aggression hypothesis has paid inadequate attention to the fact that aggressive responses are dependent largely upon developmental level and learning history. Finally, the theory has not accounted for the many situations when frustration and aggression do not co-occur (Parke & Slaby, 1983; Shaffer, 1979).

Efforts by learning theorists to explain the production of aggressive behavior have generally emphasized either a reinforcement or social learning perspective (Feshbach,

1970). Patterson and his colleagues (Patterson, Littman, & Bricker, 1967; Patterson et al., 1975) exemplified the reinforcement approach. They regarded aggression as operant behavior which demands, and is shaped by, responses from the environment. Aggressive behavior, they suggested, can be very successful in eliciting reinforcing responses such as compliance or submission. Some environments, such as families which encourage aggression, enhance this effect. In most cases, aggressive behavior in children is of relatively low frequency and intensity. In children who are problematically aggressive, however, such behavior has been strengthened first by a high degree of reinforcement (in itself and relative to other behaviors) and second by a conditioning process through which certain motivational states (e.g., frustration, anger) both elicit and are terminated by aggressive behavior.

Social learning theory (SLT) not only considers the role of reinforcement and motivational states in the production of aggressive behavior, but also proposes specifically social mechanisms by which aggression is strengthened and maintained through reinforcement. SLT similarly accounts for the inhibition and moderation of aggressive behavior in the presence of "internal" states which, according to instinct or drive theories, would elicit aggression (Bandura, 1973).

The role of modelling has also received considerable emphasis from SLT theorists and researchers. A number

of studies. (Bandura, Ross, & Ross, 1961, 1963a, 1963b; Lovaas, 1961) have demonstrated that children exposed to the aggressive behavior of others (live or on film) were more likely to behave aggressively as a result, even when this modelled aggression was not directly reinforced.

Although a detailed examination of these theories of aggression is beyond the scope of this thesis, one important common feature is emphasized. This is the limited attention most have given to the role of cognitive variables in the mediation of aggressive behavior (Feshbach, 1974). As Feshbach (1979) pointed out in relation to the frustration-aggression hypothesis, humans make a variety of responses to frustration, and whether aggression is one of these responses depends largely upon the cognitive operations by which they interpret the behavior of a frustrating agent. Similarly, both Rule (1974) and Fraczek (1979) argued that aggression, the subject of various definitions and explanations by early theorists, is a highly complex phenomenon. To explain the many interactions between individual characteristics and situational factors in producing aggression, a consideration of cognitive processes is essential.

Fraczek (1979) summarized research which supported his argument that even simple cues must not only be registered before an aggressive response is elicited, but must also be given specific signal and emotional meaning by an individual. In several experiments (Berkowitz,

1974), the manipulation of visual and other situational characteristics produced variation in the levels of punishment administered by one subject to another. Many of the features which were varied were too complex to have been responded to as simple cues, and it was concluded that their effect upon aggressive behavior was mediated through cognitive activity. Berkowitz (1977) cited studies specifying such cognitive mediators as judgments about the propriety of hostile impulses, the meaning assigned to cues, how realistic objects and events appear, and which aspects of a situation are being attended to. In other studies, the direction and form of angry or aggressive reactions were shown to be determined by the interpretation of nondifferentiated arousal, or by the content of feedback regarding the effects of performance on experimental tasks. The appraisal of feedback from victims of aggression has also been shown to mediate further aggressive behavior. Depending on the specifics of the aggressor's evaluation of this feedback, aggression can be inhibited or intensified (Fraczek, 1979).

Similarly, Feshbach (1974) has argued that the existence and effect of social norms is important in understanding the relationship between cognition and aggression. Social norms and the expectations of parents and others permit some aggression, but at the same time require that it be appropriately expressed. This presents children with a

difficult set of discriminations to make with regard to both stimuli and potential aggressive responses, in an effort to attain or approximate society's "aggressive ideal". Many of the processes involved, he contended, are primarily cognitive, including judgments, inferences, and attributions, and are closely related to the child's level of moral development.

An example of a cognitive process which is important in the mediation of aggressive behavior is the potential aggressor's evaluation of the intentions underlying frustrating or injurious behavior on the part of another (Hill, 1979; Rule, 1974).

It was proposed by Piaget (1965) that in middle childhood, children attain a stage of moral development in which they are able to judge the behavior of others according to their intentions. By contrast, younger children make such judgments largely on the basis of the consequences of the behavior, or other fixed criteria such as adult authority or the requirement of rigid equality of treatment. While there is experimental and cross-cultural evidence for this developmental progression, the age at which such transitions occur has proven difficult to specify (Hill, 1979; Rule & Duker, 1973; Rule, Nesdale, & McAra, 1974; Shantz & Voydanoff, 1973). It has been suggested that the inconsistent results obtained in developmental studies may have resulted from methodological differences in subject

testing and training; the specific acts the child was asked to judge, or variations in social structures and influences (Hetherington & Parke, 1975; Hill, 1979; Shantz, 1975).

Research by Dodge and his colleagues examined more specifically the role of the attribution of intentions in mediating aggressive behavior, as well as possible differences in this area between aggressive and nonaggressive boys. Dodge (1980) found that both aggressive and nonaggressive boys from Grades 2, 4, and 6 were more likely to respond with defensive aggression in an experimental condition where the intent of an aggressive peer in a video simulation was hostile, as opposed to benign. Aggressive and nonaggressive boys differed only in another condition when the intent of the other child was ambiguous. In this case, the aggressive boys responded significantly more aggressively, as if the intent of the other child had been clearly hostile. Dodge concluded that inappropriately aggressive children do not lack the ability to utilize cues relating to the intentions of others, but tend to distort such cues in ambiguous situations.

In a subsequent study (Dodge & Newman, 1981), aggressive and nonaggressive boys played a detective game involving the accumulation of evidence to determine whether persons in a story had acted with or without hostile intent. Aggressive boys from Grades 3 to 5 again demonstrated a bias toward the attribution of hostile intent. A similar

attributional bias was found to be positively associated with the degree of caretaker-rated aggressiveness among emotionally disturbed boys in residential treatment (Nasby, Hayden, & DePaulo, 1980).

Dodge and Newman suggested that their finding was related to the tendency which the aggressive boys in this study had displayed to respond impulsively, with incomplete attention to available relevant social cues.

A third series of studies (Dodge & Frame, 1982) further specified the nature of the attributional biases which had been demonstrated in aggressive boys. In the first study, it was found that the tendency of aggressive boys to over-attribute hostile intent applied only when actions were directed toward themselves. In the second, the selective bias toward recall of hostile cues was demonstrated in both aggressive and nonaggressive subjects. However, the aggressive boys made significantly more erroneous intrusions into their free recall, and more "false positive" errors on a recognition task. Their performance in this regard was similar to that of younger subjects, suggesting a possible developmental lag.

It was concluded that aggressive boys demonstrate highly specific cognitive deficits, rather than a generalized deficiency or developmental delay. The deficits, they suggested, may relate primarily to a developmental lag in the ability to inhibit highly available first responses.

on cognitive tasks. This possible difference between aggressive and nonaggressive boys will be discussed further in a later section of this thesis.

It was also suggested that these cognitive deficits in aggressive boys may be part of a cyclical process by which their aggression is maintained and intensified. The overattribution of hostility to peers might lead to more frequent retaliation toward these peers, who in turn view and retaliate toward the child as characteristically aggressive. As a result, the aggressive child's biased attributions acquire some basis in reality (Dodge, 1980; Dodge & Frame, 1982).

Thus it can be concluded that aggressive behavior in children must be understood largely in terms of cognitive mediators, and not viewed simply as a direct reaction to frustration or as a response to reinforcement contingencies or environmental cues. If this were the case, it would be expected that children who exhibit repeated, problematic, interpersonally aggressive behavior will differ from those who do not characteristically exhibit such behavior, along some dimensions of their cognitive abilities and processes. The research reported in this thesis examines such a proposition; namely, that clinically identified aggressive children will differ from other children (from both clinical and nonclinical populations) with respect to the orderly cognitive problem-solving operations by which a range of effective solutions might be found to problem situations.

REVIEW OF THE LITERATURE

Definitions

Before proceeding with the literature review, several terms central to the discussion will be defined. First, a number of definitions relating to problem solving have been given by D'Zurilla and Goldfried (1971), and are suitable for use in this thesis.

1. Problem is defined as "a specific situation or set of related situations to which a person must respond in order to function in his environment" (p. 107).
2. Problematic situation is one in which "no effective response alternative is immediately available to the individual confronted with the situation" (p. 108).
3. Problem solving is defined as "a behavioral process, whether overt or cognitive in nature, which (a) makes available a variety of potentially effective response alternatives for dealing with the problematic situation and (b) increases the probability of selecting the most effective response from these alternatives" (p. 109).
4. Solution is defined as "a response or pattern of responses which alters the situation so that

it is no longer problematic to the individual and at the same time maximizes other positive consequences and minimizes other negative ones" (pp. 108-109).

To these definitions is added the definition of aggressive behaviors used by Hartup (1974).

5. Aggressive behaviors are defined as "intentional physical and verbal responses that are directed toward an object or another person and that have the capacity to damage or injure" (p. 339).

The Nature of Problem Solving

While the conciseness of the preceding definitions is necessary to facilitate the discussion which follows, it is nevertheless important to recognize that problem solving is a complex phenomenon which has been considered in terms of various theories, models, and taxonomies (Asher et al., 1971; Davis, 1973). The selective overview which follows is intended to indicate where in this complex field the focus of this thesis lies, and to emphasize aspects of problem solving which are central to subsequent discussion.

Classical theoretical views of problem solving have tended toward either a learning theory or a Gestalt/cognitive approach.

Learning theory formulations assume that problem

solving is largely a trial-and-error process. An individual confronted with a problematic situation will engage in overt exploratory behavior, and correct problem-solving behavior will be reinforced by its success. The fact that even trial-and-error problem-solving responses are rarely completely random has been explained in terms of Hullian habit-hierarchy mechanisms. That is, a problem situation will elicit a hierarchical family of responses, with the strength and probability of each response determined by the individual's reinforcement history. In fact, a problem can be redefined in these terms as "a stimulus situation for which the strongest, first-emitted response is incorrect" (Davis, 1973, p. 48). The hierarchy of solution responses undergoes continual modification through the learning experiences which accompany subsequent problem-solving experience (Asher et al., 1971; Davis, 1973).

According to Davis (1973), the principal contribution of learning theories has been the clarification and objectification of the complex field of problem solving. However, he suggested, this simplicity has been gained at the expense of completeness. For example, a great deal of conscious and deliberate mental behavior has been ignored. Davis also viewed the learning theory based problem-solving literature as limited in its ability to suggest how problem-solving ability might be enhanced.

In contrast to the deterministic approach inherent

in learning theories of problem solving, Gestalt and modern cognitive theorists have emphasized the role of productive and creative thinking in the individual, who not only responds to, but also redefines and restructures, a problem situation.

Building upon Köhler's early work with "insight" in chimpanzees, mid-century Gestalt and cognitive psychologists considered the limiting effects of habit and mental set upon problem solving, and the facilitative role of hints, directions, and instructional cues. Other more contemporary views of problem solving emphasized the importance of such cognitive processes as concept learning and categorizing. The solution of unfamiliar problems, for example, can become much more simple and direct if the problem can be identified with a class of problems for which the solution strategy is already known (Davis, 1973).

Of course, it is not sufficient to describe and explain cognitive problem solving as a static phenomenon. One must also consider its development over time and the influence of previous and subsequent experience. All aspects of cognitive development involve the building of increasingly complex cognitive structures on the basis of previous experience. The emerging structures can subsume and solve some problems which are encountered, or be modified to accommodate new information or other more complex problems (Asher et al., 1971).

While learning and cognitive theories have frequently been dichotomized (Davis, 1973; Kendler, 1964), it is more common that contemporary treatments of problem solving will vary in their relative emphasis on the two approaches, and incorporate both to some extent. Two examples of the manner in which learning and cognitive views of problem solving have been integrated are of interest here.

Gagné (1964) viewed any form of problem solving as a type of learning, since it involves a measurable change in performance over time. His hierarchical model presented problem solving as the highest form of learning, preceded by behavioral and cognitive processes of lesser complexity: response learning, response chaining, verbal association, and concept and principle learning. The development of the ability to solve a problem depends upon the prior acquisition of simpler cognitive processing. Also of central importance, according to Gagné, is the phenomenon of transfer. While solution-specific learning may occur during the problem-solving process (Asher et al., 1971), problem solving by nature involves the generalizability of solutions from one problem situation to another:

Problem solving is an inferred change in human capability that results in the acquisition of a generalizable rule which is novel to the individual, which cannot have been established by direct recall, and which can manifest itself in applicability to the solution of a class of problems. (Gagné, 1966, p. 132)

Davis (1973) also proposed an integration of behavioral

and cognitive processing which postulated a unique role for each in solving problems. He suggested that overt (behavioral or trial-and-error) problem solving is likely to be elicited in a problem situation where the individual has at least minimal knowledge of the outcomes of alternative courses of action. If the individual does not possess such knowledge, alternatives will be tested covertly before selection and implementation. Generally, cognitive processing will be preferred: "The problem solver will think if he can, he will manipulate if he must" (Davis, 1973, p. 43).

In addition to theoretical emphases, one must also consider the types of models by which problem solving has been described and explained. These perspectives on problem-solving processes and abilities have been classified in a review by Feldhusen and Guthrie (1979).

Information-processing models assume that the individual engaged in problem solving operates on information by executing an orderly set of cognitive processes. These models are sometimes associated with, or derived from, computer simulations of human intelligence and decision making. Other information-processing models specifying the operations involved in cognitive problem solving will be discussed in later sections of this thesis.

Models which stress abilities may in some ways resemble information-processing models, but emphasize the mental abilities which are presumed or demonstrated to underlie

problem solving. Guilford's (1967) structure-of-intellect model is perhaps the best known abilities model of problem solving.

Feldhusen and his colleagues (Feldhusen, Houtz, & Ringenbach, 1972) have developed a problem-solving inventory which combines information-processing and abilities models by measuring specific problem-solving abilities which have been derived on the basis of a sequential view of the problem-solving process. This test, the Purdue Elementary Problem-Solving Inventory (PEPSI), is the principal measure in the present research and will be discussed in detail later.

Models of creative problem solving, as well as computer and logical-mathematical approaches to problem solving, appear frequently in the literature, but are beyond the scope of this discussion.

One final consideration is highly relevant to problem solving and its treatment in this thesis: This is the type of problem or task toward which the individual's problem-solving efforts are directed. As Feldhusen and Guthrie (1979) pointed out, problem solving not only consists of a complex variety of behavioral and cognitive processes, but the specific set of processes employed may also vary according to the type of problem the individual faces. Much of the early problem-solving research involved tasks with a remote or questionable connection to day-to-day

problems or to human adjustment; for example, puzzles, manipulation of objects, or anagrams (Gagné, 1964). Similarly, most experimental studies have been based upon discrete problems which were well defined for the subject. It has been suggested, however, that the level of definition of a problem is an important determinant of problem-solving behavior. Ill-defined problems (such as the interpersonal difficulties which are the focus of this thesis) place far different and greater demands upon the individual, especially with regard to such fundamental problem-solving processes as understanding the nature of the problem and planning a solution (Asher et al., 1971; Gagné, 1964, 1965; Glass, Holyoak, & Santa, 1979).

To summarize, problem solving may be viewed from both cognitive and learning theory perspectives. The relative utility of these two approaches may depend to a large degree upon the type of problem being considered. It can be argued that cognitive views of problem solving have greater applicability to relatively ill-defined problems, which the individual must first identify and relate to previously encountered problem situations and the capabilities he or she possesses. The integration of both learning and cognitive views may provide a set of organizing concepts with which to consider both the acquisition and modification of problem-solving ability through experience, and the mental operations which must be relied upon in the case

of complex problems such as peer difficulties. If, as some models assume, problem solving proceeds as an orderly, predictable series of operations, the understanding of problem solving can be further enhanced.

Against this background, the remainder of this literature review will consider problem solving first in terms of some of its component skills, and later as a sequential process. Similarities and differences between social and nonsocial problem solving will be discussed, as will developmental and measurement issues. Theory and research pertaining to the relationship between problem solving and behavioral adjustment will also be reviewed.

Component Problem-Solving Abilities: Verbal Mediation

Verbal mediation, the guiding of behavior by overtly or covertly "talking to oneself," has been regarded by a number of writers as central to human learning and problem solving. Jensen (1966), for example, presented verbal mediation as a crucial aspect of that portion of human intelligence which can be modified by environmental factors. Jensen also distinguished mediated from nonmediated learning. Nonmediated learning, he suggested, occurs largely on the perceptual level as a direct response to sensory input. The capacity for mediated learning, on the other hand, is more effective for complex (e.g., social) problem solving:

It is a few steps removed from the sensory input. (It) frees the learner from having his responses bound to specific stimuli and it makes for a degree of generalization and transfer of experience far beyond the limits of primary stimulus generalization. (p. 101)

Similarly, Kendler and Kendler (1962) presented evidence that the selection and combination of previous learning into complex problem-solving behavior is dependent upon verbal mediation processes.

In an early and frequently cited study, Meichenbaum and Goodman (1971) focused on verbal mediation as a component of problem-solving ability, and designed a program to train children in cognitive self-instruction. They suggested that the solution of any problem can be conceptualized as consisting of three stages: the comprehension of the problem and the mediators it requires, the production of relevant verbal mediators, and the use of such mediators to control behavior. As difficulties in task performance or self-control could theoretically arise in any of of these stages, the program provided training in all three. The program also followed a progression from the initial reliance of subjects on external verbal control, to the use of overt and finally covert verbal self-control. This sequence had originally been posited by Luria (1959) and other Soviet psychologists as a predictable ontogenetic progression. While several studies by Meichenbaum (1975) called into question the relationship of these stages to chronological age, it was

suggested that the same sequence may still characterize the use of verbal control in learning new tasks. Meichenbaum also concluded on the basis of his research that problematically impulsive children may be less likely to control their behavior through self-verbalization, and that what private speech does occur is predominantly immature, self-stimulatory, and of little use in facilitating purposive behavior.

Melchenbaum and Goodman trained 15 second-grade children, who had been placed in a special class as a result of behavior problems, to use self-instructions to control nonverbal behavior and reduce impulsivity in a variety of tasks. These ranged from simple sensorimotor tasks to more complex tasks taken from standard psychometric instruments. The tasks were selected to represent the three potential deficit areas mentioned above, and training procedures followed the same sequence. Training produced significantly greater improvement for the experimental group, compared to attentional and assessment control groups, on some WISC subtests and prorated IQ scores; and Matching Familiar Figures Test (MFFT) latency (but not error) scores. On the Porteus Maze Test, both the experimental and attention control groups improved relative to assessment controls. However, time-sampling observation of individuals' classroom behavior and teacher ratings at 4 week follow-up produced no significant differences among the groups.

The Meichenbaum and Goodman study was important as an early demonstration that an aspect of problem-solving ability could be enhanced, not only by training in the performance of more effective problem-solving behaviors, but also by manipulating the presumed cognitive mediators of these behaviors. Their work also stimulated a number of further investigations, including much of the research summarized in this section. Further, the study pointed to the importance of the work of Soviet psychologists concerning the central role of overt and, more important to this discussion, covert verbalization in mediating behavior (Meichenbaum, 1975).

The Meichenbaum and Goodman study also had a number of significant limitations which were addressed in later research. Problem tasks were exclusively impersonal in nature, and the relevance of the findings to interpersonal problem solving was unclear. Generalizability of the study to real-life problem solving was also limited by the similarity between training tasks and dependent measures. Experimental results had no impact on classroom behavior, although this is not surprising considering that the training only extended over a two-week period.

Walters (1979) reviewed several other studies which attempted to modify behavior through training in self-instruction. Training procedures included various combinations of live and video modelling, direct

instructions, reinforcement and operant techniques, and exercises in the selection and rehearsal of self-statements. Results displayed a consistent pattern of significant cognitive changes, but little or no generalization to the behavior of subjects. The results of the only study which demonstrated behavioral change were based on brief training with a very small sample of preschoolers, and did not assess the extent of cognitive changes resulting from training.

Further verbal mediation research by Camp and her colleagues related problem solving more directly to interpersonal behavioral adjustment, and specifically to problematic aggression.

Camp, Zimet, van Doorninck, and Dahlem (1977) first investigated the verbal abilities of young (kindergarten to second-grade) aggressive boys to examine the possibility that their problem behavior could be explained by the lower verbal aptitudes often observed among older delinquent boys. Aggressives were compared to normals on measures of intelligence, psycholinguistic and conceptual ability, and school achievement. Although a few (and generally slight) differences were found, the results were not consistent with the presence of a generalized verbal deficiency among aggressive boys.

An alternate explanation was proposed for the results which had been obtained. It was speculated that aggressives may be deficient in the development of the verbal mediation

skills required to solve problems. Although the resolution of nonverbal and interpersonal problems requires the use of relatively complex cognitive skills, it was suggested that aggressive children tend to rely on more immature processing.

Camp (1977) expanded on this hypothesized connection between problem solving and aggressive behavior, citing White's (1965) "temporal stacking" model of learning. White had proposed that the development of internalized language permits the inhibition of associative processing, which is governed chiefly by the association of stimulus and response at the perceptual rather than the cognitive level. The use of associative processing carries with it a high probability that the first available response to a problem situation will be employed. The transition to more cognitive processing, said to occur between the ages of 5 and 7, permits the use of internalized linguistic controls and lowers the speed of responding. Camp suggested that excessive aggression in children may be accounted for by a prolonged reliance on associative processing. This would result in a tendency to choose the first available response, often an aggressive one, in peer conflict situations. The more cognitive processing characteristic of normal nonaggressives, on the other hand, would make more likely the choice of potentially adaptive alternative responses from farther down the hierarchy of availability.

which White had postulated.

Camp (1977) tested this hypothesis with a sample of boys similar to that used in the Camp, Zimet, et al. (1977) study. Several of the cognitive measures from that study were retained, and measures of private speech and response speed and inhibition added. Discriminant function analysis revealed that the added measures were more powerful in separating a group of highly aggressive boys from normals. Differences between the groups on these measures were consistent with the reliance of aggressive boys on associative processing. Results were again similar to those of the previous study when the private speech and response speed and inhibition measures were removed from the analysis.

It was concluded from these results that aggressive boys demonstrate a "production" rather than a "mediation" deficiency; that is, they possess adequate mediational skills but fail to use them in complex problem situations. (Jensen, 1966, had also made a similar distinction in stressing the importance of both the availability of mediational skills and the threshold of arousal of verbal mediation processes.) Camp suggested that the development of verbal self-control in aggressive boys may be at the next-to-final stage, where overt self-commands are effective but the effectiveness of covert verbal self-commands is not yet established.

Based on these findings, the Think Aloud Classroom Program was devised (Bash & Camp, 1980; Camp, Blom, Hébert, & van Doorninck, 1977). Modelling in the use of verbal mediation by adults, together with a variety of other materials and procedures, were used to promote and develop the use of self-guiding speech in problem solving. As well, it is important to note that this program extended problem-solving training beyond the emphasis on a single component skill by training subjects in a systematic approach to problem solving which stressed problem identification, generation and evaluation of alternative solutions (based on the research discussed in the next section), and self-evaluation during and after problem-solving.

Aggressive 6 to 8 year old boys were trained in daily 30 minute sessions. Normal and aggressive control groups received no training. Results were similar to those of other verbal mediation research described above. The training produced the expected significant differences between experimental and control subjects on several measures of cognitive functioning, and on posttest measures of interpersonal problem-solving skills. However, no differences were found on teacher ratings of aggressive behavior in the classroom. Furthermore, while the trained aggressive children offered more potential solutions to hypothetical interpersonal problem situations as a result of training, the solutions were more aggressive in nature

than those offered by either the aggressive or normal controls.

In summary, research in verbal mediation demonstrated that self-instruction skills could be improved through training, and that the acquisition of these skills could be validated by measures from which the operation of verbal mediation processes may be inferred. However, there was little evidence that such improvements were in themselves sufficient to produce gains in behavioral adjustment.

A hypothesized relationship between verbal mediation and behavioral adjustment was also outlined in this section. Camp (1977) suggested that while aggressive children do not seem to be deficient in their verbal mediation abilities, they may fail to use the cognitive mediating skills they possess in situations where such skills might facilitate more adaptive behavior. Instead, they rely on more immature processing which predisposes them to choose the first available response, often taking the form of aggressive behavior. Possible causal mechanisms include a developmental lag, experiential and learning influences, or other factors such as short- or long-term modification in the individual's response tempo (Denney, 1973; White, 1965).

Verbal mediation may thus be regarded as an ability which is fundamental to a range of problem-solving processes, especially the covert cognitive operations upon which the individual must rely to deal with complex

interpersonal problem situations which require definition, interpretation, and planning before a solution can be carried out. One such set of cognitive problem-solving processes is discussed in the section which follows.

Component Problem-Solving Abilities: Interpersonal
Cognitive Problem-Solving (ICPS) Abilities

Another influential body of problem-solving research was the work of Spivack and Shure and their colleagues. Their extensive theoretical and research activity focused on a group of hypothesized abilities which they termed Interpersonal Cognitive Problem-Solving (ICPS) skills, their relationship to behavioral and social adjustment, and the design and evaluation of remedial programs.

Five ICPS skills have been identified and investigated (Spivack, Platt, & Shure, 1976). The first, problem sensitivity, is an awareness of the variety of problems which can occur in human interaction, and a willingness to attend to and evaluate such problems in an interpersonal situation. The second, alternative-solution thinking, involves the generation of a range of potential problem solutions while temporarily suspending judgment as to their quality or appropriateness. A third skills, means-ends thinking, is the ability to articulate step-by-step means to solve a problem. It is regarded as an especially complex and demanding problem-solving ability, which includes

insight, forethought, and the ability to defer gratification and inhibit impulsive responding. A fourth ICPS skill, consequential thinking, is the tendency to generate and consider the alternative consequences of one's actions in terms of their effect on oneself and others. The fifth, causal thinking, is the understanding and appreciation of social and personal motivation. It includes the recognition that the way one feels and acts can be both a cause and an effect of the behavior and emotions of others.

Early investigations of ICPS skills were summarized by Spivack and Shure (1974). Studies of impulsive, emotionally disturbed adolescent boys had revealed deficiencies in conceptualizing the relationship between means and ends, the anticipation of consequences, and in planning and foresight in problem situations. Similar deficits had also been found in adult psychiatric patients.

The bulk of ICPS research has been concerned with children of preschool age. In a series of studies (Spivack & Shure, 1974; Spivack et al., 1976), it was found that middle socioeconomic status (SES) children outperformed lower SES children on the Preschool Interpersonal Problem-Solving (PIPS) test. The PIPS was a measure of alternative-solution thinking which required children to offer alternate solutions to verbally presented peer-toy and parent-authority problem situations. In both socioeconomic groups, children rated as poorly adjusted by their teachers

gave fewer, simpler and less relevant, and more aggressive solutions than well adjusted children. The differences obtained were independent of IQ and test verbosity. It was concluded that alternative-solution thinking is a significant mediator of behavioral adjustment in this age group. Measures of other ICPS skills suggested a secondary mediating role for consequential thinking, and that causal thinking and problem sensitivity were of relatively little importance as mediators.

Spivack and Shure (1974) devised an extensive training program for preschoolers based on their findings. It began with the teaching of presumed prerequisite skills in language, listening, paying attention, and emotional awareness. The last third of the program provided training in alternative-solution, consequential, and causal thinking. Training produced significant improvements in ICPS skills, especially in the case of children initially rated as behaviorally maladjusted. The proportion of children rated by their teachers as adjusted increased in the trained group compared to controls. Improvements were also found in the trained group on teacher ratings of several dimensions of adjustment. These gains were positively related to the degree of measured cognitive change, and remained at 6 month follow-up. It was concluded that the program had produced gains in behavioral adjustment which were directly attributable to problem-solving training.

Relatively little research attention was given by these researchers to ICPS skills in middle childhood. The results of research reviewed by Spivack et al., (1976, pp. 58-64) and Butler (1979, pp. 12-13) suggested that the relationship observed in early childhood between alternative-solution thinking and behavior continues into middle childhood, but that consequential thinking may not emerge as an important factor in mediating behavior until adolescence. Evidence concerning causal thinking was inconclusive, but suggested that it serves some mediating function.

Other research has indicated that middle childhood is a period when means-ends thinking emerges as an especially important mediator of behavioral adjustment. In a study by Shure and Spivack (1972), it was hypothesized that, compared to normal children, maladjusted children would generate or possess a narrower repertoire of means-ends thinking to use in solving problems, and would tend to be preoccupied with end goals rather than how to achieve them.

Subjects for this study were 74 normal children and 34 disturbed special school pupils, aged 10 to 12 years and from two socioeconomic levels (middle and lower). They were administered the Children's Means-Ends Problem-Solving Test (MEPS), which had been adapted from earlier research with adults and adolescents. The MEPS presented

six stories simulating real-life problems, which contained only a beginning and an end. Children were asked to "fill in the middle" to indicate the steps they thought would be involved in reaching a goal. They were scored on the number of indications they gave of means, obstacles, and time taken to reach a goal.

It was found that normals produced more means, obstacles, and time notations than disturbed children. This effect remained when scores were adjusted for IQ. Normals also produced a wider range of possibilities, more foresight, and more sophisticated use of interpersonal helping strategies. Disturbed subjects produced more impulsive, poorly thought out solutions which were more likely to be aggressive or otherwise socially disapproved. Pilot research reported in the same article found that superior means-ends skills were also related to high teacher ratings of classroom and peer group functioning.

Another study by Larcen, Spivack, and Shure (1972, cited in Spivack et al., 1976) also demonstrated deficient means-ends thinking in institutionalized, neglected, preadolescents. These deficits were strongly related to teacher-rated social aggressiveness, emotionality, and inability to delay.

The results of the research reported in this section appear on first examination to be an impressive demonstration of the role of ICPS skills in mediating behavioral adjustment. However, there are a number of indications

for caution in interpreting these findings. With respect to the training study with preschoolers described above, Walters (1979) pointed to the difficulty of explaining the nonsignificant but considerable gains in rated adjustment within the control group. The effects of teacher expectancy were also impossible to assess, as the same teachers who conducted the training performed the ratings. (It should be noted, however, that Shure, 1982, reported replications of the original results with independent teacher ratings.) In any case, such ratings may be an imprecise basis for inferences concerning overall behavioral adjustment. Butler (1979) further observed that it is difficult to determine what factors were responsible for experimental effects in multifaceted programs which included training in both problem solving and general cognitive abilities.

It is also difficult to draw firm conclusions from the Shure and Spivack (1972) study of elementary-school-age children. The differences obtained in the number of means generated were small, and their theoretical and clinical significance relative to level of adjustment cannot be taken for granted (especially since the samples were originally selected on the basis of considerable differences in this regard). Richard and Dodge (1982) also pointed out that Spivack and Shure did not substantiate the implicit assumption that if enough alternative solutions are generated by a child, the most effective solution will somehow emerge

in his or her behavior.

A number of issues have been raised concerning the measurement properties of the Spivack and Shure tests. Despite the claims of Spivack et al. (1976) that verbal fluency does not affect MEPS scores, Butler (1979) and Allen, Chinsky, Larcen, Lochman, and Selinger (1976) have obtained results to the contrary. Butler (1979) also demonstrated only low to moderate internal consistency in the MEPS. Scores from different stories and subscales varied in the extent to which they predicted external criteria of adjustment (e.g., peer and teacher ratings). Furthermore, the MEPS demonstrated a high verbal intelligence component which had inflated some of the already low correlations Butler found with overt behavioral measures of adjustment. Butler and Meichenbaum (1981) also proposed that the disparity in instructional sets makes the interpretation of findings difficult across different ICPS measures and age groups. As well, the open-middle format of the MEPS might be highly sensitive to the individual's preexisting expectations about the probable outcome of problem situations.

Finally, both Butler (1979) and Walters (1979) pointed to a number of other methodological problems in the ICPS research. Since many of the studies comparing maladjusted subjects to normals differentiated their samples on the basis of broad diagnostic or treatment categories rather

than overt behavior, obtained differences could be explained by a variety of factors besides problem-solving ability. Potentially confounding variables such as age and sex were also poorly controlled.

Studies which have attempted to replicate the findings of the ICPS research will be reported later in this thesis.

Social and Nonsocial Problem Solving

The problem-solving abilities discussed to this point have varied along an important dimension; namely, the extent to which they apply specifically to social situations. Verbal mediation processes are relevant to impersonal as well as social problem solving, although it appears that social situations may place special demands upon the individual's verbal mediation abilities. On the other hand, ICPS skills have been presented almost exclusively in the context of social problem situations. It is with this distinction, and the relationship between social and nonsocial problem solving, that this section is concerned.

A broad distinction may be drawn between two aspects of social cognition (Shantz, 1983). The first, to which the term "social cognition" often refers in the literature, is concerned with how children conceptualize and understand their social world. Flavell (1974), for example, viewed social cognition largely in terms of the inferences

individuals make about others, whether with respect to their "psychological insides" (p. 70) or interpersonal relations. Similarly, Shantz (1975) suggested that "the area of social cognition refers to the child's intuitive or logical representation of others; that is, how he characterizes and makes inferences about their covert, inner psychological experiences" (p. 258).

A second and more complex dimension of social cognition, social problem solving, refers to the manner in which problems are solved in an interpersonal context. For example Butler (1979), paraphrasing Spivack and his colleagues, regarded social problem solving as "a set of interrelated cognitive skills that determine how a person thinks about and works through a problematic interpersonal situation" (p. 77).

Social cognition has been treated by some theorists and researchers as derived from the development of physical cognition, and capable of description and explanation by many of the same concepts. This point of view has been identified largely with the Piagetian tradition (Hartup, Brady, & Newcomb, 1983). Piagetian theory assumes that the same processes and structures underlie all thought, independent of content (Walters, 1979). Of key importance is the concept of egocentrism, which has been used to account for cognitive development and processes in both social and physical areas. Briefly, the egocentrism of

young children prevents them from differentiating self from nonself, and the physical from the social world. As egocentrism declines markedly at the beginning of middle childhood, children begin to recognize that others may think or perceive the world differently, and to acquire facility in inferring the thoughts and perspectives of others. Experiences with peers are considered to play a major role in these developments (Shantz, 1983; Walters, 1979).

Other treatments of problem solving have also suggested that some nonsocial cognitive processes are of importance in understanding social behavior and human adjustment. The verbal mediation research by Meichenbaum and Goodman and Camp and her associates, discussed earlier, dealt with the relationship between nonsocial cognitive processes and hyperactivity (see also Douglas, 1972; Douglas, Parry, Marton, & Garson, 1976; McKinney, 1973) or aggression. As will be discussed further below, Walters (1979) also found significant relationships between aggression and performance on nonsocial cognitive tasks, especially those related to impulse control.

However, there has been a trend in the recent literature to question the assumption of homogeneity between social and nonsocial cognition. As was noted above, much of the early problem-solving research involved laboratory problems that clearly have little relevance to social or

even everyday behavior, despite claims (e.g., Levenson & Neuringer, 1971) that the processes involved are similar.

Even in areas where the differences between social and nonsocial cognition are less obvious, it has been argued that unique aspects of both social cognition itself and the social situations in which it operates call into question, or at least qualify, the assumption that social and nonsocial cognition are isomorphic. Many such arguments emphasize the unique aspects of social situations and stimuli. Social situations, for example, are more complex and affectively intense, are less predictable and stable, and involve mutually determined interactive behavior (Shantz, 1983). There is evidence that, as a result, social problem solving requires a distinctly more active form of cognitive processing (Damon, 1981). It has also been suggested by a number of writers (Butler & Meichenbaum, 1981; Glick, 1978; Hartup et al., 1983; Shantz, 1983) that the primarily logical cognitive processes employed in nonsocial situations can be relied upon to a lesser degree in social situations, and must be supplemented by the greater use of intuitive strategies. Probabilistic scenarios or "scripts" based on past experience may be used to reduce complexity to a manageable level, sometimes to the point of overriding currently available information as a determinant of social-cognitive processing and social behavior (Glick, 1978; Hartup et al., 1983).

Another important implication of the differences between social and nonsocial stimulus situations is the corresponding difference in the importance of contextual factors. For example, social situations may differ from nonsocial situations in the type of response required (e.g., judgments about individuals or relationships) or in the type and amount of information which is provided or available to the individual (Hartup et al., 1983; Shantz, 1975).

The limited amount of empirical data on the relationship between cognitive performance in social and nonsocial domains is another reason why the homogeneity of social and nonsocial cognition cannot be taken for granted. In fact, as Walters (1979) pointed out, this lack of information is to some degree the result of such an equivalence being assumed. Walters (1979) and Shantz (1983) summarized past research which on the whole has demonstrated significant but low correlations between measures of social and nonsocial cognitive abilities. As well, research has not appeared to support the assertion that social-cognitive abilities in children represent nothing more than the effect of general intelligence. Results of investigations of the relationship between social-cognitive and impersonal Piagetian (e.g., conservation) tasks have also been inconsistent. Walters' own research into the relationship between social and nonsocial problem solving (reported below) produced a

pattern of intercorrelations which suggested that the social and nonsocial tasks were measuring different aspects of the problem-solving process (Walters, 1979).

Since social and nonsocial cognition can, at least in some instances, be regarded as distinct phenomena, it would be useful at this point to outline briefly the processes considered to be specifically social-cognitive in nature.

Almost all of the social-cognitive skills and abilities which have received attention in the literature have been concerned with social inference. Shantz (1975, 1983) organized social inference into five content areas. Inferences about what the other sees (visual perspective taking), extensively studied by Piaget, are regarded as having the least relevance to social behavior. Judgments of what the other feels (affective perspective taking) have been presented as both cognitive and affective processes. Children's inferences about the thoughts of others (cognitive perspective taking) have been studied largely in terms of communicative behavior, game playing, and story analysis. Inferences about the intentions of others were discussed earlier in this thesis. Finally, judgments about what another is like (person perception) have been investigated largely by social psychologists. The child's increasing use in middle childhood of covert, "psychological" descriptions of others is of interest with

respect to the relationship between social cognition and behavior.

Other cognitive abilities and processes which have been considered as aspects of social cognition include: communication skills and processes; attributions of social causality; moral reasoning; and socially oriented cognitions about the self, social relations, interpersonal transactions, social and moral regulation, and societal institutions (Damon, 1981; Shantz, 1983).

Butler (1979) viewed specific social-cognitive abilities, such as those just discussed, as being concerned mainly with the information processed in social situations. Interpersonal problem solving, on the other hand, refers to the stylistic qualities of cognitions which occur in social situations, such as the tendency to plan rather than to respond impulsively, or the consideration of alternative solutions and consequences. Similarly, Shantz (1983) presented social problem solving not in terms of children's conceptions of social reality, but rather as the knowledge and reasoning they use to solve social problems. With very few exceptions, reviews of specifically social problem solving have concentrated upon the Spivack and Shure research which has dominated the field.

It might appear from the preceding review that a number of compelling arguments have been made for treating social and nonsocial cognition as separate phenomena. However,

several qualifications are suggested to these arguments which mitigate such a conclusion. First, it should be considered that the apparent weight of these arguments to some degree simply reflects the increased attention which social cognition has received in the past 10 years. The substance of the arguments is still largely logical and theoretical, rather than empirical. Comparisons between the two types of cognition have tended to dichotomize, with cognitive processes based upon obviously impersonal laboratory and logical tasks on one hand; and cognitions which are exclusively social in content on the other. There seems to have been little explicit acknowledgement that everyday problems contain both social and nonsocial elements.

Conclusions about the relationship between social and nonsocial cognition have also been made difficult by the limited body of knowledge which exists. Social-cognitive theory and research have so far tended to concentrate upon rather narrowly defined content areas; for example, perspective taking. There has been comparatively little attention to social problem solving, and most of the research which has been done has been derived from the work of Spivack and Shure and their colleagues. The relationship between social cognition and social behavior also continues to be poorly understood. In the specific area of aggression and its relation to social

cognition, much of the research has concentrated on the areas of empathy (e.g., Feshbach & Feshbach, 1969) and attribution of intent. The relatively young field of social cognition and its influence on behavior has produced little in the way of unifying theories to guide further research (Shantz, 1983).

Thus, as Shantz (1983) has suggested, the extent to which social and nonsocial cognition are distinct phenomena is still very much an open issue. While the unique features of social situations and thought must be recognized, it would seem premature to conclude that only social cognition is relevant to social behavior and adjustment. Social and nonsocial cognition may both be involved, and perhaps functionally related, in mediating social behavior.

Finally, the position noted earlier in this section, that common psychological processes underlie some aspects of both social and nonsocial cognition, may still have some merit. After all, as Flavell (1977) pointed out with respect to cognitive development:

The head that thinks about the social world is the selfsame head that thinks about the nonsocial world. It would therefore be astonishing if none of the developmental trends in nonsocial thinking would be seen in the area of social thinking. (p. 122)

Problem-Solving Ability in Middle Childhood

Middle childhood, the focus of this thesis, has been regarded by many writers as a period of especially rapid growth in cognitive abilities related to problem solving. Some of this development can, as noted earlier, be understood as the continuing refinement of the egocentric thought of the preschooler. Children in early middle childhood have been described as demonstrating the capacity to view simple social episodes from the position of each actor, and to maintain some consistency of viewpoints (Shantz, 1975). The general cognitive shift in emphasis from external and superficial aspects of social relations to more abstract qualities has also been noted (Berndt, 1981; Hartup et al., 1983). The brief review which follows further illustrates the developmental changes related to cognitive problem-solving ability which characterize middle childhood.

The nature of perspective-taking (role-taking) operations and abilities undergoes a number of changes during middle childhood, although the evidence regarding such changes is clearer in some areas than others. Visual perspective taking appears to become more accurate, reliable, and complex (Shantz, 1975; Walters, 1979). There are indications as well of rapid development in cognitive perspective taking (Elardo, 1977; Flavell, Botkin, Fry,

Wright, & Jarvis, 1968). Walters (1979) also found a significant linear trend in differences between the cognitive perspective-taking performance of boys in Grades 2 to 6.

An important aspect of cognitive perspective taking which develops in middle childhood is the capacity for recursive thought; that is, the recognition by the child that he or she cannot only infer the thoughts of others, but that his or her thinking can itself be the object of inferences by another. It is possible that the "psychological revolution" (Shantz, 1983, p. 541) of recognizing this and other aspects of mutual, coordinated perspective taking may account for the increasing complexity and general importance of peer interaction in this age group.

With respect to affective perspective taking, Walters (1979) concluded from the literature she reviewed that substantial development occurs during middle childhood. However, her own research failed to demonstrate age effects on a measure of affective perspective taking. In his review of the affective perspective-taking literature, Hill (1979) pointed to methodological difficulties which in his view prevented reliable conclusions from being drawn about the development of this ability in middle childhood.

As noted earlier, children's abilities to infer the intent of another have also been regarded as undergoing a developmental shift in middle childhood. According to

Shantz (1975), the general finding has been that children below the age of 8 or 9 tend to emphasize the seriousness of outcome in attributing responsibility, while older children consider intentions to a greater degree. Recall, however, that there is some disagreement in the literature about this conclusion.

It also appears that significant changes occur in the child's descriptions and characterizations of others. In middle childhood (especially, as a number of studies have shown, around the age of 7 or 8), the child's descriptions of others become more inferential and less dependent upon observable, concrete information. The number of "psychological" descriptions increases, as does the trait vocabulary used in making such descriptions. Others are described as more differentiated from their environments and in a less stereotyped manner (Hartup et al., 1983; Hill, 1979; Shantz, 1983).

In addition to developmental changes in social-cognitive processes, the nature of information which is used and attended to by the child also changes during middle childhood. (Hartup et al. (1983) demonstrated that first-grade children playing a board game based their social behavior (cooperative or competitive) solely on the behavior of a confederate game partner. Fifth-graders, however, integrated the partner's behavior both with incentive information (for cooperative or competitive behavior) and

a normative framework favoring cooperation. First-graders used incentive information only when explicitly cued to do so in a second experiment.

There is considerably less information on the development of cognitive problem-solving ability, as opposed to discrete cognitive skills. In fact, most research has appeared since 1979, when Walters pointed to an almost complete lack of knowledge in the area. Her research with boys in Grades 2 to 6 revealed linear trends for age in alternative-solution, alternative-consequence, and means-ends problem-solving thinking, using measures adapted from Spivack and Shure's research. In addition, the same study demonstrated that performance improved linearly with age on several measures related to nonsocial problem solving: reflectiveness, nonsocial measures of consequential, causal, and means-ends thinking, and anagram and 20-questions games (Walters, 1979). Hains and Ryan (1983) also demonstrated differences between 10-11 and 14-15 year old boys on measures of strategic social thinking and moral reasoning.

Other studies have revealed developmental changes in the types of problem-solving skills and strategies children employ. Spivack et al. (1976) and Shure (1981) concluded that middle childhood is a period when the importance of such ICPS skills as alternative-solution thinking gives way to more complex skills such as means-

ends, consequential, and causal thinking. Krasnor (1984) demonstrated developmental changes in the size and diversity of the problem-solving repertoire. Preferred (chosen) strategies also showed some developmental changes, with verbally aggressive problem-solving strategies more likely to be chosen by fifth-graders than by first-graders. As well, social problem-solving strategies became more indirect and psychologically sophisticated with age. However, this pattern varied somewhat with story content (object-, friendship-, or peer-oriented), apparently reflecting such factors as differences in relevancy among age groups. Such a finding serves as an illustration of the difficulty in making between-age comparisons in this and other developmental research.

Problem-Solving Ability and Behavioral Adjustment

Barely a decade ago, Shantz (1975) concluded that "the relation between social cognition and interpersonal behavior may be one of the largest unexplored areas in developmental psychology" (p. 303). Since that time, a number of researchers have addressed themselves to this issue, which is also central to the present study. A connection between problem-solving ability and behavioral adjustment has often been assumed, especially in the design of preventive and treatment programs (Walters, 1979).

However, the review of the research literature which follows will attempt to show that many questions about the nature and extent of such a relationship remain unresolved.

As Walters (1979) pointed out, most studies attempting to relate behavioral adjustment to performance on impersonal laboratory tasks have produced negative or inconclusive findings. However, a number of earlier research studies indicated that cognitive impulse control on nonsocial problem-solving tasks may have relevance to behavioral adjustment. Glenwick (1976) demonstrated a negative relationship between impulsivity and peer popularity ratings in fourth-graders. Douglas (1972) found that hyperactive children, in comparison to normals, tended to react with their first available responses in a variety of problem situations. The work of Camp and her associates, discussed earlier, also pointed to the role of impulsivity in maladaptively aggressive behavior.

Other studies have attempted to specify which aspects of the problem-solving process may be affected by impulsivity. McKinney (1973) found that while reflective children showed evidence of a conceptually-based strategy and the testing of alternative hypotheses on a match-to-sample task, impulsives were significantly more random and less efficient. He related his findings to Camp's (1977) suggestion that such children may be deficient in the spontaneous production of the cognitive problem-solving

operations which mediate adaptive behavior.

Denney (1973) demonstrated that reflective children made greater use of constraint-seeking cognitive strategies (known to reflect cognitive maturity) than impulsives on a 20-questions task. Instructions to respond more slowly or quickly changed latencies in both groups, but only the instructions to respond more impulsively had an effect upon the proportion of constraint-seeking strategies. The results were related to White's (1965) temporal-stacking model, discussed earlier. It was suggested that while children can be induced to respond impulsively, the ability to inhibit first available responses is more complex and dependent upon a wider range of cognitive abilities.

Other studies which claimed to demonstrate a relationship between problem solving and behavioral adjustment employed social-cognitive tasks and measures. For example, Chandler (1973) reported role-taking deficits in delinquent 11 to 14 year olds, relative to nondelinquent controls. Role-taking training appeared to be successful in lowering the egocentrism scores of the delinquents and reducing their rate of known delinquences on 18-month follow-up. However, the results of this study are difficult to interpret for a number of reasons, including sampling problems, the possibility of treatment effects unrelated to role taking, the uncertain reliability of offense records, and the questionable real-world significance of the small

differences obtained.

Similarly, Gottman, Gonso, and Rasmussen (1975) found positive interaction and popularity in normal third-grade children to be unrelated to social-cognitive skills, especially perspective taking. Burka and Glenwick (1978) also found that cognitive perspective-taking ability was positively related to peer and teacher ratings of social adjustment.

While studies such as these are illustrative of those which have suggested a relationship between role taking and behavioral adjustment, it has been pointed out in a review by Hartup et al. (1983) that results are far from conclusive, and just as many studies have failed to demonstrate such a relationship.

Adjustment-related differences in the type of information attended to and processed in social problem situations have also been suggested. Cutrona and Feshbach (1975) presented children from Grades 3, 4, and 5 with stories of individuals in problematic situations. Both situational information and dispositional facts (psychological characteristics) concerning the individuals were presented. Subjects were asked to predict the characters' behavior in solving the problems, and to explain their predictions. Children who had used primarily situational information were rated by their teachers as engaging in significantly more aggressive behavior than

those who had relied on dispositional information. It was suggested that children who are relatively insensitive to the personalities of persons with whom they interact may be more likely to offend and less likely to help others.

Selman (1976) also found deficits on three measures of social reasoning in a clinical sample of 7 to 12 year old children with peer problems, as compared to a matched sample of socially competent children.

The literature reviewed so far in this section, dating to approximately 1979, is representative of what had been accomplished up to that point in time. There was still relatively little evidence on which to base firm conclusions concerning the relationship between problem-solving ability and behavioral adjustment. Certain cognitive skills, such as role taking, had been emphasized, and comparatively little was known about others and their relationship to adjustment or the problem-solving process. With regard to more complex cognitive problem-solving skills, almost all the evidence supporting hypothesized connections between such processes and behavioral adjustment was the product of the research, discussed earlier, by Spivack and Shure and their colleagues.

A review of subsequent investigations of problem solving and adjustment in children begins with two important studies by Walters and Butler.

Walters (1979) examined the hypothesis that aggressive

elementary-school-age boys are deficient in various aspects of social and nonsocial problem-solving ability.

(Developmental changes in problem-solving ability were also investigated, as discussed in the previous section.)

Subjects were 52 aggressive and 52 nonaggressive boys from Grades 2 to 6. Mean age was approximately 10 years. The selection criterion for the aggressive group was a T score of at least 70 on the Aggression subscale of the School Behavior Checklist (SBCL; see Method section below). The matched nonaggressive group was composed of boys from the same classrooms as the aggressive subjects. Selection criteria for this group were T scores of 60 or less on Aggression and several other SBCL subscales considered to be indicative of behavior problems. Selection criteria for both groups were validated through simple peer ratings of aggressiveness, and whether the subject was liked or disliked.

Subjects were assessed using the following measures: (1) a self-report scale of impulse control, (2) the Peabody Picture Vocabulary Test (PPVT), (3) social problem-solving measures of means-ends, alternative-solution, and consequential thinking (based on measures developed by Spivack and Shure), (4) cognitive and affective perspective-taking tasks, (5) nonsocial problem-solving measures, including reflection-impulsivity and nonsocial means-ends, causal, and consequential thinking, (6) nonsocial problem-

solving games (anagrams and 20 questions), and (7) measures of preference for various types of behavioral solution.

While the results of the study indicated that problem-solving ability increases with age, there was a consistent lack of difference between the aggressive and nonaggressive groups on the social problem-solving measures.

Nonaggressives performed significantly better than the aggressives on three of the nonsocial measures (a match-to-sample task, maze test, and anagrams), possibly reflecting a difference in impulse control. Discriminant analyses indicated that while neither the social nor the nonsocial problem-solving measures discriminated effectively between the groups, the discriminant function containing the nonsocial measures was the more powerful of the two.

While the hypothesized problem-solving deficits in aggressive boys were not supported, there were several interesting qualitative differences in problem solving between the two groups. The aggressive boys expressed a clear preference for aggressive solutions to hypothetical peer conflicts. Aggressives also offered an aggressive solution as a first response significantly more often than nonaggressives. However, differences between the groups disappeared when subjects were asked to choose the best solution.

Walters concluded that aggressive boys had not exhibited evidence of deficits in either general or social

problem solving, or in their knowledge of socially acceptable behavior. Rather, the pattern of results suggested that aggressive boys may have difficulty in making use of the problem-solving skills they possess, possibly due to problems with impulse control which predispose them to choose the most readily available response. The reader will recall similar suggestions by Denney (1973), Douglas (1972), and Camp (1977) on the basis of their findings.

Another 1979 study by Butler examined the relationships among interpersonal cognitive problem solving, peer- and teacher-rated indices of adjustment, and naturally occurring interpersonal behavior. The study also investigated the relationship of these variables to peer group acceptance and reputation, and evaluated the psychometric properties of the Spivack and Shure MEPS instrument.

Butler first administered two sociometric measures to 69 male and female Grade 5 pupils. These measures assessed positive or negative peer reputation and peer playmate choice and popularity. Data were also collected for each child on SES, verbal intelligence (WISC Vocabulary subtest), the Children's MEPS, and teacher ratings of academic and general functioning.

In the next phase of the study, 46 children were assigned to four groups representing all combinations of high and low scores on the MEPS and peer-reputation measures. The behavior of these children was observed using a time-

sampling procedure which yielded measures of task orientation and reinforcement (positive, negative, or neutral) given and received in interaction with teachers and peers.

It was found that the MEPS failed to predict behavioral differences on almost all of these measures. While children with high MEPS scores dispensed more positive reinforcement to teachers, the frequency of this behavior was very low and of questionable statistical reliability. The MEPS also failed to correlate significantly with peer reputation and popularity measures, or with teacher ratings.

Butler acknowledged that replication studies were needed to validate her findings, especially in view of the possible influences of the classroom situation, the use of an essentially normal sample, and insensitivities or other measurement problems in the MEPS and the sociometric procedure. Nevertheless, she argued that the consistency of her findings across 13 categories of observable behavior and the convergence of her results with other recent work (e.g., Allen et al., 1976; discussed below) supported the conclusion that problem-solving ability, at least as measured by the MEPS, may not bear the important mediating role in behavioral adjustment which had been claimed by Spivack et al. (1976).

Gillespie, Durlak, and Sherman (1982) reached a similar conclusion from their study of kindergarten pupils, in

which they found no evidence of significant relationships between ICPS skills (alternative solution and consequential thinking) and teacher-rated adjustment.

A number of other recent studies have also investigated the relationship between cognitive problem solving and behavioral adjustment. Richard and Dodge (1982) compared aggressive and nonaggressive boys not only in terms of the number of alternative solutions they generated, but also with regard to the effectiveness of these solutions.

Subjects were 68 boys divided into six groups ($n = 10$ or 12) according to two grade levels (2 to 3 and 4 to 5) and three levels of social adjustment (aggressive, isolated, and popular). The social adjustment groups were selected on the basis of both peer sociometric and teacher adjustment ratings. (They suggested that the failure of several recent studies, including Butler's, to replicate Spivack and Shure's findings may have resulted from a reliance on teacher ratings for subject selection.)

Richard and Dodge first administered a story-completion procedure similar to the MEPS. Subjects were then presented with two series of three randomly ordered possible solutions to the same stories. Each series contained one clearly aggressive solution, one which was ineffective and submissive, and one which was nonhostile and effective. From each series, the subject was asked to choose both the best solution and the one he would be most likely to

try.

The results replicated Spivack and Shure's finding that well-adjusted children produced more alternative solutions to hypothetical problems than those with adjustment difficulties. Boys in the three groups did not differ in the ability to correctly evaluate the solutions presented to them. It was also found that subjects from all groups initially produced solutions considered effective. However, the subsequent solutions produced by aggressive and isolated boys contained a higher proportion of aggressive and ineffective solutions. It was suggested that their social problem-solving adequacy may be limited to their initial solution. Adaptive difficulties may result for these children when the initial solution does not work, and the alternative behaviors which are called for also tend to be ineffective. Such a suggestion is at some variance with that of Camp (1977) and others that aggressive children are predisposed to choose the first, often maladaptive, solution in a problem situation. Nevertheless, both studies have the important similarity of emphasizing the nature of solutions chosen by aggressive boys, as well as the problem-solving processes leading up to them. Another interesting finding by Richard and Dodge was a lack of difference between aggressive and isolated boys on all measures, suggesting that a common deficit might underlie two quite different deviant patterns.

A study by Deluty (1981b) also pointed to the importance of the type of problem solution chosen by children with adjustment problems. Deluty selected three groups of 30 Grade 5 to 7 children (15 boys and 15 girls) designated as highly assertive, highly aggressive, and highly submissive on the basis of extreme scores on peer-report measures. The three groups were compared in terms of the number and type of alternative solutions generated in response to items of the Children's Action Tendency Scale (CATS; see Method section below).

While the subjects in the three groups were equivalent in terms of the number of alternatives they generated, the types of alternatives they offered differed significantly. Although all children produced more assertive than other responses, aggressive and submissive boys chose fewer assertive and more aggressive solutions than assertive boys. The aggressive and submissive groups did not differ from each other on these measures. It was concluded that assertive children showed the most flexibility in conceiving of a variety of response alternatives to hypothetical conflict situations. Their higher proportion of assertive solutions was considered to reflect their greater adaptiveness, based on another study (Deluty, 1981a) which demonstrated an association of assertiveness with self-esteem, popularity, and peer-rated behavioral adjustment.

In another study, Deluty (1983) found that highly aggressive children (selected on the joint basis of the CATS and a peer-report measure) rated aggressive behaviors in hypothetical peer conflict situations significantly more positively, and assertive behaviors more negatively, than did highly assertive and highly submissive children. They were also more likely to regard aggressive behavior as a course of action they should exhibit, and one which was more likely to yield favorable results for themselves and even the recipients of their aggression.

McKim, Weissberg, Cowen, Gesten, and Rapkin (1982) investigated problem-solving ability and adjustment in a comparative study of suburban and urban third-grade children. Positive relationships between alternative-resolution thinking and adjustment (primarily on teacher-rated measures) were found only for the lower income, black, urban children when scores were adjusted for IQ. It was suggested that the relationship between problem-solving ability and behavioral adjustment may differ across sociodemographic groups, and that such a difference might account for both the success of Spivack and Shure's (1974) interventions with black urban preschool children and the replication failures reported by investigators using other samples.

Hains and Ryan (1983) investigated social problem solving in delinquent and nondelinquent boys at the ages

of 10 to 11 and 14 to 15. They employed measures of strategic social thinking (corresponding closely to the D'Zurilla and Goldfried, 1971, model discussed in the next section), social metacognition (awareness of one's own problem-solving and self-control strategies), prosocial reasoning, and moral reasoning. No differences were found on most measures between delinquents and nondelinquents, although there was some indication that delinquents may be less exhaustive in considering various dimensions of social problem solving. As noted in the previous section, a number of age differences were found. In terms of the pattern of findings, this research is similar to the Walters (1979) study. That is, maladaptive children did not exhibit a deficit in problem-solving ability, but there were indications that they differed from normals along dimensions related to the actual use of existing problem-solving skills.

A recent study by Asarnow and Callan (1985) examined the social-cognitive processes of adjusted and maladjusted boys. Two groups of 30 fourth- and sixth-grade boys were selected on the basis of extreme scores in their classrooms on peer-nomination measures of positive and negative status. Subsequent analyses using two other sociometric measures revealed that the negatively evaluated boys were also rated as significantly more aggressive and disliked than positively evaluated boys. Each subject was presented

with four hypothetical peer problem situations and asked to describe how the child in the story might solve the problem. He was then presented with six potential problem-solving responses and asked to rate how much he would like to play with the hypothetical peer using each solution.

It was found that negatively evaluated boys generated significantly fewer alternative solutions. Their responses also contained more solutions rated as intensely aggressive, while positively evaluated boys produced solutions rated as more assertive and mature. On measures of the degree and type of planning in their problem-solving approaches, negatively evaluated boys showed less evidence of adaptive, prosocial planning, and more planning which supported aggressive or maladaptive behavior. Both groups rated positive and assertive responses as the most desirable and aggressive responses the least. However, negatively evaluated boys rated aggressive responses more positively and positive responses more negatively.² These findings suggested that boys in both groups possessed equivalent knowledge of what is socially desirable or acceptable, but that behavioral preferences existed which were consistent with the results of other research reviewed in this thesis (Camp, Blom, et al., 1977; Deluty, 1981b, 1983; Richard & Dodge, 1982; Shure & Spivack, 1972; Spivack et al., 1976; Spivack & Shure, 1974; Walters, 1979).

Asarnow and Callan proposed a possible explanation

for the contrast between their results, which replicated the findings of Spivack and Shure with respect to the generation of alternative solutions, and those of Butler (1979), which had failed to do so. It was suggested that this difference may indicate that deficits in this social-cognitive ability appear only in the case of the relatively extreme differences in social adjustment which characterized their sample, but not Butler's. However, this explanation seems less convincing when it is noted that, despite this important difference between the two studies, the mean numbers of alternative solutions for the two groups in the Asarnow and Callan study differed by less than one unit. Such a difference could be just as plausibly explained by other differences between the studies, or problems with the reliability of the measures as demonstrated by Butler (1979).

Another source of evidence concerning the relationship between problem-solving ability and behavioral adjustment is the large number of preventive and remedial programs which have attempted to improve adjustment by enhancing some aspect of problem-solving ability. To the extent that changes in problem-solving ability as a result of training are accompanied by improvements in adjustment, the argument can be made that the hypothesis of a connection between problem-solving ability and adjustment is supported. Such training studies will not be considered in detail.

here, as comprehensive reviews exist elsewhere. It is of interest to note, however, that these reviews (Alpert & Rosenfeld, 1981; Urbain & Kendall, 1980; Walters, 1979; Weissberg, Gesten, Rapkin et al., 1981) are consistent in the observation that while such programs have usually been able to demonstrate improvements in trained problem-solving skills, the evidence is weak for the generalization of these gains to observable behavioral improvements outside the training situation.

The results of a number of other training studies, which are more comprehensive and broadly based than those referred to above, will be reviewed in the following section.

To summarize, research has suggested that impulse control is an aspect of social and nonsocial problem solving which may bear an important relationship to behavioral adjustment. The connection between role taking and adjustment has received considerable attention, but findings have been inconsistent. There is also some evidence that maladaptive children differ from others in the information which is attended to and the manner in which it is processed in problem situations.

With regard to social problem-solving skills and behavioral adjustment, the evidence is by no means conclusive. A large body of literature asserting that problem-solving skills are important mediators of behavioral

adjustment has been developed by Spivack and Shure and their colleagues. While several replications of their findings have been reported in recent years, replication failures have been reported as well. Results of training studies have in general failed to provide evidence for a link between problem solving and adjustment.

Whether or not differences in problem-solving ability were found between adjusted and maladjusted children, an additional finding has appeared with some consistency. Aggressive or other maladjusted children have been shown in several studies to differ from others in their preferences for specific types of problem-solving behavior or solutions.

The Process of Problem Solving

To this point, problem solving has been discussed primarily in terms of its component skills and abilities, from such basic capacities as verbal mediation to ICPS skills and other aspects of problem-solving operations. It is important to recognize, however, that problem solving may also be understood as a complex form of information processing in which individual skills and abilities are combined and applied in an orderly fashion to problem situations. This does not imply that a firm distinction can always be drawn between "component skill" and "process"

conceptualizations of problem solving. Spivack et al. (1976), for example, acknowledged the importance of a process view of problem solving. However, their work and the measures they devised clearly emphasized the pivotal role of certain component skills (e.g., means-ends thinking in middle childhood) rather than the manner in which a range of skills is integrated in solving problems.

If problem solving can be understood as an orderly process as well as in terms of individual skills, it would be useful to consider a model of problem solving which integrates the skills involved into functional groups or stages.

D'Zurilla and Goldfried (1971) proposed a model of the problem-solving process as a series of stages or sets of cognitive and behavioral operations. The emphasis in the model was not upon the production of discrete behavioral responses, such as assertive behavior or self-control, which might be included in problem solution. Rather, the model was concerned with the strategy by which the individual combines elements of previous learning to arrive at solutions to the range of problematic situations which he or she encounters. Although it must be kept in mind that there has been little empirical validation of the correspondence between this model and actual human problem solving (Walters, 1979), it is presented here as a useful organizing model which, as D'Zurilla and Goldfried pointed

out, reflects a strong consensus in the problem-solving literature (see Davis, 1973, pp. 15-17; Gagné, 1966; Glass et al., 1979, p. 393; Guilford, 1967). The components of the D'Zurilla and Goldfried model are:

1. General orientation (set) includes the expectation that problems are a common part of life which the individual is capable of solving (competency set), the ability to recognize problematic situations, and a preference for considering various alternative solutions by inhibiting the tendency to inaction or impulsive responding, (divergent set).
2. Problem definition and formulation consists of defining the problem in operational or solvable terms and formulating a classification of relevant and irrelevant elements.
3. Generation of alternatives involves not only generating alternative solutions, but doing so in a manner which maximizes the probability that the most effective response will be included.
4. Decision making refers to the process by which the alternatives generated are evaluated and reduced, and the course of action determined. An important subskill is the estimation of the consequences of a given course of action.
5. Verification is the assessment of the outcome

of the course of action which has been chosen. This feedback process provides the opportunity for self-correction and a learning process through which problem-solving ability can change over time.

Returning to the problem-solving view of human adjustment stated in the introduction to this thesis, the use of a process model of problem solving has an important implication for clinical assessment and remediation. An individual's adaptive difficulties can be conceptualized not only in terms of specific or generalized deficits in problem solving, but also with respect to his or her effectiveness at various points in the problem-solving process. For some, difficulties might arise in the general orientation phase of problem solving (e.g., set, self-statements), in others the generation of alternatives or anticipation of consequences, and in others the implementation and evaluation of problem solutions or the ability to modify problem solving as a result of experience.

D'Zurilla and Goldfried (1971) proposed a behavioral approach to remedial problem solving based on their model. The client would be trained by various techniques to a minimum criterion of performance on each of the steps outlined above. The stages would be mastered in succession until they formed a "response chain" in which each stage was a conditioned reinforcer for the preceding stage and

a cue for the next. The resolution of the problem would serve as a reinforcer for the entire chain. Heppner (1978) and Goldfried and Goldfried (1975) have also considered problem-solving processes in counseling, in relation to the D'Zurilla and Goldfried model.

A number of broader based problem-solving training studies, which reflect the conceptualization of problem solving as a sequential process, will now be reviewed. Such studies have trained subjects over a range of problem-solving skills, and some have also stressed the integration and application of these skills outside the training situation. This emphasis distinguishes these studies from some of the relatively extensive training studies reviewed earlier (e.g., Spivack & Shure, 1974), which have derived their comprehensiveness from the addition of prerequisite or related abilities to programs based essentially upon training in specific component problem-solving skills.

An elaborate preventive program by Allen et al. (1976) trained 151 children in six classrooms (mean age: 9 years) using a curriculum based on both the D'Zurilla and Goldfried model and the training and assessment approach of Spivack and Shure. Subjects were taught divergent thinking, problem identification, generation of alternative solutions, consequential thinking, and elaboration of solutions, with the important addition of training in the integration of problem-solving skills. The program was carried out by

experimenter-trained teachers through video modelling, small-group experiences for shaping and reinforcement of problem-solving skills, follow-up exercises, and in-class assessment.

A number of improvements were observed as a result of training. Subjects increased the number of alternatives and elaborations (steps) generated and the number of problems identified on a Spivack and Shure style problem-solving measure. In a structured real-life problem situation, trained children gave more than two solutions significantly more often than controls. As well, trained children demonstrated higher expectancies of the outcome of peer interactions and a shift toward internality on a locus of control measure, although the latter change had disappeared at 4-month follow-up (McClure, Chinsky, & Larcen, 1978). There were, however, no differences on standardized teacher ratings of adjustment, and measures of self-esteem and general levels of aspiration. Methodological issues such as the possible suppression of some effects by the use of a normal sample (Urbain & Kendall, 1980) and the possible imprecision of teacher relative to peer ratings (Richard & Dodge, 1982) make it difficult to reach conclusions from these findings. However, Allen et al. suggested that the gradient of effect of problem-solving training may be quite specific, with poor transfer to general adjustment.

A study by McClure et al. (1978) also based its training program on the D'Zurilla and Goldfried model. Subjects were 185 third and fourth grade children. Program outcome was assessed through: (1) a modification of the MEPS, with item content based on problem situations supplied by children and teachers, (2) dyad interactions, in which children discussed hypothetical problems with a confederate posing as a new child's mother, and (3) an experimental analog of problematic peer situations called the "Friendship Club."

It was found that training produced significant increases in the number and effectiveness of alternative solutions, which were independent of the effect of verbal productivity. However, as has been noted with respect to studies reviewed earlier, the obtained differences were small and may be of questionable real-life significance. The dyad interaction showed no treatment effects on measures of problem sensing or persistency. In the Friendship Club procedure, what treatment effects were found (in generation of alternatives and elaboration of solutions) appeared only in interactions with the type of hypothetical situation presented. Again, it was concluded that the ability to solve hypothetical problems does not necessarily transfer to real-life situations. However, it was striking that, despite their largely negative results, the authors pointed to their finding that the number of alternative solutions

generated was strongly predictive of the effectiveness of chosen solutions, and suggested that this was an indication of the potential value of problem-solving training in increasing social competence. This willingness to maintain a belief in social problem-solving training was evidently shared by teachers and undergraduate assistants involved in the study. "True to the problem-solving orientation" (p. 153), they decided to continue and extend the program through the following school year.

Several comprehensive training studies conducted by a research group at the University of Rochester also examined the value of problem-solving training in preventive programs. Gesten, Flores de Apodaca, Rains, Weissberg, and Cowen (1979) trained second- and third-grade subjects in problem identification, feeling recognition, alternative-solution and consequential thinking, and skill integration, using class discussion, role playing, and video modelling. Children who received the comprehensive program improved, relative to controls and those receiving an abridged (videotape only) program, on measures of alternative-solution and consequential thinking, and the number of solutions attempted in a contrived real-life problem situation. Trained subjects did not improve on measures of behavioral adjustment (teacher and peer ratings and measures of self-esteem and locus of control). Changes in social problem-solving skills correlated weakly

and infrequently with adjustment gains (Weissberg, Gesten, Rapkin, et al., 1981). There was, however, some evidence of improvements on peer and teacher ratings in trained children at 12 month follow-up (Gesten et al., 1982).

It was suggested that adjustment changes may have followed a slower course than problem-solving gains, or that earlier biases in teacher ratings had masked the initial effect on adjustment.

Weissberg, Gesten, Rapkin, et al. (1981) expanded the Gesten et al. (1979) program by doubling its duration, greatly increasing the number of lessons, and incorporating parent training to promote children's use of learned problem-solving skills. Subjects were third-grade pupils from both suburban and inner-city schools. The program produced substantial changes in the number of alternative solutions generated and the effectiveness of solutions. In addition, trained subjects attempted more solutions with greater persistence than controls on the contrived problem situation. However, there was again no improvement on behavioral adjustment measures. While some teacher adjustment ratings improved for suburban pupils and actually declined for inner-city subjects, this finding was difficult to interpret due to methodological problems. No significant relationships were found between changes in problem-solving and behavioral adjustment scores.

Weissberg, Gesten, Carnrike, et al. (1981) employed

a similar methodology in another study with second-, third-, and fourth-graders. They also added teacher-led postprogram follow-up through weekly reviews and social problem-solving "dialoguing" around day-to-day problem situations.

Trained subjects improved significantly more than controls on several problem-solving measures and on a contrived problem situation. They also showed greater improvements on teacher ratings of shy-anxious behaviors, total problems, likeability, and global school adjustment. Urban pupils gained more than suburban pupils on a number of teacher ratings. While this study was more successful than others in producing adjustment gains in trained pupils, it too failed to find consistently significant relationships between improvements in problem-solving skills and adjustment. The authors concluded, on the basis of this study and those preceding it, that while social problem solving appeared to be a useful and trainable skill with some evidence of generalizability outside the training situation, the role of such skills in actually mediating adjustment remained questionable. Similar findings and conclusions with respect to kindergarten children were also reported by Winer, Hilpert, Gesten, Cowen, and Schubin (1982).

Piscione (1981) devised a very broadly based social skills training program which combined cognitive problem-solving training with affective and life-skills training.

Subjects were 1017 lower SES children from Grades 5 to 8 in nine schools, with 85% of the subjects drawn from Grades 7 and 8. They were divided into a large number of groups ranging in size from 8 to 33 on the basis of classroom, training method (not of relevance here), and the assessment measure used. The training curriculum proceeded in a sequence corresponding to the D'Zurilla and Goldfried model discussed above. Materials were adapted from various sources, including Allen et al. (1976). In addition to skill training, the program emphasized the application and potential benefits of the skills in everyday life.

Piscione found, first, that problem-solving skills targeted in the program could be reproduced by subjects, as evidenced by posttraining improvements on a modified and abbreviated version of the Purdue Elementary Problem-Solving Inventory. Second, trained subjects demonstrated significant improvements relative to controls on ICPS measures including alternative-solution, consequential, causal, and means-ends thinking. The quality of problem-solving responses on these measures also improved. Improvements were also found on indices of personal responsibility, internal locus of control, and an action or "doing" orientation. Finally, trainees demonstrated improvements on three measures of social adjustment: Cassel's Test for Social Insight, the Mooney Problem

Check List, and the Intellectual Achievement Responsibility Scale, which appears to measure a construct related to locus of control.

While Piscione claimed that the consistently positive outcome with such a large sample supported the utility of the problem-solving approach for primary prevention programs, he also acknowledged that a number of methodological limitations qualified this conclusion. These included imprecise matching among the many treatment and control groups, failure to control for possible confounding variables (e.g., motivation, attention, and inadvertent modification of environmental contingencies), follow-up at only 3 weeks, and the lack of independent measures of cognitive processes and overt behaviors. Furthermore, the measures of social adjustment were so indirect that their validity and the conclusions based upon them are even more questionable.

The Piscione study also demonstrated a difficulty common to all the broad-based studies reviewed in this section. While they have an advantage over component-skill training studies in terms of ecological validity, their comprehensiveness also makes it difficult or impossible to sort out which aspect of training is responsible for any effects which do result (Butler & Meichenbaum, 1981; Urbain & Kendall, 1980).

In summary, models of the problem-solving process

such as the D'Zurilla and Goldfried model outlined in this section allow consideration to be given to the problem-solving process as a whole, or to groupings of skills within it. Such a view has potentially important clinical and, as will be suggested in the next section, measurement implications.

By virtue of their comprehensiveness and closer correspondence to the complexity of everyday problem solving, training programs based on a process view of problem solving might be expected to have a greater impact on both problem-solving ability and adjustment than programs which train children in discrete problem-solving skills. However, a consistent pattern of findings has emerged from research with both types of programs, and is well summarized by Winer et al. (1982):

Findings from a number of problem-solving interventions to date are consistent with respect to skill-acquisition, but not to adjustment. Children ranging from the preschool to the middle-childhood periods, with diverse sociodemographic backgrounds do indeed acquire such skills through training based on a variety of different curricula. Moreover, these "cognitive" gains generalize effectively to behavioral situations removed in time, place, and person from the training setting. . . . The strongest evidence for post-intervention adjustment-gain (and its mediation by cognitive-gain) is with preschool, initially maladjusted, inner-city disadvantaged children. Initially well-adjusted children, who have little "room" to improve, and older, suburban youngsters, show much weaker, if any, postprogram adjustive gains. (p. 207)

Another recent review concurred with this assessment, and did not consider it to be explainable by methodological

problems. As a result, it was concluded that "despite the intuitive appeal of (social problem-solving) skills, making their acquisition the core element for prevention programs directed at children in primary grades or older is a gamble that is not paying off" (Kirschenbaum & Ordman, 1984, p. 391).

Measurement of Problem-Solving Ability

If it can be concluded from the preceding discussion that problem solving is a composite skill, the question arises as to how this ability can be measured. It appears from the literature which has been reviewed that three distinct approaches have been taken to the measurement of problem-solving ability in children.

The research by Meichenbaum and Goodman, Douglas, and Camp and her associates, discussed above, employed standardized tests of cognitive function. This strategy provided useful preliminary information and stimulated a great deal of further research. However, since the relationship of the abilities measured to problem solving was poorly understood, this approach measured problem solving indirectly at best.

A second approach involved the construction of tests to assess problem-solving skills in hypothetical problem-solving situations. This "hypothetical-reflective" method

(Krasnor & Rubin, 1981) was used in the PIPS and MEPS measures described earlier. These instruments had the advantage of being related more directly to problem solving, and based upon a theoretical view of the nature of problem solving and its components. While Allen et al. (1976) produced some evidence of interrater reliability of MEPS scores and validity by the method of known groups, significant questions about the psychometric properties of this measure have also been raised (Butler, 1979; Meichenbaum & Butler, 1981).

Measures such as the PIPS and MEPS tests also emphasize certain aspects of problem solving in relation to, or to the exclusion of, others. This restricts their research utility, unless one is willing to risk conceptual and methodological complications by adding or constructing other tests to broaden the range of problem-solving skills measured.

A third approach to the measurement of problem-solving ability has allowed for measurement over a range of theoretical component problem-solving skills, while also providing for the separate measurement of component skills. The Purdue Elementary Problem-Solving Inventory exemplifies this approach, and will be discussed in detail in the next section.

The Purdue Elementary Problem-Solving Inventory

The Purdue Elementary Problem-Solving Inventory (PEPSI) was originally designed to assess problem-solving ability in socially disadvantaged children of varying ethnic backgrounds in the first through sixth grades (Asher et al., 1972; Feldhusen et al., 1972). It was based on a conceptualization of problem solving as a multifaceted process consisting of 12 component subskills. These subskills are summarized in Table 1, and related to the D'Zurilla and Goldfried model discussed earlier. As there was some variation in wording and numbering between the two publications cited above, both versions have been included in the table.

Items were developed to assess each of the 12 specific abilities. To enhance subject motivation and interest, they reflected real-life situations and avoided school-related content. To minimize cultural and socioeconomic bias, items avoided reliance on more elaborate conceptual, verbal, and memory skills, and a slide-tape presentation format was used. Developmental differences in problem-solving ability were accommodated by retaining items which became easier as grade level increased.

An initial item pool was reduced from 150 to 49 in three trial administrations. The final form was administered to 1073 school children. A principal factor analysis of

Table 1

Subskills Measured by the Purdue Elementary Problem-Solving
Inventory (PEPSI)

| Asher et al., 1972 | Feldhusen et al., 1972 | D'Zurilla and Goldfried, 1971 |
|---|--|---------------------------------------|
| 1. Sensing that a problem exists | 1. Sensing that a problem exists | 1. General orientation |
| 2. Identifying the problem specifically | 2. Defining the problem | 2. Problem definition and formulation |
| 3. Asking questions about the problem | 4. Asking questions | 2. Problem definition and formulation |
| 4. Guessing causes | 5. Guessing causes | 2. Problem definition and formulation |
| 5. Clarifying the goal | 3. Clarifying the goal | 2. Problem definition and formulation |
| 6. Judging if more information is needed to solve the problem | 6. Judging if more information is needed | 2. Problem definition and formulation |
| 7. Identifying relevant aspects of the problem situation | 7. Noticing relevant details | 2. Problem definition and formulation |
| 8. Redefining new uses of familiar objects | 8. Using familiar objects in unfamiliar ways | 3. Generation of alternatives |

Table 1 (continued)

| Asher et al., 1972 | Feldhusen et al., 1972 | D'Zurilla and Goldfried, 1971 |
|--|--|---------------------------------------|
| 9. Seeing implications of some action | 9. Seeing implications | 4 Decision making |
| 10. Sensing what should follow problem solution | 12. Verifying solutions | 4. Decision making 5. Verification |
| 11. Selecting the one possible solution among several alternatives | 10. Solving single-solution problems | 4. Decision making |
| 12. Selecting the best or most unusual solution among several alternatives | 11. Solving multiple-solution problems | 4. Decision making |

the results yielded problem-solving factors accounting for 21% (second grade) and 12% (fourth grade) of the common variance in a battery which included the PEPSI and other measures of logical thinking, concept formation, basic skills, verbal IQ, and perceptual ability. This shared variance, and the significant correlations obtained with other cognitive measures regarded as comparable to it, were presented as evidence of criterion related validity for the PEPSI. It was further concluded that while the PEPSI correlated highly with other cognitive measures, the results indicated that it measured several skills not assessed by cognitive and school achievement measures. Reliability (Kuder-Richardson formula 20) of the PEPSI was found to be .79 (Feldhusen et al., 1972; Houtz, Ringenbach, & Feldhusen, 1973).

Speedie, Houtz, Ringenbach, and Feldhusen (1973) factor-analyzed scores on the PEPSI from a sample of 364 second-graders (apparently a subsample from the two studies discussed above). Seven factors emerged, six of which were interpretable. These factors corresponded closely to 6 of the 12 subskills the PEPSI was originally hypothesized to measure. This result was presented as further evidence for the validity of the PEPSI. The six factors and the corresponding PEPSI subscales (numbered after Asher et al., 1972) were:

Factor I: Selection of the best possible solution
(Subskill 12)

Factor II: Noticing relevant or critical details
(Subskill 7)

- Factor III: Sensing that a problem exists (Subskill 1)
- Factor IV: Defining the problem specifically (Subskill 2)
- Factor V: Foreseeing consequences or implications (Subskill 9)
- Factor VI: Redefining common objects in unusual roles (Subskill 8)

The 12 subskills of the PEPSI have also been combined into several subtasks (subtests) to reflect hypothetical functional groupings within the problem-solving process. (Asher et al., 1972). One such grouping, the Presolution subtask, consists of two smaller subtasks, Sensing and Identifying (Subskills 1 and 2) and Clarification II (Subskills 3 through 7).

The Presolution subtask is of particular interest for the present research. Its 25 items appear to reflect the problem-solving operations which precede the choice and implementation of a problem solution; that is, those which mainly involve what Camp (1977) would term cognitive rather than associative processing. The remaining 22 items in the PEPSI (from Subskills 8 through 12) were given the subtask designation of Solving Problems III by Asher et al. (1972), and for the sake of clarity are termed Postsolution items in this thesis. Examination of the Postsolution items suggests that they require more direct and concrete (i.e., perceptual or associative) processing than do the Presolution items.

In another study, an attempt was made to investigate the relationship between the PEPSI and cognitive functioning by varying the degree of concreteness of test stimuli (Feldhusen & Houtz, 1975; Houtz & Feldhusen, 1975). Based on evidence that the cognitive style of disadvantaged children is more concrete and relational than that of nondisadvantaged children, it was hypothesized that test material in more concrete forms would increase the scores of disadvantaged relative to advantaged children.

Item formats varying from more abstract than the standard test (verbal description only) to less abstract (full-color, three-dimensional models) were presented to advantaged and disadvantaged second and fourth graders. A second experiment added a race factor. In both cases the standard test form (slide and tape) produced the highest performance. It was concluded that the concreteness or abstractness of the test format was not as important a determinant of performance as the content of the items themselves.

Houtz and Feldhusen (1976, 1977) provided fourth graders with training in the problem-solving skills measured by the PEPSI under training-plus-reward (with free time as the reward) and training-only conditions. There was also a pre- and posttest control condition. Items used for training were similar to PEPSI items, but with an open-ended response format. It was found that

the training-only group outperformed the training-plus-reward group, possibly because the reward was delayed or perceived as not contingent upon performance. As well, scores on a task involving the generation of alternative solutions were increased by training to a much greater degree than scores on the PEPSI itself. It was speculated that this difference was due to the PEPSI requiring skills in the evaluation as well as the generation of answers (possibly a significant contrast between the PEPSI and the MEPS).

In addition to its comprehensiveness, the PEPSI has a number of advantages which suggest its potential for problem-solving research: It offers an alternative measurement strategy to the essentially projective approach of the Spivack and Shure measures, which have been relied upon by most recent investigators. As Butler and Meichenbaum (1981) suggested:

"Capabilities" tests such as the PEPSI, which are carefully developed to assess maximal performance with respect to specific areas of problem-solving cognition, may provide quite precise information about the particular abilities or deficits in the cognitive repertoire of good and poor problem solvers. (p. 204)

Similarly, although the PEPSI has been regarded as a measure of social problem solving by some writers (Allen et al., 1976; Piscione, 1981), the everyday content of its items actually reflects a variety of social and nonsocial problem situations. There has been very little

research activity in this middle ground between the exclusively social focus of some problem-solving measures (e.g., the MEPS) and the impersonal content of others (e.g., the MFFT). It has also been pointed out that the PEPSI has been more adequately evaluated than many problem-solving measures in terms of its psychometric properties (Allen et al., 1976; Butler & Meichenbaum, 1981).

It would appear that the principal shortcomings of the PEPSI are the lack of published normative data, the fairly high "easiness level" of its items (Feldhusen et al., 1972), and its unknown relationship to behavioral adjustment (Kendall, Pellegrini, & Urbain, 1981). These questions will be addressed in the present research.

Summary of Literature Review and Research Problem

Viewing problematic aggression and other human adjustment problems in problem-solving terms has considerable intuitive appeal, and has received much recent attention in the research literature and in preventive and treatment programs. As was pointed out early in this discussion, it is important to remember that any consideration of problem solving will be strongly influenced by the way problem solving has been defined, and the descriptive and explanatory models which have been employed. It has been suggested, and is assumed for the purposes of the present

research, that a cognitive view of problem solving has the greatest applicability to social problem situations. In addition, this thesis emphasizes an information-processing view of problem solving, which postulates an orderly series of cognitive problem-solving operations.

There is ample evidence that aggressive behavior in children is largely a cognitively mediated phenomenon. The individual must initially make sense of a complex interpersonal problem situation to determine whether an aggressive course of action should be considered or carried out. The evaluation of intentions underlying the behavior of others has been established as an especially important cognitive process in this regard.

Understanding a problem situation, however, is only a first step in dealing with it. The individual must continue to engage in some form of orderly cognitive activity which is instrumental in arriving at an effective solution. Verbal mediation has been presented as a skill which is fundamental to such problem-solving processes. Camp and her associates built upon the work of Meichenbaum and Goodman in impersonal problem solving, and related verbal mediation to interpersonal problem solving and aggressiveness. Their research led them to suggest that aggressive children rely on immature associative processing which predisposes them to employ the first available response (often an aggressive one) in an interpersonal

problem situation rather than using more verbally mediated, reflective, and adaptive cognitive processing.

The work of Spivack and Shure and their colleagues proceeded from the level of fundamental cognitive abilities in problem solving to consider more complex functional units of problem-solving activity. They concluded that the generation of alternative solutions and the means to achieve them in social problem situations are especially important mediators of behavioral adjustment in middle childhood. This research has been the major influence upon recent research concerning the relationship between problem solving and behavioral adjustment. However, a number of methodological and psychometric limitations have been noted in their studies, and attempts to replicate their findings have met with limited success. It has been suggested that the original Spivack and Shure findings may be applicable primarily to disadvantaged, urban, minority children of preschool age.

The similarities and differences between social and nonsocial problem solving remain controversial. Little research attention has been given to "everyday" problem solving which may contain both social and nonsocial elements.

Other research into the relationship between problem solving and behavioral adjustment has produced evidence that the ability to inhibit impulsive responding in problem situations is a significant mediator of adjustment and,

like verbal mediation, may be fundamental to more complex problem-solving skills.

From the research reviewed in this thesis, it can be concluded that the importance of quantitative problem-solving deficits as factors in behavioral maladjustment, and specifically problematic aggression, has not been conclusively established. However, many of these studies (Asarnow & Callan, 1985; Cutrona & Feshbach, 1979; Deluty, 1981b, 1983; Hains & Ryan, 1983; Richard & Dodge, 1982; Walters, 1979) have suggested that other more qualitative aspects of problem solving may also be relevant to the relationship between problem solving and behavioral adjustment. These include differences in the nature of information which is attended to and processed in social situations, the preference for specific types of problem solutions, or the effectiveness of the solutions which are chosen.

When the studies reviewed in this thesis are examined in terms of approach and methodology, a number of conclusions can be drawn. With the exception of studies concerned with verbal mediation and impulse control, most investigations of the relationship between problem solving and adjustment have been concerned with a limited range of social-cognitive problem-solving processes. Studies of specific social-cognitive abilities have emphasized social inference, especially perspective taking. More

importantly, it is again pointed out that research into more complex problem-solving skills has been based almost exclusively upon the constructs and measures of Spivack and Shure and their colleagues. As a result, little is known about problem solving and its relation to behavior from any other theoretical or psychometric perspective. Finally, studies of problem-solving ability have generally investigated specific component skills, and few (especially among correlational studies) have attempted to incorporate a view of problem solving as a series of interrelated skills.

The research literature has also been quite restricted in terms of the populations which have been studied. Despite evidence, reviewed earlier, that middle childhood is an important period with respect to the development of problem-solving skills, relatively little is known about the relationship between problem-solving ability and adjustment in this age group. The results of a number of problem-solving training studies which have been conducted with elementary-school children in recent years have been inconclusive or nonsupportive of such a relationship.

Furthermore, questions can be raised about the means by which studies comparing adjusted and maladjusted children have defined and selected their samples. In many studies, maladjusted (or specifically aggressive) children

have been differentiated from others on the basis of teacher ratings which, it has been suggested, are less discriminating than peer ratings (Richard & Dodge, 1982). Whether children with behavioral problems were selected by either or both methods, it could not be determined how similar these children were to those who would require or receive clinical treatment for these problems. As well, almost all studies have involved the comparison of aggressive or globally dysfunctional children to normals. There have been few investigations comparing the problem-solving ability of children from various diagnostic or behavioral groupings. Thus it is not known whether the importance of problem-solving ability in mediating adjustment varies according to the adjustment problem being considered.

The present study investigated further the relationship between problem-solving ability and behavioral adjustment in elementary-school-age boys, with specific attention to clinically significant aggressiveness. It differed from most of the previous research in two principal respects: subject characteristics and selection procedures, and the measures employed.

In this study, aggressive boys were compared not only to normal boys, but also to others with behavioral problems of a nonaggressive nature. This approach permitted the importance of problem-solving ability to be investigated

with respect to both problematic aggressiveness and behavioral adjustment in general. As well, to ensure that the subjects with behavioral problems represented clinical populations, these subjects were obtained by referral from the professionals who had seen them in relation to their problem behavior. Teacher- and peer-rating behavioral measures, which had been used as criteria for subject selection in much of the previous research, were employed in the present study to cross-validate the sampling procedure which was used.

The advantages of the Purdue Elementary Problem-Solving Inventory, discussed earlier in this thesis, applied as well to its use as the measure of the problem-solving ability in the present research. It offered an alternative measurement approach to the often-used Spivack and Shure measures, a need which has been pointed out by other writers (Weissberg, Gesten, et al., 1981). It provided for comprehensive measurement across a range of theoretical problem-solving abilities, while retaining the capability to assess performance on a grouping of separate subskills. Finally, item content reflected everyday problems which combined social and nonsocial tasks, and which have not been widely studied.

A number of subsidiary questions were also addressed in the present research. As indicated earlier, data from this research were used to evaluate the sensitivity of

the PEPSI to differences in behavioral adjustment, and to explore questions arising from the lack of published normative data and the possibly low difficulty levels of the test items. The performance and utility of the peer- and teacher-rating measures used were also assessed. In addition, a self-report measure of habitual behavioral style (aggressive, submissive, and assertive) was included in the tests administered. This measure permitted an attempt to replicate previous findings that aggressive children differed from others in their preference for specific types of behavioral solutions in problem situations.

HYPOTHESES

The first two hypotheses tested in this study relate to the general research question; that is, the relationship between problem-solving ability and aggressiveness.

Aggressive boys were compared in terms of their Total PEPSI scores to normal controls, and to a clinically identified but nonaggressive group of boys whose behavior problems were hypothesized not to be as closely linked to problem-solving ability. It was hypothesized that:

1. Measured problem-solving ability will be less in boys with aggressive behavior problems than in boys with nonaggressive behavior problems.
2. Measured problem-solving ability will be greater in boys with no behavioral or emotional problems than in boys with either aggressive or nonaggressive behavior problems.

It should be remembered that hypotheses such as these, which predict global differences among clinical and nonclinical groups, can be limited in their utility due to problems in interpretation. Even if the data support such hypotheses, one cannot be certain whether this is the result of a theoretically significant difference between groups, or simply a manifestation of the truism that persons displaying one problem tend to have others as well. For this reason, the present study tested two further

hypotheses which were more specific in terms of both their theoretical basis and the locus of the predicted differences in test scores.

It was suggested by Camp (1977) that aggressive children rely on associative processing, which is characterized by relatively little use of complex cognitive mediation and makes the selection of the first available response (such as aggression) probable. If this is the case, aggressive boys should perform less well on the Presolution items of the PEPSI which, as proposed in the previous section, can be assumed to reflect the predominantly "internal" mediational operations preparatory to the choice and implementation of a solution. Therefore, it was hypothesized that:

3. Measured ability to perform Presolution problem-solving operations will be less in boys with aggressive behavior problems than in boys with nonaggressive behavior problems.
4. Measured ability to perform Presolution problem-solving operations will be greater in boys with no behavioral or emotional problems than in boys with either aggressive or nonaggressive behavior problems.

It is also possible that aspects of cognitive problem solving which follow the choice and implementation of a solution rely to a greater degree upon more concrete,

readily observable cues and feedback from the results of problem-solving behavior (that is, on more associative processing). By the same logic which underlies Hypotheses 3 and 4, it might be expected that aggressive children would be able to perform these operations adequately. For this reason, no differences were predicted among clinical aggressive, clinical nonaggressive, and control boys in the ability to perform the more associative problem-solving operations which are assumed to be measured by the Postsolution subtask of the PEPSI.

Even if aggressive children were found to differ from others in cognitive problem-solving ability, important questions would remain concerning the implications of the findings in terms of actual social functioning. As mentioned earlier, for example, aggressive and nonaggressive boys may or may not differ in the choice of preferred interpersonal behaviors in peer problem situations. Although no formal predictions were proposed, exploratory comparisons with respect to such behavioral tendencies were made in the present research.

PILOT STUDYINTRODUCTION

As indicated in the preceding discussion, the PEPSI was chosen as the principal measure for this research primarily on the basis of its comprehensiveness, the everyday content (social and nonsocial) of the test items, and empirical evidence of reasonable psychometric properties. However, during the early planning phases of the study, a number of questions remained unanswered concerning the PEPSI. No norms or standardization data had been made available, and there had been little recent research using the PEPSI. Furthermore, examination of the test items raised concerns about the appropriateness of their difficulty level for subjects who were expected to differ in grade level and socioeconomic status (SES). A pilot study was conducted to help resolve these questions, and to evaluate the potential usefulness of the PEPSI for the principal research.

METHODSubjects

Initial subjects were 126 pupils from two elementary

schools in Halifax. These schools are referred to here as "Suburban Elementary" and "Downtown Elementary" to preserve confidentiality. In each school, one class from Grades 2, 4, and 6 was tested as a group with the PEPST. Of the 126 children tested, the scores of three (all from the Grade 2 class at Downtown Elementary) were eliminated before the data were analyzed due to obvious misunderstanding of the test instructions or the omission of more than three test items. This resulted in a final N of 123.

The two schools used in this study were chosen because it was expected that their student populations would differ substantially in terms of socioeconomic level. Downtown Elementary School is located in an area containing a primarily low-income population, while Suburban Elementary is located in a relatively new, middle-income residential area of Halifax. Although it is recognized that there would be a number of exceptions in both schools to this approximate classification, it is assumed to be adequate for the present purpose of examining the relationship between PEPST scores and SES.

No systematic effort was made to record or control demographic variables such as racial or ethnic origin in the classes tested. However, it was noted from casual observation that black students were a sizeable minority at Downtown Elementary. There were also a number of children from Southeast Asian backgrounds. Although the

students tested at Suburban Elementary were predominantly Caucasian, there were some children of Asian and Oriental extraction.

The characteristics of the children in the final sample from each classroom are summarized in Table 2.

Procedure

Written parental consent was obtained for the pupils tested. Group administrations of the PEPSI were conducted in each classroom in December, 1982. Prior to the test, the children were given an explanation of the procedure (see Appendix G). The importance of not showing their answers, looking at those of other children, nor calling out answers was emphasized. Children were encouraged to ask the investigator or the teacher for help. Items were replayed on the tape as requested by students, or if all did not appear to have heard or understood them adequately. The entire procedure took less than one hour. The only exception was the Grade 2 class at Downtown Elementary, which required 80 minutes. Members of this class appeared more restless than others, and had some difficulty following the instructions. However, the fact that they were tested on the last Friday afternoon before Christmas, with the regular classroom teacher absent, should also be taken into account when interpreting the scores from this

Table 2

School, Grade Level, Age, and Sex of Subjects - Pilot Study

| School | Sex ^a | | Age ^b | |
|---------------------|------------------|-------|------------------|-----|
| | Boys | Girls | M | SD |
| Suburban Elementary | | | | |
| Grade 2 | 13 | 7 | 91 | 3.6 |
| Grade 4 | 13 | 14 | 117 | 5.2 |
| Grade 6 | 13 | 7 | 141 | 5.2 |
| Downtown Elementary | | | | |
| Grade 2 | 5 | 7 | 92 | 6.1 |
| Grade 4 | 7 | 16 | 118 | 7.9 |
| Grade 6 | 11 | 10 | 140 | 4.4 |

^aNumber of subjects. ^bIn months. Fractions of months disregarded.

classroom. Generally, the students in all grades at Downtown Elementary required more explanations and repetitions of test items and procedures than those at Suburban Elementary.

RESULTS

Total Scores

The PEPSI Total scores of the pupils in each of the six classes tested are summarized in Table 3. The group testing situation inevitably results in some copying and calling out of responses, as well as the possibility of inadvertent cueing of pupils by testers or classmates as to correct answers. For these reasons, the scores as reported may be somewhat inflated relative to those which would have been obtained by individual administration.

An unweighted means analysis of variance was carried out on the data. A significant effect was found for grades, $F(2, 117) = 22.45, p < .001$, indicating that performance on the test increased with grade level. The grades variable accounted for 26.5% of the variance. A significant schools effect was also found, $F(1, 117) = 5.09, p < .05$. This reflects higher scores among the Suburban Elementary pupils than among those at Downtown Elementary. To the extent that the difference between the schools is one of SES, this result supports the conclusion that SES also affects

Table 3
Scores on the Purdue Elementary Problem-Solving
 Inventory (PEPSI) - Pilot Study

| School | | Grade | | |
|---------------------------------------|-----------|-------|-------|-------|
| | | 2 | 4 | 6 |
| <u>Total Scores^a</u> | | | | |
| Suburban | <u>M</u> | 30.9 | 37.5 | 39.6 |
| Elementary | <u>SD</u> | 3.6 | 2.2 | 2.3 |
| | Range | 26-37 | 33-42 | 34-44 |
| Downtown | <u>M</u> | 27.2 | 33.4 | 38.9 |
| Elementary | <u>SD</u> | 3.2 | 4.3 | 2.5 |
| | Range | 22-29 | 24-42 | 33-43 |
| <u>Presolution Scores^b</u> | | | | |
| Suburban | <u>M</u> | 14.6 | 18.3 | 20.2 |
| Elementary | <u>SD</u> | 2.9 | 1.9 | 1.6 |
| | Range | 10-19 | 14-22 | 17-24 |
| Downtown | <u>M</u> | 12.8 | 16.6 | 19.1 |
| Elementary | <u>SD</u> | 1.8 | 2.5 | 1.9 |
| | Range | 10-15 | 11-23 | 15-22 |

^a Maximum score = 47. ^b Maximum score = 25.

PEPSI scores. However, this effect was much smaller, accounting for only 2.5% of the variance.

Pairwise comparisons of classroom means between schools at each grade level revealed significant differences at the Grade 2 [$t(117) = 3.29, p < .01$] and Grade 4 [$t(117) = 4.68, p < .01$] levels, but not between the Grade 6 classes; $t(117) = .77, ns$.³ However, this pattern of differences was not accompanied by a significant Schools x Grades interaction, $F(2, 117) = .73, ns$.

Presolution Scores

PEPSI Presolution scores, which would be of interest for the principal study, are also summarized in Table 3. Unweighted means analysis of variance again revealed a significant effect for grades; $F(2, 117) = 73.75, p < .001$. The grades variable accounted for 53.5% of the variance. A significant schools effect was also found, $F(1, 117) = 14.18, p < .001$, reflecting higher scores among the Suburban Elementary pupils. The schools variable accounted for 4.7% of the variance. The Schools x Grades interaction was nonsignificant, $F(2, 117) = .21, ns$.

Pairwise comparisons of classroom means between schools at each grade level revealed a significant difference between classes at the Grade 4 level, $t(117) = 2.76, p < .01$. Differences were not significant between the Grade 2 classes, $t(117) = 2.18, ns$, nor between the Grade 6 classes, $t(117) = 1.69, ns$.^{3,4}

DISCUSSION

These findings with respect to the PEPSI Total scores are very similar to those of the original PEPSI research. Asher et al. (1972) found that grade level accounted for a substantial proportion of the variance in PEPSI scores, between 9% and 37%. The advantagedness variable accounted for a much smaller proportion, between 0.7% and 5%. A similar pattern of results was also obtained in this research when Presolution scores were analyzed. Comparisons of classroom means between schools at each grade level suggest that the small effect of SES on PEPSI scores may lessen or disappear at higher grade levels. In fact, it is possible that even the differences obtained at the Grade 2 level were exaggerated by the problems encountered in testing the Grade 2 class at Downtown Elementary.

It was concluded on the basis of this pilot study that the PEPSI was an appropriate measure of problem-solving ability for the principal research described below. It could be administered to most Grade 2 to Grade 6 pupils within one hour. It appeared to be neither too difficult for most Grade 2 pupils, nor too easy for most Grade 6 pupils. Its reasonable "culture-fairness" (Asher et al., 1972, p. 70) across socioeconomic levels and the increase of scores with grade level also pointed to its potential utility for problem-solving research.

PRINCIPAL STUDYMETHODSubjectsGroup 1 - Clinical Aggressive

Potential subjects for this group of 12 boys were referred by professional staff of the Special Education and Services Departments of the Halifax City and the Halifax County and Bedford District School Boards, and of the Halifax and Sackville Branches of the Atlantic Child Guidance Centre (ACGC). In all cases, the referring staff member obtained the verbal consent of the child's parents before making the referral. Criteria for referral of potential subjects were:

1. They were being seen currently by the referring staff member in connection with repeated difficulty with peers, which took the form of aggressive behavior. Referral sources were given Hartup's (1974) definition of aggressive behaviors, which was cited earlier in this thesis. It was also mentioned that this study was concerned chiefly with interpersonal aggression.
2. They would have passed their 8th birthdays but not reached their 13th birthdays at the time of

data collection.

3. They were attending regular Grade 3 to 6 classes in Halifax City or Halifax County schools.⁵
4. Caucasian.

Several categories of boys were not considered for inclusion in this subject group (or any of the others) because of the expectation that it would be difficult to consider aggressive behavior separately from other problem behaviors.⁶ Excluded on this basis were:

- 5a. Boys whose identified problems included psychosis, or neurological or physical disability, or whose problems were judged by the referral source to be related primarily to learning difficulties.
- 5b. Boys whose problems were judged by the referral source to be primarily or equally emotional as well as behavioral in nature (e.g., anxiety reactions, depression, adjustment reactions to recent changes or stresses).
- 5c. Boys who were being seen for enuresis or encopresis. These boys were excluded because of separate referral and treatment procedures which existed for them at ACGC.

The following brief description of two boys in the clinical aggressive group are included as illustrative examples. Names have been changed and identifying information modified to preserve confidentiality.

Scott was described by the referral source as disruptive and argumentative. While his classroom behavior had improved somewhat, he was frequently explosive and physically aggressive on the school grounds. He would usually blame others for problems, and refuse to accept any responsibility himself. Scott's parents reported problems since early school age, and felt that past attempts at behavior therapy had produced no lasting effect.

Peter's identified problems at school included suspensions for fighting, underachievement, and disregard for rules. His parents complained of noncompliance at home as well.

Group 2 - Clinical Nonaggressive

A second sample of 12 boys was obtained by the same method from the Special Education and Services Department of the Halifax County and Bedford District School Board, and from ACGC. These boys were selected according to the following criteria:

1. They were being seen currently by the referring staff member in connection with behavioral difficulties at home and/or school; but presented no consistent peer difficulties of an aggressive nature.
- 2-5. Same as for Group 1.

While the characteristics of this group could not

be determined in advance; it was anticipated that these children would typically demonstrate problems of moderate severity in some areas (e.g., mischief, stealing, disruptiveness), but function adequately in others. This could be taken as an indication that they were effective problem solvers in some areas of their lives, but in others were not capable of avoiding repeated difficulty. This assumption was the basis of the hypothesis proposed earlier that the problem-solving ability of this group would be greater than that of problematically aggressive children (for whom, it has been hypothesized, deficient problem-solving ability is a central feature), but less than that of control children presenting no evident problems. The inclusion of this group was also intended to control for clinical status by permitting an important question to be addressed; that is, whether a problem-solving deficit is of particular importance with regard to aggressiveness in children, or is a feature of clinical populations in general.

As expected, the boys in the final clinical nonaggressive sample had exhibited a variety of behavioral problems, including noncompliance, school underachievement unaccompanied by learning problems, poor self-control, and specific parent-child difficulties. Two boys from the clinical nonaggressive group, again with names changed and identifying information omitted or modified, are

described briefly as illustrations.

Terry was described on referral as stubborn and often refusing to apply himself to his work in school.

His parents confirmed a history of problems with behavior and "attitude" for several years.

Jeffrey, although cheerful and friendly, was repeatedly in trouble for lying. He was often very excitable. Men found his behavior easier to manage than did women. His parents also reported behavior problems.

Group 3 - Control

A sample of 12 control subjects was also selected.

Boys in this group were drawn from the home room class of every second subject in each of the clinical groups.

In each case, a potential control subject and one or more alternates were selected using a class list from which the teacher had eliminated boys he or she considered to have evident behavioral, emotional, or learning problems.

Only boys who had participated in the sociometric testing (see Procedure below) could be selected as potential control subjects.

In addition, control subjects met the following criteria:

1. They had no prior or current contact with the school Special Services Department, ACGC, Children's Hospital Psychiatry, Psychology, or Neurology Departments, or any similar service, as indicated

by the referral source or parents. In addition, there were no other indications of persistent problems as referred to in the criteria for Groups 1 and 2 above.

2-5. Same as for Groups 1 and 2.

In each case, the first potential control subject who met the above criteria, and for whom parental consent had been received, underwent the same data collection procedure as boys from Groups 1 and 2.

The use of a matched control group drawn from the classrooms of boys in Groups 1 and 2 was intended not only for the main research purpose of comparing clinical samples to "normals", but also to serve as an approximate control for SES, community of residence, and other demographic variables.

Boys were referred specifically for inclusion in one of the two clinical groups, and considered only for that group. Referrals were screened in relation to the above criteria using the information supplied by the referral source on the Referral and Information Form (see Appendix M), and by the parent on the Parent Questionnaire (see Appendix S). Referral sources or parents were contacted if further clarification was required.

Once parental consent forms and the Parent Questionnaire had been sent and returned by mail, each subject was tested with his classmates and individually

(see Procedure). He would remain in the sample only if the standard score he obtained on the Peabody Picture Vocabulary Test-Revised (PPVT-R) was at least 85. This cut-off point was chosen on the basis of Miller's (1972) statement that all types of deviant behavior were likely to increase as IQ scores on most tests (including, it is assumed, the original version of the PPVT) fell below 90. This level is equivalent to a standard score of 83 on the PPVT-R (Dunn & Dunn, 1981). For the present study, this was rounded to 85, one standard deviation below the mean. A similar practice was adopted by Camp (1977) and Camp, Zimet, et al. (1977), discussed earlier.

The data collection procedure was continued until the desired sample size of 12 was reached for each group.

A breakdown by referral source of the 36 subjects in the final sample, and the 19 boys who were referred but not included in the final sample, appears in Appendix A. Appendix B gives a further breakdown of subjects excluded according to the group for which they had been considered and the reason for exclusion.

The composition of the three final samples by grade level and age is summarized in Table 4. Note that the distribution of grade levels was approximately equal among the groups, except that there were no Grade 6 pupils in the clinical nonaggressive group. Most subjects were at the expected age for their grade levels, with the exception

Table 4

Subject Group Composition by Age and Grade Level

| Group ^c | Age ^a | | Grade ^b | | | |
|---------------------------|------------------|-----------|--------------------|---|---|---|
| | <u>M</u> | <u>SD</u> | 3 | 4 | 5 | 6 |
| Clinical Aggressive | 132.4 | 18.3 | 4 | 3 | 3 | 2 |
| Clinical Nonaggressive | 127.5 | 12.9 | 4 | 4 | 4 | — |
| Control | 123.0 | 15.7 | 4 | 3 | 3 | 2 |

^aIn months. Ages of individual subjects rounded to nearest whole month. ^bFrequencies. ^cn = 12.

of three clinical aggressive subjects (one from each of Grades 4, 5, and 6) and four clinical nonaggressive subjects (three from Grade 4 and one from Grade 5), who were approximately one year older. The three groups did not differ significantly in mean age, $F(2, 33) = 1.07$, ns.

Equipment and Materials

1. Purdue Elementary Problem-Solving Inventory (PEPSI)

The PEPSI (Feldhusen et al., 1972), discussed in detail earlier in this thesis, served as the principal measure for this research. It was administered to subjects using the taped instructions supplied with the test, and with additional orientation and instruction by the investigator (see Appendix G): The test items, originally supplied in filmstrip form, were remounted as half-frame 35 mm slides to permit presentation of the slides and taped instructions using a Singer Caramate rear projection apparatus. The Caramate enabled subjects to be tested without requiring a projection screen and darkened room, and by a novel means which might help maintain subject interest.

2. Peabody Picture Vocabulary Test-Revised (PPVT-R)

The PPVT-R (Dunn & Dunn, 1981) is a widely used measure of receptive vocabulary. The revised version has demonstrated median split-half and test-retest reliability

coefficients of approximately .80 (Dunn & Dunn, 1981). Validity research, mostly with the original PPVT, has demonstrated moderate correlations with other measures of verbal intelligence. For example, median correlations of approximately .65 have been reported with Verbal and Full Scale scores of the Wechsler Intelligence Scale for Children (WISC) (Dunn & Dunn, 1981).

The PPVT-R was used in this study as an approximate index of verbal intelligence.

3. Children's Action Tendency Scale (CATS)

In this self-report measure (Deluty, 1979), children are presented with hypothetical problem situations and asked to indicate which of two alternative behavioral responses (three pairs per situation) they would choose (see Appendix D). The CATS yields scores on Aggressiveness, Assertiveness, and Submissiveness.

The initial research with the CATS (Deluty, 1979) produced split-half reliability coefficients of .77, .63, and .72 for the Aggressiveness, Assertiveness, and Submissiveness scales, respectively. Test-retest reliabilities for boys on the same three subtests were significant but quite low; .44, .50, and .52. Investigations of the validity of the CATS revealed significant correlations of the self-report ratings on the three scales with ratings by peers and teachers. Of interest for the present research was the finding that

the correlations were the highest in the case of the Aggressiveness scale. CATS Aggressiveness scores were also found to be significantly higher in a sample of clinically identified aggressive boys in a special school, when compared with a sample of boys from a nonclinical population.

Although the low obtained reliabilities are indications for caution in interpreting the results from this test in the present research, the CATS was considered to be adequate for the purpose of exploratory comparisons of preferred behavior choices in conflict situations.

4. Pupil Evaluation Inventory (PEI)

This peer-nomination sociometric measure (Pekarik, Brinz, Liebert, Weintraub, & Neale, 1976) contains 34 behavioral descriptions and one demonstration item (see Appendix E) arranged in rows in the answer booklet. The names of peers appear over the columns. Children are asked to indicate which classmates are best described by the content of each item. The measure yields Aggression, Withdrawal, and Likeability subscores for each child.

The original research with the PEI (Pekarik et al., 1976) was based on the scores of 181 male and 171 female children who had been rated by approximately 4000 peers and teachers. The PEI was found to demonstrate high internal consistency ($r > .70$ in most cases), and interrater agreement between males and females (most $r_s > .60$).

Significantly for present purposes, the Aggression scores demonstrated higher internal consistency (most over .90) and male-female interrater agreement (.75 - .92) coefficients than did the other subscales. Median test-retest reliability coefficients for all subscores exceeded .80. Concurrent validity, as measured by the correlations of PEI scores with teacher- and self-ratings, was acceptable.

More recent evidence for the satisfactory reliability of the PEI has been presented by Grossi and Nicholson (1983). The PEI has also been shown to successfully differentiate the children of schizophrenics and depressives from children in a control group (Weintraub, Prinz, & Neale, 1978), and to identify aggressive and withdrawn children potentially vulnerable to psychopathology (Ledingham, 1981). O'Leary and Johnson (1979) regarded the PEI as having been more thoroughly assessed for its psychometric adequacy than most other sociometric measures.

The PEI was used in the present research principally to evaluate the extent to which the subject selection procedure produced samples which could be distinguished from one another on the basis of peer-rated aggressiveness. Exploratory comparisons would also be made with respect to Withdrawal and Likeability scores.

5. School Behavior Checklist (SBCL)

The SBCL (Miller, 1972, 1977) requires the teacher

to answer True or False to 96 behavioral descriptions of the child in the school setting. Form A2, for ages 7-13, yields six subscale scores plus a Total Disability score. The subscales were derived by factor analysis in a study which cross-validated and modified The Pittsburgh Adjustment Survey Scales (Miller, 1972). The SBCL subscales, with sample items, are listed in Appendix F. Subscale scores are reported in the form of standardized T scores (M = 50, SD = 10).

Miller (1977) reported split-half and test-retest reliability coefficients of .70 to .90. The only exception was the Hostile Isolation subscale, which produced a coefficient of approximately .40. Two studies have also reported evidence of satisfactory criterion-related validity (Miller, 1977).

In this research, the SBCL was used for a purpose similar to the PEI; that is, to cross-validate the selection procedure for the three subject groups, as well as to permit additional comparisons among subject groups.

6. Indices of Socioeconomic Status (SES)

Quantitative socioeconomic indices were devised by Blishen and McRoberts (1976) for male wage earners and by Blishen and Carroll (1979) for females. The indices were derived from Canadian census data and based on a regression formula incorporating education, occupation, and prestige variables. Because SES has been found to

be related to both problem-solving ability (Asher et al., 1972; Gottman et al., 1975; McKim et al., 1982; Shure, 1982; Spivack et al., 1976) and aggression (Feshbach, 1970; Semler et al., 1967), these indices were used to estimate and compare the SES of subjects in the present research.

7. Additional Equipment and Materials

Subject referral and information forms, explanatory memoranda, consent forms, questionnaires, and materials for test administration and scoring are referred to at various points in this thesis and contained in the Appendixes.

Procedure

Overview of Research Procedure

For each clinical subject, data collection proceeded in two phases. In the first phase, the peer-nomination sociometric procedure was administered in the subject's home room classroom. When applicable, selection of potential control subjects was also carried out. In the second phase of data collection, the investigator returned to the school and conducted individual testing of clinical and control subjects.

Classroom Administration of Sociometric Procedure

The Pupil Evaluation Inventory (PEI) was administered

to the home room classes of clinical subjects beginning in November, 1983. The PEI was not administered during September and October of the school year, as it was assumed that peer relationships and perceptions would not be sufficiently stable to permit reliable measurement.

Before the investigator visited the school for the sociometric testing, a class list was obtained. Parental consent forms were prepared for each child in the class and sent to the school; together with a description of the research procedure for the Principal and teacher (see Appendix L). It was requested that consent forms be sent home and returned to school with each pupil.

The names of all boys in the class were arranged in random order. One name was then entered at the top of each column on the blank PEI answer booklet using a stencil and spirit duplicator. The order of names was adjusted as required to ensure that the name of the clinical subject did not appear first or last, and to prevent similar first or last names from appearing adjacent to each other.

The PEI was administered by the investigator in the classroom of each boy selected for the study, at a time when all children whose parents had given their consent were available. Efforts were made to conduct the procedure as soon as possible after referral, and as early in the day as possible to minimize the effects of fatigue and restlessness. Testing was carried out only if the referred

child was present, and care was taken not to single him out in any way. In almost all cases, the teacher was present during the procedure.

It was explained to the children that the investigator wanted their help to "find out what kinds of things boys do at different ages and in different grades" (Pekarik et al., 1976, p. 18). They were instructed in the use of the answer booklets, and the sample item was done aloud with the participation of volunteers from the class (see Appendix I). Children completed each subsequent item after it was read aloud by the investigator, who emphasized the importance of not showing, copying, nor calling out their answers. The confidentiality of their answers and the voluntary nature of their participation was also emphasized. To prevent confusion and errors, children were supplied with 40.5 mm by 9.5 mm pieces of green bristol board with which they could cover questions they had not yet reached.

On the same day, in classrooms from which a matched control subject was to be selected, the teacher was asked to designate any boys on the class list whom he or she considered to demonstrate significant behavioral, emotional or learning problems. These boys would not be considered as possible control subjects. Two potential control subjects were later selected at random from the remaining boys. Consent forms, Parent Questionnaires,

and descriptions of the study were sent to the parents of these boys.

Individual Testing

Individual testing of clinical and, when applicable, control subjects was carried out on a second visit to the school. The time interval between sociometric and individual testing was 1 to 2 weeks in most cases for clinical subjects not matched with controls, and 3 to 4 weeks when controls were selected and tested. The order of testing between clinical subjects and their matched controls within each group was counterbalanced. Tests were administered in the following order: PPVT-R, PEPSI, and CATS. Administration usually took between 60 and 90 minutes. Although subjects were offered rest periods during the testing, most chose to continue.

Further visits to the school were sometimes required if clinical and control subjects could not be tested on the same day, or if it became necessary to test more than one control subject. In addition, two visits were needed to complete testing on one clinical aggressive subject due to rapport and behavior problems. In the case of two clinical nonaggressive subjects, testing was terminated by unanticipated events at school, and the tests which had not been completed were readministered on a second date. Form M of the PPVT-R was employed with all subjects, unless the alternate Form L was required for a second

administration. This occurred in four cases: the clinical aggressive subject mentioned above, one of the two clinical nonaggressive subjects whose testing sessions had been interrupted, and two other clinical nonaggressive subjects whose scores were considered invalid due to inadequate attention to the test in one case and the admission of frequent guessing in the other.

At the time of the individual testing, teachers were given SBCL materials for each child tested, together with an explanatory letter and a stamped envelope in which to return the completed checklists. In most cases, completed forms were received within 2-3 weeks. One teacher took approximately 2 months to return SBCL forms on one clinical nonaggressive and one control subject.

Socioeconomic indices were obtained on the basis of occupational information supplied by the parents or guardians in the Parent Questionnaire. If a parent or guardian was temporarily unemployed, his or her usual occupation was used in determining the socioeconomic index. If both parents of a subject were employed, the higher of the two indices was used as the socioeconomic index with respect to that subject.

RESULTS

Overview of the Results Section

The findings of this study will be presented first by comparing data for the three subject groups. These comparisons will provide further information on subject characteristics (PPVT-R scores and SES), evaluation of the research hypotheses with respect to problem-solving ability, and the results of the teacher-rating, self-report, and sociometric measures. Additional evaluation and modification of the sociometric instrument will also be reported. Secondly, the intercorrelations among all test scores and subject characteristics will be presented. Finally, data will be reported which examine the effect upon the research results of alternative approaches to subject classification.

The hypothesized differences among the three groups with regard to PEPSI scores were tested by means of a one-factor analysis of covariance. Problem-solving ability can be expected to increase with age and grade level, as the pilot study reported earlier and other evidence (Asher et al., 1972; Walters, 1979) have shown. Similarly, significant correlations between problem-solving ability and various measures of intelligence have been demonstrated, with respect to both the PEPSI (Asher et al., 1972) and

other problem-solving tests (Butler, 1979). While it was not possible to control for the effect of these variables through matching or other sampling techniques, the use of analysis of covariance with age and PPVT-R scores as covariates would permit these sources of variance to be removed from problem-solving scores.

The analyses of covariance were carried out by performing a regression analysis of PEPSI scores, with group membership, age, and PPVT-R scores as predictors, using the MINITAB statistical computing system (Ryan, Joiner, & Ryan, 1976). The output of the MINITAB regression program includes analysis of variance information from which an analysis of covariance can be derived. The results of these analyses were verified using the MANOVA subprogram of the SPSS^X statistical package (SPSS Inc., 1983).

Comparisons of subject groups with respect to all other data, as well as additional analyses of PEPSI scores, were made by one-factor analysis of variance. Where appropriate, pairwise contrasts between group means were made using the Tukey method (Glass & Stanley, 1970). Pearson's product-moment correlation coefficient (r) was used for all correlational analyses.

The sampling procedure employed in this research presents one possible analytical problem with respect to the analysis of variance and covariance. Due to the fact that in each clinical group, only half the subjects were

matched with controls from their classrooms, data for clinical and control samples were statistically independent in some cases, but could be considered as dependent in others. The inclusion of dependent (correlated) data in a statistical test which assumes independent (uncorrelated) samples can bias the estimation of the standard error of differences between group means (Glass & Stanley, 1970, p. 300). The extent to which this issue applies to the present research will be addressed later in this section.

Subject Characteristics

PPVT-R

Standard scores on the PPVT-R are reported in Table 5. While scores were lowest for the clinical aggressive group and highest for the control group, this difference was not significant, $F(2, 33) = 1.18, ns$. This finding suggests the approximate equivalence of the groups in terms of verbal intelligence, as measured by the PPVT-R.

SES

Indices of SES are also reported in Table 5. Differences in SES among the groups were not found to be significant, $F(2, 33) = 2.27, ns$. Examination of the SES index tables (Blisshem & Carroll, 1978; Blisshem & McRoberts, 1976) reveals that the approximately 10-unit

Table 5

Peabody Picture Vocabulary Test-Revised (PPVT-R) Scores
and Socioeconomic Status (SES)

| Group ^c | PPVT-R ^a | | SES ^b | |
|---------------------------|---------------------|-----------|------------------|-----------|
| | <u>M</u> | <u>SD</u> | <u>M</u> | <u>SD</u> |
| Clinical Aggressive | 100.3 | 11.8 | 40.8 | 11.3 |
| Clinical Nonaggressive | 104.1 | 10.7 | 49.9 | 11.4 |
| Control | 107.5 | 12.2 | 50.2 | 14.2 |

^aForms L and M. ^bIndex of SES based on Canadian Census
 Data. ^cn = 12.

range of mean indices between the clinical aggressives and the other two groups represents such relatively small distinctions as those between mail carriers, receptionists, and air transport workers on the lower end of the range and fire fighters, secretaries, and printers on the upper

Purdue Elementary Problem-Solving Inventory

Table 6 shows means and standard deviations of PEPSI Total, Presolution, and Postsolution scores. All analyses of covariance, summarized in Table 7, produced nonsignificant results, with F ratios less than 1. It was also found that correlations between PEPSI scores and the covariate measures were nonsignificant and minimal. As a result, the analyses of variance, also summarized in Table 7, produced results very similar to the analysis of covariance.

Examination of the PEPSI scores and their distribution for all 36 subjects indicated an approximately normal distribution for the Presolution scores, with a range comparable to that which was obtained in the pilot study. This suggests that the absence of significant differences among the groups was not the result of obvious measurement insensitivities. The distribution of the Postsolution scores, however, was markedly skewed, with 28 of 36 scores between 19 and 21 (of a possible 25). It is likely that

Table 6

Scores on the Purdue Elementary Problem-Solving Inventory
(PEPSI) - Principal Study

| Score | Group ^a | | |
|----------------------------------|--------------------|-------|-------|
| | CA | CNA | CO |
| <u>Total</u> ^b | | | |
| <u>M.</u> | 36.6 | 36.4 | 37.4 |
| <u>SD</u> | 3.4 | 2.6 | 2.2 |
| <u>Range</u> | 30-40 | 32-41 | 33-41 |
| <u>Presolution</u> ^c | | | |
| <u>M</u> | 17.6 | 17.3 | 18.2 |
| <u>SD</u> | 2.0 | 1.7 | 1.9 |
| <u>Range</u> | 14-20 | 15-21 | 15-22 |
| <u>Postsolution</u> ^d | | | |
| <u>M</u> | 19.0 | 19.2 | 19.3 |
| <u>SD</u> | 2.0 | 1.5 | 1.0 |
| <u>Range</u> | 15-21 | 16-21 | 17-20 |

Note. CA = Clinical Aggressive; CNA = Clinical Nonaggressive; CO = Control.

^a n = 12. ^b Maximum = 47. ^c Maximum = 25. ^d Maximum = 22.

Table 7

Summary of the Analysis of Variance and Covariance of the
Purdue Elementary Problem-Solving Inventory (PEPSI) Scores

| Score | Analysis | |
|--------------|-------------------|-----------------|
| | <u>Covariance</u> | <u>Variance</u> |
| Total | .42 | .45 |
| Presolution | .64 | .76 |
| Postsolution | .10 | .08 |

Note. All entries are F ratios. One-factor analyses were performed, with three levels: Clinical Aggressive, Clinical Nonaggressive, and Control. Degrees of freedom: 2 and 31 (covariance); 2 and 33 (variance).

the items comprising the Postsolution score were too easy to provide an adequate degree of discrimination among ability levels. With respect to the Total scores, the range was again similar to the pilot study results. The distribution of Total scores was mildly negatively skewed, probably reflecting the effect of the high Postsolution scores.

The statistical issue of the combination of uncorrelated and potentially correlated data, mentioned earlier, is clearly unimportant with respect to these results. It is intuitively obvious that, even if a conservative bias had resulted from the violation of the independence assumption, it would be inadequate to explain such small F ratios. In fact, an analysis of variance of Total PEPSI scores for the six unmatched subjects from each clinical group and six randomly drawn controls resulted in an F ratio of similar magnitude, $F(2, 15) = .36$, ns.

To summarize, these results have failed to support any of the research hypotheses concerning differences in problem-solving ability among boys who vary in their level of aggressiveness. With the exception of Postsolution scores, the results obtained do not appear to be attributable to inherent insensitivities of the PEPSI.

School Behavior Checklist

Teacher ratings for children in the three groups, expressed as standardized T scores, appear in Table 8 and Figure 1. The subscale scores can be regarded as measuring aspects of psychopathology, with the exception of the Extraversion subscale, in which the items load high on social desirability. Miller (1977) suggested that T scores of 65 or more on the remaining subscales are signs of possible maladjustment.

The results of the analysis of variance of the SBCL scores are summarized in Table 9. Controls received significantly lower ratings than both clinical aggressives and clinical nonaggressives on the Low Need Achievement, Aggression, and Total Disability subscales. Academic Disability and Hostile Isolation scores for the controls were significantly lower than those of the clinical aggressives. Control subjects also scored lower than both clinical groups on the Anxiety subscale, although this difference was not statistically significant. Extraversion subscores were nearly equal for all three groups.

While the clinical aggressive group scored higher than the clinical nonaggressive group on most SBCL subscales, differences between the two clinical groups were not statistically significant.

In summary, both clinical groups were rated by their

Table 8

Scores on the School Behavior Checklist (SBCL)

| Subscale score | Group ^a | | |
|----------------------------|--------------------|------|------|
| | CA | CNA | CO |
| Low Need Achievement (LNA) | | | |
| <u>M</u> | 62.6 | 61.5 | 51.7 |
| <u>SD</u> | 8.6 | 8.4 | 10.5 |
| Aggression (AGG) | | | |
| <u>M</u> | 76.3 | 68.6 | 49.3 |
| <u>SD</u> | 12.2 | 16.1 | 10.3 |
| Anxiety (ANX) | | | |
| <u>M</u> | 56.3 | 59.0 | 51.8 |
| <u>SD</u> | 9.1 | 9.7 | 9.7 |
| Academic Disability (AD) | | | |
| <u>M</u> | 55.6 | 53.7 | 45.7 |
| <u>SD</u> | 9.3 | 8.1 | 6.4 |
| Hostile Isolation (HI) | | | |
| <u>M</u> | 56.5 | 52.0 | 47.2 |
| <u>SD</u> | 7.8 | 4.6 | 6.6 |
| Extraversion (EXT) | | | |
| <u>M</u> | 51.3 | 50.4 | 52.5 |
| <u>SD</u> | 14.7 | 12.1 | 9.6 |

Table 8 (continued)

| Subscale score | Group ^a | | |
|-----------------------|--------------------|------|------|
| | CA | CNA | CO |
| Total Disability (TD) | | | |
| <u>M</u> | 70.8 | 66.6 | 49.9 |
| <u>SD</u> | 10.0 | 9.6 | 8.1 |

Note. All scores are standardized T scores. CA = Clinical Aggressive; CNA = Clinical Nonaggressive; CO = Control.

^an = 12.

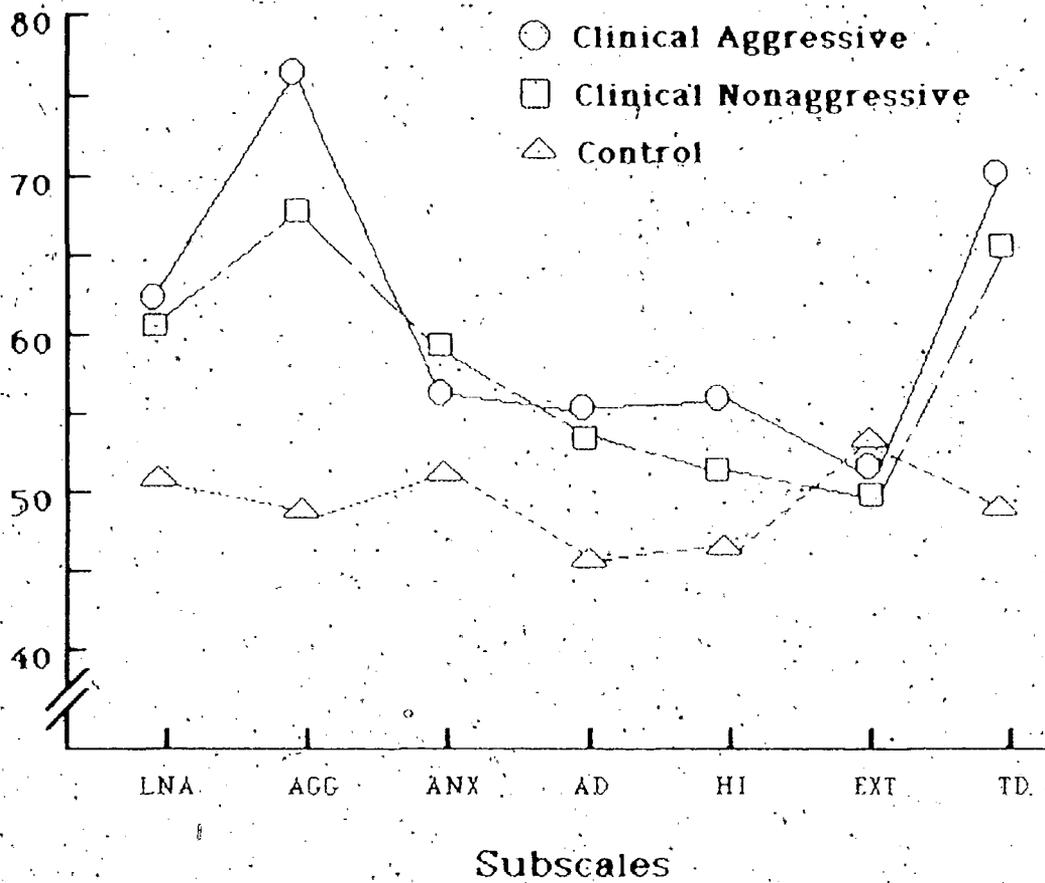


Figure 1. Mean T Scores of Target Groups on the School Behavior Checklist.

Table 9

Summary of the Analysis of Variance of the School Behavior Checklist (SBCL) Subscores

| Subscore | F | p | Contrasts |
|----------|-------|------|--------------------------------------|
| LNA | 5.10 | .05 | CA>CO, $p < .05$; CNA>CO, $p < .05$ |
| AGG | 13.46 | .001 | CA>CO, $p < .01$; CNA>CO, $p < .01$ |
| ANX | 1.79 | ns | |
| AD | 5.16 | .05 | CA>CO, $p < .05$ |
| HI | 6.27 | .01 | CA>CO, $p < .01$ |
| EXT | .09 | ns | |
| TD | 16.96 | .001 | CA>CO, $p < .01$; CNA>CO, $p < .01$ |

Note. One-factor analyses with three levels: Clinical Aggressive (CA), Clinical Nonaggressive (CNA), and Control (CO). LNA = Low Need Achievement; AGG = Aggression; ANX = Anxiety; AD = Academic Disability; HI = Hostile Isolation; EXT = Extraversion; TD = Total Disability. Degrees of freedom: 2 and 33. Pairwise contrasts among group means were by the Tukey method.

teachers as maladjusted in terms of Aggression and Total Disability scores. The clinical aggressive group was rated as more aggressive than the clinical nonaggressives, although this difference was not significant. Both groups displayed a combination of high Aggression and low Anxiety scores, a pattern which Miller (1977) suggested was indicative of problematic aggressiveness. Elevations of clinical group scores relative to those of controls appeared on other subscales, but were still within normal limits.

Some care should be taken in interpreting these SBCL scores: Teachers, while not informed of the specific focus of the research, were usually aware of the professional attention clinical subjects had received for behavioral problems, and were involved in the selection of control subjects. This may have produced a negative "halo effect" which contributed to the obtained pattern of marked differences between clinical and control subjects, but little discrimination between the two clinical groups.

Children's Action Tendency Scale

Scores on the CATS represent the number of times a response contributing to the Aggressiveness, Submissiveness, or Assertiveness score was chosen across the 30 items of the test. Scores on each of the three subscales can range from 0 to 20. Because of the

paired-comparison format, the scores are not independent of one another. High scores on two dimensions will result in a low score on the third.

The CATS scores for the three groups are reported in Table 10 and Figure 2. Analysis of variance revealed significant group effects for the Aggressiveness scores, $F(2, 33) = 6.86$, $p < .01$, with the mean score for the clinical aggressive group significantly greater than the control group mean ($p < .01$). While the clinical aggressives also scored higher on Aggressiveness than the clinical nonaggressives, this difference was not significant. A significant group effect was also found with respect to the Assertiveness scores, $F(2, 33) = 6.54$, $p < .01$. On this subscale, the mean control group score was greater than both the clinical aggressive ($p < .01$) and clinical nonaggressive ($p < .05$) group means. While the analysis of variance for the Submissiveness scores was nonsignificant, $F(2, 33) = 2.77$, ns, it was noted that the mean Submissiveness score for the clinical aggressive group was somewhat lower than the mean scores for the other two groups, which were approximately equal.

To summarize, these results have shown that a group of boys who were clinically identified as aggressive also expressed a significantly greater preference for aggressive behavior in a hypothetical problem situation, when compared to boys not exhibiting significant problem behavior.

Table 10

Scores on the Children's Action Tendency Scale (CATS)

| Subscore | Group ^a | | |
|----------------|--------------------|------|------|
| | CA | CNA | CO |
| Aggressiveness | | | |
| <u>M</u> | 8.3 | 5.6 | 2.6 |
| <u>SD</u> | 5.2 | 3.5 | 1.9 |
| Assertiveness | | | |
| <u>M</u> | 14.5 | 15.3 | 17.7 |
| <u>SD</u> | 2.7 | 2.1 | 1.9 |
| Submissiveness | | | |
| <u>M</u> | 7.3 | 9.2 | 9.8 |
| <u>SD</u> | 3.5 | 2.8 | 1.5 |

Note. CA = Clinical Aggressive; CNA = Clinical Nonaggressive; CO = Control.

^an = 12.

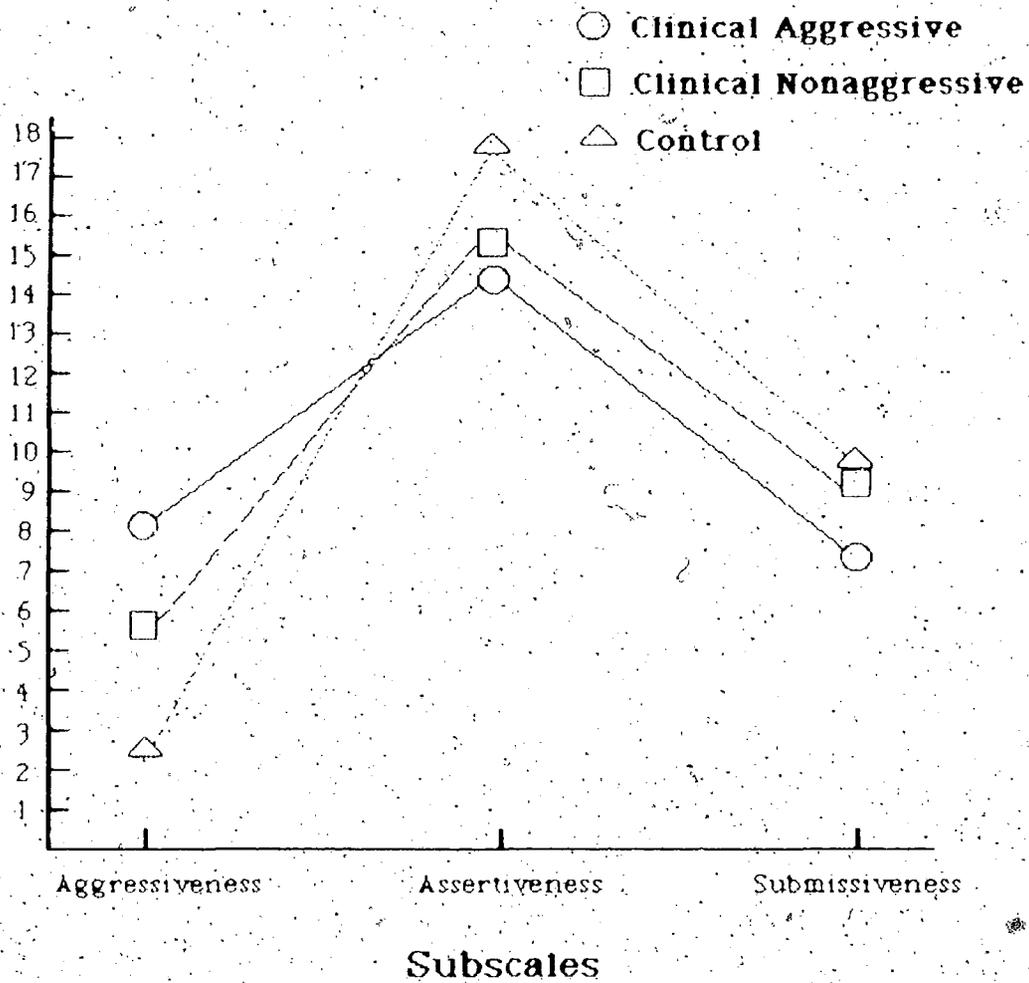


Figure 2. Mean Scores of Target Groups on the Children's Action Tendency Scale

Conversely, the controls chose an assertive course of action significantly more often than both clinical groups. As was the case with the SBCL, mean scores did not differ significantly between the clinical aggressive and clinical nonaggressive groups on any of the CATS subscales.

Pupil Evaluation Inventory

Overview

The PEI scores reported here are based on peer-nomination data from 528 children in 24 classrooms. Of the 569 children from these classrooms for whom parental consent forms were originally sent home, approximately 5% of the forms were not returned. Parental consent was denied for another 5%. An additional 51 children in two classrooms were also administered the PEI, but their responses were not scored due to the subsequent deletion of the potential clinical subject in each class from the final sample.

Although PEI scores were computed only for boys, they were based on ratings by both boys and girls in each class. The separation of boys' and girls' ratings was considered impractical for the present research. As well, such a strategy would have compromised the reliability of the scores due to the smaller number of ratings upon which they would be based. Since some studies have found

significant differences between children's ratings of same-sex and cross-sex peers on simple sociometric rating measures (Asher & Hymel, 1981; Singleton & Asher, 1977), it is possible that the combination of boys' and girls' scores added a source of error variation to the data in this case. Fortunately, such potential problems were moderated to some degree in the present research by the fact that the proportion of boys in the 24 classes averaged approximately 30% ($M = 53.3\%$; $SD = 9.6$). The mean proportion of boys was also similar in the classrooms of clinical aggressive ($M = 54\%$) and clinical nonaggressive ($M = 52.5\%$) subjects. Furthermore, other studies using the PEI or similar measures have demonstrated considerable agreement between male and female raters (Eron, Walder, Lefkowitz, & Monroe, 1971; Landau, Milich, & Whitten, 1984; Pekarik et al., 1976). It is possible that the differences between same- and cross-sex ratings are less in the case of sociometric measures such as the PEI, which measure relatively complex peer perceptions.

The completed PEI booklets from each class were scored using the procedure outlined in Appendix J. To prevent biases resulting from the absence of individual boys from the classroom (Eron et al., 1971; Kane & Lawler, 1978), scores were computed only for boys who had participated in the PEI.⁷

To permit the comparison of PEI scores for members

of different classrooms, scores on the Aggression, Withdrawal, and Likeability subscales were converted to z scores based on the mean and standard deviation within each class. This procedure has been used in other research with the PEI (Ledingham, 1981; Ledingham, Younger, Schwartzman, & Bergeron, 1982; Lefèvre, West, & Ledingham, 1982). Willingham (1959) pointed out that this method does not correct for the lower reliability of z scores based on smaller groups, and proposed a mathematical correction for this bias. However, the Willingham correction has not been widely adopted in sociometric research. In addition, the z score method seems preferable to the common practice of expressing scores as proportions of the maximum scores attainable (see Kane & Lawler, 1978; Pekarik et al., 1976; Weintraub et al., 1978). The latter approach presents difficulties in comparing individual scores from classrooms varying in size and the overall nominating frequency of their members.

Comparison of Subject Groups

Aggression, Withdrawal, and Likeability z scores for the three subject groups appear in Table 11 and Figure 3. Analysis of variance for the Aggression scores revealed a highly significant effect for group membership, $F(2, 33) = 24.39; p < .001$. Mean Aggression scores for the clinical aggressives were significantly greater than for both the clinical nonaggressives ($p < .05$) and controls ($p < .01$). The scores of the clinical nonaggressives were

Table 11
Scores on the Pupil Evaluation Inventory (PEI)

| Subscale | Group ^a | | |
|---------------------|--------------------|-------|-------|
| | CA | CNA | CO |
| Aggression | | | |
| <u>M</u> | 1.95 | 0.91 | -0.57 |
| <u>SD</u> | 0.49 | 1.25 | 0.76 |
| Withdrawal | | | |
| <u>M</u> | 1.00 | 1.03 | 0.01 |
| <u>SD</u> | 0.75 | 1.07 | 0.81 |
| Likeability | | | |
| <u>M</u> | -1.08 | -0.63 | 0.32 |
| <u>SD</u> | 0.46 | 0.94 | 0.90 |
| Aggression-Modified | | | |
| <u>M</u> | 1.94 | 0.87 | -0.58 |
| <u>SD</u> | 0.54 | 1.30 | 0.71 |

Note. Mean z scores. Individual z scores were based on the classroom of each subject. CA = Clinical Aggressive; CNA = Clinical Nonaggressive; CO = Control.

^an = 12.

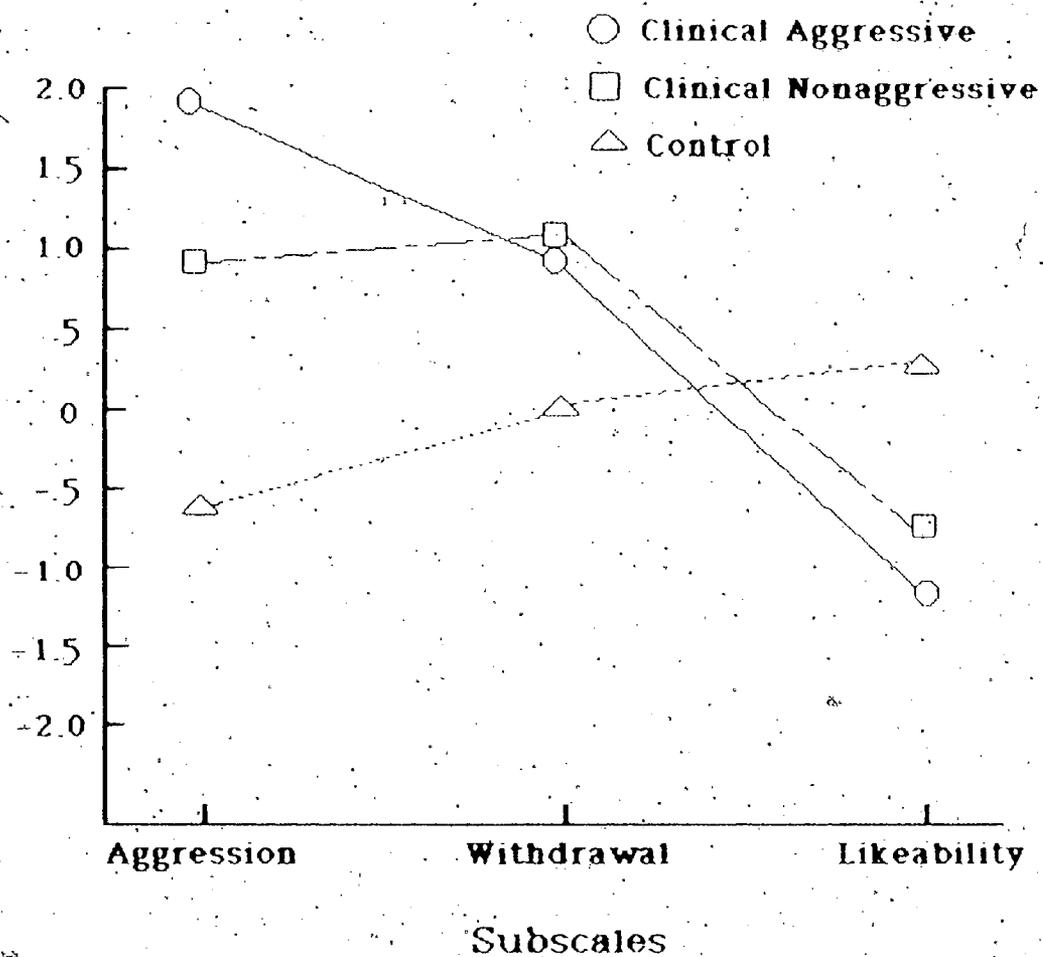


Figure 3. Mean Z Scores of Target Groups on the Pupil Evaluation Inventory.

also significantly greater than those of the controls ($p < .01$). The analysis of variance of the Withdrawal scores was also significant, $F(2, 33) = 5.12, p < .05$. Mean Withdrawal scores for both the clinical aggressive and clinical nonaggressive groups were greater than the control mean ($p < .05$), but did not differ significantly from each other. Finally, a significant group membership effect was found for the Likeability scores, $F(2, 33) = 9.67, p < .001$. The mean Likeability score for the controls was significantly greater than the mean scores for both the clinical aggressives ($p < .01$) and clinical nonaggressives ($p < .05$), while the two clinical groups again did not differ significantly from each other.

Aggression-Modified Score



It is apparent from an examination of the 20 Aggression items of the PEI that they reflect a much broader definition of aggressive behavior than the definition by Hartup (1974) which was adopted for the present research. In view of this, an exploratory procedure was devised to construct a modified Aggression subscale with item content corresponding more closely to this definition.

Three professional staff members of the Atlantic Child Guidance Centre were asked to examine the 20 items of the PEI Aggression subscale, and to designate those which they considered to be consistent with the Hartup definition (see Appendix N). Items marked by two or more raters were retained, resulting in an Aggression-Modified scale.

containing eight items (see Appendix E). PEI answer booklets were rescored to obtain Aggression-Modified scores.

Analysis of variance of the mean Aggression-Modified z scores for the three subject groups (see Table 11) produced a result which was very similar to the analysis of the original Aggression scores, $F(2, 33) = 23.00$, $p < .001$. Results of pairwise contrasts among means were identical.

Relationships Among PEI Subscale Scores (N = 281)

The intercorrelations of PEI subscale scores, based on all 281 boys for whom scores were computed, are reported in Table 12. All correlations were significant beyond the .01 level. Note that the highest correlations obtained were the almost complete correspondence between the Aggression and Aggression-Modified scores, and the moderate negative relationship between Aggression and Likeability scores.

When the correlations between pairs of PEI subscale scores were adjusted (by calculating partial correlations) to remove the effect of the remaining subscale score, the relationship between Aggression and Withdrawal scores was virtually eliminated. It would appear that the simple correlation between these two scores was an artifact of the association of both variables with Likeability scores.

Summary

As was the case with the teacher- and self-rating

Table 12

Intercorrelations of Subscale Scores on the Pupil
Evaluation Inventory (PEI)

| Subscale | 1 | 2 | 3 |
|----------------------------|--------------|--------------|-------|
| 1. Aggression | -- | | |
| 2. Withdrawal | .33*(.02) | -- | |
| 3. Likeability | -.67*(-.62)* | -.48*(-.37)* | -- |
| 4. Aggression- Modified | .98* | .29* | -.64* |

Note. $N = 281$. Pearson's r . Partial correlations (of two subscale scores with the third held constant) are in parentheses.

* $p < .01$.

measures, significant differences in peer ratings on the Withdrawal and Likeability subscales were found between clinical and control subjects, but not between the two clinical groups. The Aggression subscale, however, was the only measure in this study which was able to differentiate clinical aggressives from clinical nonaggressives. The construction of an Aggression-Modified subscale to reflect a more precise definition of aggressive behavior did not alter these findings. This can be explained by the almost perfect correlation between Aggression and Aggression-Modified scores, a not surprising result since the PEI subscales were originally constructed by factor-analytic techniques which maximized the correlations among items. A second interesting result from the correlational analysis of all available PEI scores was the fairly strong inverse relationship between Aggression and Likeability scores.

Relationship Among Measures

Intercorrelations of all test score and subject characteristic data for the 36 subjects appear in Table 13.

Correlations with the PEPSI

PEPSI Total scores correlated highly with Presolution and Postsolution scores, as would be expected on the basis

of their overlapping item content.

Correlations of PEPSI scores with PPVT-R scores, SES, and age were all nonsignificant. One could speculate that the first two findings reflect the success of efforts by the PEPSI's constructors to minimize the sensitivity of the test to verbal intelligence and SES (Asher et al., 1972). The failure of PEPSI scores to correlate significantly with age, however, is inconsistent with both the design and initial performance of the test (Asher et al., 1972) and the pilot data reported earlier in this thesis.

PEPSI scores also failed to correlate significantly with most scores on the peer, teacher, and self-report behavioral measures. A marginally significant r was obtained between PEPSI Total and PEI Withdrawal scores. Similarly, Total and Presolution scores correlated significantly with only the Academic Disability scores of the SBCL, and Presolution scores marginally with Total Disability scores. There were no significant correlations between scores on the PEPSI and the self-report CATS measure.

It is difficult, however, to draw firm conclusions from the low correlations between PEPSI scores and other variables. Such findings may also be explained by the restricted range and skewed distributions of PEPSI scores, especially the Total and Postsolution scores.

Table 13

Intercorrelations of Test Score and Subject Characteristic Data

| | PEPSI | | | SBCL | | | | | | | CATS | | | PEI | | | | PPVT-R |
|--------------|--------|--------|------|--------|--------|--------|--------|--------|------|--------|--------|-------|--------|--------|--------|------|------|--------|
| | Tot | Pre | Post | LNA | AGG | ANX | AD | HI | EXT | TD | Agg | Ass | Sub | Agg | With | Like | Age | |
| <u>PEPSI</u> | | | | | | | | | | | | | | | | | | |
| Tot | — | | | | | | | | | | | | | | | | | |
| Pre | .84** | — | | | | | | | | | | | | | | | | |
| Post | .76** | .29 | — | | | | | | | | | | | | | | | |
| <u>SBCL</u> | | | | | | | | | | | | | | | | | | |
| LNA | -.25 | -.21 | -.19 | — | | | | | | | | | | | | | | |
| AGG | -.24 | -.26 | -.11 | .47** | — | | | | | | | | | | | | | |
| ANX | -.20 | -.16 | -.15 | .48** | .03 | — | | | | | | | | | | | | |
| AD | -.43** | -.46** | -.22 | .68** | .46** | .27 | — | | | | | | | | | | | |
| HI | -.10 | -.15 | .01 | .29 | .68** | .13 | .14 | — | | | | | | | | | | |
| EXT | -.17 | -.16 | -.12 | -.09 | .34* | -.56** | -.11 | .14 | — | | | | | | | | | |
| TD | -.32 | -.33* | -.18 | .81** | .88** | .37* | .69** | .61** | .08 | — | | | | | | | | |
| <u>CATS</u> | | | | | | | | | | | | | | | | | | |
| Agg | -.16 | -.22 | -.01 | .36* | .40* | .17 | .45** | .32 | -.03 | .48** | — | | | | | | | |
| Ass | .14 | .20 | .01 | -.40* | -.42** | -.20 | -.46** | -.45** | .19 | -.51** | -.77** | — | | | | | | |
| Sub | .11 | .15 | .02 | -.19 | -.24 | -.08 | -.27 | -.07 | -.12 | -.26 | -.82** | .27 | — | | | | | |
| <u>PEI</u> | | | | | | | | | | | | | | | | | | |
| Agg | -.20 | -.18 | -.14 | .42** | .84** | .03 | .46** | .50** | .29 | .76** | .42** | -.39* | -.29 | — | | | | |
| With | -.33* | -.27 | -.26 | .44** | .45** | .13 | .40* | .23 | .01 | .51** | .11 | -.22 | .04 | -.54** | — | | | |
| Like | .14 | .09 | .14 | -.52** | -.62** | -.14 | -.43** | -.32 | -.20 | -.66** | -.26 | .18 | .23 | -.78** | -.60** | — | | |
| Age | .21 | .09 | .27 | .14 | .06 | .16 | .26 | -.01 | -.16 | .14 | .54** | -.17 | -.66** | .01 | -.16 | .00 | — | |
| PPVT-R | .30 | .24 | .25 | -.34* | -.13 | -.18 | -.47** | -.31 | .06 | -.31 | -.11 | .17 | .01 | -.26 | -.15 | .29 | -.08 | — |
| SES | .11 | .17 | .00 | -.31 | -.05 | -.24 | -.34* | -.23 | .18 | -.23 | -.28 | .24 | .21 | -.18 | -.39* | .25 | -.20 | .47** |

Note. N = 36.

*p < .05. **p < .01.

Correlations of Subject Characteristics with Other Test Scores

There were also relatively few significant correlations between scores on tests other than the PEPSI and the subject characteristics of age, PPVT-R scores, and SES. The only test scores correlating significantly with age were two CATS subscores, Aggressiveness (positively) and Submissiveness (negatively). This finding will be discussed later.

PEI Withdrawal and SBCL Academic Disability scores correlated negatively with SES. A stronger positive relationship was found between SES and PPVT-R scores. Significant negative correlations were also found between PPVT-R scores and the Low Need Achievement and Academic Disability scores of the SBCL.

Correlations of Subscales Within Behavioral Rating Measures

As might be expected, a number of significant correlations were found among subscale scores within the PEI, SBCL, and CATS. Intercorrelations among the PEI subscale scores indicated a strongly negative relationship between Aggression and Likeability scores, and a similar but more moderate relationship between Withdrawal and Likeability. Aggression and Withdrawal were also positively related. This pattern of correlations paralleled the correlational analysis, reported above, of all available PEI scores.

In the case of the SBCL, significant positive correlations were found among almost all subscale scores. The intercorrelations obtained were similar to those reported by Miller (1977). Of course, these correlations can be explained to some extent by common item content.

Examination of correlations among CATS subscale scores reveals a strong negative relationship of Aggressiveness with both Submissiveness and Assertiveness scores, while Assertiveness and Submissiveness did not correlate significantly. Deluty (1979) obtained a very similar pattern in his correlational analysis of CATS scores.

Correlations Between Behavioral Rating Measures

A number of interesting results emerge from the correlations among the three behavioral rating measures.

Teacher (SBCL) and peer (PEI) ratings of aggressiveness demonstrate strong agreement, providing some evidence for the construct validity of each. A similar but considerably weaker relationship was found between these two measures and Aggression scores on the self-report CATS. This may indicate the operation of a social desirability set in responding to the CATS, leading aggressive boys to underreport an inclination toward such behavior. This possibility will be considered further in the Discussion section.

A close relationship was also demonstrated among other subscale scores on the PEI and SBCL. The relationship

was strongest in the case of the positive correlation of PEI Aggression and Withdrawal scores with SBCL Total Disability, and the negative relationship between PEI Likeability and Total Disability. These findings suggest that peer ratings using the PEI are sensitive to differences in overall level of adjustment.

Relationships among SBCL and CATS subscale scores, while statistically significant, were fewer and of lesser magnitude than those between some PEI and SBCL subscores. However, the findings of a significant and consistent negative relationship between Assertiveness scores on the CATS and several SBCL subscale scores suggestive of maladjustment (and with PEI Aggression scores) is consistent with Deluty's (1981a) finding that Assertiveness scores were positively associated with other indices of adaptiveness.

Evaluation of the Classification of Subjects

An important consideration in interpreting the data from this research concerns the manner in which boys were assigned to the three subject groups. Recall that each potential subject was referred specifically for inclusion in either the clinical aggressive or clinical nonaggressive group at the discretion of the referral source. Subjects accepted for the study were placed only in the group for

which they had been referred. It had originally been planned to employ SBCL and PEI scores as criterion measures to verify the expected differences in problematic aggressiveness among the three subject groups; and to confirm that control children fell within normal limits on adjustment-related measures. However, it was found to be impractical to screen subjects in this manner, due to difficulties in attaining the desired sample size within the time available. As a result, it was necessary to assign subjects to the three groups only on the basis of referral information and the selection criteria listed in the Procedures section. We now consider data relevant to a post-hoc evaluation of this method of subject selection and classification.

First, the comparisons of subject groups already reported suggest that the sampling strategy was successful in obtaining a control group whose mean scores on adjustment-related measures (PEI, SBCL, and CATS) consistently demonstrated a significantly higher level of adjustment than that of the clinical groups. As well, the clinical aggressives obtained the most "maladjusted" scores on most measures. However, the differences between the clinical aggressives and clinical nonaggressives were generally nonsignificant, resulting in a less than optimal degree of discrimination between the clinical groups.

A second approach to the evaluation of the subject

selection procedure was undertaken to examine the influence of different methods of defining and classifying subjects upon the results of this research. Subjects' scores were twice reclassified into three new groups (also designated clinical aggressive, clinical nonaggressive, and control), first on the basis of their PEI Aggression scores and second by their SBCL Aggression scores. For each measure, the 12 highest Aggression scores were placed in the new clinical aggressive group, the next 12 in the clinical nonaggressive group, and the lowest 12 in the control group. The data were then reanalyzed for each reclassification in the same manner as for the original classification.

The results of this procedure are summarized in Appendixes T and U. In almost all cases, there was virtually no effect upon the original results. The only exceptions occurred with respect to the CATS scores, and appear to be of minor importance.⁸ Although these exploratory reclassifications are approximate and still involve considerable overlap among subject groups, the analyses suggest that the results of this research are not easily attributable to the original method of subject classification.

Finally, some indication of the reliability of the original subject classification may be gained by examining the extent to which it was changed by the reclassification. On this basis, it would appear that the classification of control subjects was reasonably stable. Three of the

control subjects were classified into the clinical nonaggressive group on the basis of the PEI, and two by the SBCL, an average of 21%. Of the clinical aggressive subjects, three were reclassified into the clinical nonaggressive group by the PEI and five by the SBCL, an average of 33% of the original group. This suggests some degree of overlap between the two clinical groups. However, the fact that the aggressives were never reclassified as controls by any criterion confirms their clear status as members of a clinical population. Clinical nonaggressive subjects were reclassified into the clinical aggressive group three times by the PEI and four times by the SBCL, an average of 33% of the original sample. They were reclassified into the control group three times by the PEI and twice by the SBCL, an average of 21% of the original group. This suggests that the clinical nonaggressives were more likely to be considered as part of a clinical than a nonclinical population. It also provides some confirmation of the expectation that this group would possess a level of adjustment between that of the clinical aggressives and the controls.

DISCUSSION

Problem-Solving Findings

The principal objective of this research was to extend previous investigations of the relationship between cognitive problem solving and behavioral adjustment problems in children, with specific attention to excessive and maladaptive aggression. It was decided to employ the PEPSI as the main measure, first because it offered an alternative measurement approach to the Interpersonal Cognitive Problem-Solving measures relied upon by most other researchers. Second, the PEPSI had been designed to assess a wider range of theoretical problem-solving skills than most other measures, using hypothetical everyday problem situations which were both social and nonsocial in content.

In order to determine whether any obtained deficits in problem-solving ability were specifically related to aggressiveness, or simply to behavioral problems in general, the problem-solving ability of a clinically identified sample of aggressive boys was compared not only to that of normal controls (the strategy employed in most of the previous research), but also to that of a second clinical sample of boys with behavioral problems of a less aggressive nature. It was hypothesized that the clinical aggressive boys would obtain lower Total PEPSI scores than clinical

nonaggressives; whose scores would in turn be lower than those of the controls. The same pattern of differences was predicted with respect to scores on the Presolution subtest of the PEPSI. The Presolution score was assumed to be an index of abilities in cognitive (as opposed to associative) processing which, it had been suggested, was more specifically related to problematic aggression.

The results of this research failed to support any of these hypotheses. On the basis of PEPSI scores (Total, Presolution and Postsolution), the aggressive boys did not demonstrate a deficit in their problem-solving ability relative to controls. Furthermore, no differences were found between the aggressive boys and those whose behavior problems were thought to be of a relatively nonaggressive nature. Despite the differences between the PEPSI and other problem-solving measures in terms of comprehensiveness and item content, these findings are consistent with the negative results obtained in several other studies, reviewed above, of the relationship between problem solving and behavioral adjustment.

One possible conclusion from these findings is that problematic aggression and other behavioral problems are unlikely to be explainable by cognitive problem-solving deficits, at least as measured in this research and other studies with similar findings. The present results could also provide some basis for concluding that problem-solving

training, such as that which has been described in this thesis, cannot be relied upon as a very promising approach for the remediation or prevention of aggression or other behavioral difficulties.

However, the conclusions which can be drawn from this study may be limited to some degree by the measurement strategy which was used. With specific reference to the PEPSI, it is possible that this measure, which was designed primarily for educational rather than clinical applications, is not sensitive to differences in adjustment. This is an especially likely possibility in view of the considerable difference between the clinical and control groups in teacher- and peer-related indices of adjustment. Further research would be needed to examine this question. As well, the present findings suggested significant psychometric problems with respect to the Postsolution items, both in themselves and as a component of the Total PEPSI score. These items appeared to be too easy to discriminate among different levels of ability.

Furthermore, while the present research represented an attempt to extend the rather limited range of measurement strategies employed in previous research, the assessment of problem-solving ability remained primarily quantitative rather than qualitative. Quantitative measures such as the PEPSI do not assess aspects of an individual's characteristic approach to problems (e.g., a reflective

or impulsive conceptual tempo; Kendall et al., 1981), style of information processing (Meichenbaum, Butler, & Gruson, 1981), or flexibility and persistence in solving problems (Butler & Meichenbaum, 1981). Such traits may be of equal or greater importance in mediating adjustment. Similarly, quantitative measures do not yield information concerning the type or effectiveness of the problem solutions characteristically chosen (Butler & Meichenbaum, 1981; Krasnor & Rubin, 1981) which, it will be recalled, has also been shown to be significantly related to adjustment.

A second important characteristic of the PERSI and many other problem-solving measures is the "hypothetical-reflective" format of their test items. While measures employing this format are useful in exploring children's abilities to reflect on problem situations which are presented to them, such skills represent only a small aspect of cognitive problem solving, especially in complex social situations (Cooney & Selman, 1978). Spontaneous problem-solving thinking, for example, is not assessed (Kendall et al., 1981). Furthermore, such assessment methods "pull for thinking social behavior" (Krasnor & Rubin, 1981, p. 461), and not the less logical and more automatic "scripted" problem solving which, as discussed earlier, may often predominate in social problem situations.

In view of the measurement issues just discussed, the possibility must be considered that further extension

and refinement of methods for assessing problem-solving ability might reveal relationships between aspects of problem solving and adjustment which could not be detected by the assessment devices used in previous research or in the present study.

One possible extension of problem-solving assessment is related to the important distinction between an individual's measured level of problem-solving skills, and the ability or inclination (i.e., set) to actually produce problem-solving thinking in a problem situation (Cooney & Selman, 1978; Butler & Meichenbaum, 1981; Shure, 1982; Urbain & Kendall, 1980; Walters & Peters, undated). Such a distinction corresponds to Camp's (1977) discussion, cited earlier, of production and mediation deficiencies. Flavell (1974) made a similar distinction in his developmental model of social inference between having a reasoning ability (the 'existence' component) and the tendency to use this ability (the 'need' component). There is evidence that the ability to actually use existing problem-solving skills is more variable, and in some instances is acquired later, than the skills themselves (Cooney & Selman, 1978).

It might also be useful to approach the assessment of problem-solving ability in terms of a higher level of cognitive functioning; namely, the metacognitive processes by which the individual monitors and directs his or her

own thought processes, including problem solving (Butler & Meichenbaum, 1981). In fact, it has been suggested that social competence can be conceptualized as "a problem-solving process in which the problem to be solved is the selection of the most appropriate information-processing style for the task demands" (Meichenbaum et al., 1981, p. 49). Examples of variables relevant to metacognition include expectancies, self-perceptions and self-statements, and the manner in which the individual characteristically defines the problems he or she encounters (Butler & Meichenbaum, 1981; Kendall et al., 1981; Meichenbaum et al., 1981; O'Leary & Johnson, 1979).

It has also been suggested that the complexities of problem solving can be better understood by clinicians and researchers through measures which are more comprehensive than those which have been discussed to this point (O'Leary & Johnson, 1979; Urbain & Kendall, 1980; Walters & Peters, undated). Butler and Meichenbaum (1981) suggested examining problem solving simultaneously from a range of assessment perspectives: projective measures such as the MEPS, capabilities tests like the PEPSI, and observational measures, to gain a comprehensive picture of both the individual's problem-solving ability and the manner in which it is put to use. As has been noted repeatedly in this thesis, problem-solving research has moved very little in the direction of this degree of

comprehensiveness. Nevertheless, two measurement approaches which have been proposed suggest some potential in this regard.

The Social Problem-Solving Assessment Measure (SPSAM; Elias, Larcen, Zlotlow, & Chinsky, cited in Butler & Meichenbaum, 1981 and Krasnor & Rubin, 1981) is similar to other measures in that it requires children to respond to hypothetical problem situations. However, the test items are also designed to assess and interrelate a variety of aspects of problem-solving cognition, including positive and negative expectancies, performance under stress, and the influence of various types of outcome. The SPSAM also examines these variables in relation to different types of problem situations.

Krasnor and Rubin (1981) have proposed an ambitious observational method of problem-solving assessment which examines problem-solving competence in the child's real-life environment. Under this approach, actual problem-solving behavior would be assessed through sequential analysis, with particular attention to features of the task environment, strategy selection and implementation, the effects of problem-solving behavior on the environment, and subsequent adjustments in problem-solving strategy. Krasnor and Rubin suggested that once sequences of problem-solving skills have been identified through such an analysis, relationships of these sequences to underlying cognitive

processes might be inferred.

Sociometric Findings

Sociometric procedures have been shown to have many advantages as measures of aggression and other social behaviors or characteristics in children. They represent an efficient means of obtaining data which are based on the observations of a large number of children, in more situations and over a longer period of time than could be sampled by any researcher. As a result, they are potentially highly informative, reliable, and unbiased (Asher & Hymel, 1981; Ledingham et al., 1982). Sociometric data have in general been shown to remain stable over time (Asher & Hymel, 1981; Kendall et al., 1981; Pekarik et al., 1976). Concurrent and predictive validity of sociometric instruments have been convincingly demonstrated in relation to other indices of behavioral adjustment (Kendall et al., 1981; Landau et al., 1984; Ledingham et al., 1982; Pekarik et al., 1976), especially when extremes of adjustment are being considered (Kane & Lawler, 1978). Sociometric measures have also been found not to be overly susceptible to examiner, scorer, or prosocial biases, or to variations in classroom composition (Eron et al., 1971; Pekarik et al., 1976; Rubin et al., 1982). There have been some indications as well of the

potential utility of sociometrics as diagnostic and outcome measures in treatment programs (Hops & Greenwood, 1983; Lefevre et al., 1982).

It would appear that the PEI offers further advantages beyond those associated with peer sociometrics in general. Most sociometric instruments have required very simple judgments or ratings by respondents; for example, whether individuals are liked or disliked, or desired as friends or workmates. It has frequently been pointed out that such sociometric variables, while reliable and valid, have limited descriptive and analytic potential (Gordon, 1966; Hops & Greenwood, 1983; Kane & Lawler, 1978; Kendall et al., 1981; Pekarik et al., 1976). Such simple dimensions can also mask important conceptual distinctions. For example, it has been suggested that the contrast between acceptance and rejection is far more complicated than the bipolar relationship implied by simple sociometric measures, and that constructs such as likeability and friendship or unpopularity and rejection have been confounded (Asher & Hymel, 1981; Landau et al., 1984). As a result, it is difficult to compare research results across studies using different sociometric measures (Kendall et al., 1981).

The Aggression, Withdrawal, and Likeability subscales of the PEI, on the other hand, provide estimates of behavioral and social attributes which are more complex and ecologically valid (Hops & Greenwood, 1983), and consequently of greater

clinical and research interest. Furthermore, these scales are able to tap low-frequency but psychologically significant behaviors (such as aggression) which are often not accessible through simpler peer sociometric measures, or by the direct observation of adult investigators (Asher & Hymel, 1981).

The disadvantages of peer sociometrics are relatively few, and many of these can be moderated or remediated. Various biases can affect sociometric scores, such as "halo effects" in which children uncritically assign judgments to peers simply on the basis of whom they like or dislike (Asher & Hymel, 1981; Eron et al., 1971; Kane & Lawler, 1978). Friendship biases have also been reported, but their effect and importance are controversial (Kane & Lawler, 1978). As noted in the Results section, biases related to the sex of the rater and ratee have been reported in some cases but not in others. Biases resulting from missing data, and possible difficulties in comparing sociometric scores across different-sized groups, were also discussed earlier. Another potential problem is the diminishing importance of the classroom as a social group in modern schools (Hops & Greenwood, 1983).

Ethical concerns might also be raised about the possible consequences of asking children to make judgments, especially negatives ones, about their peers (O'Leary & Johnson, 1979). The only empirical investigation of this

question was reported by Hayvren and Hymel (1984). They found that preschool children's participation in peer-nomination or rating-scale sociometric tasks had no negative effect upon subsequent interactions with preferred or nonpreferred peers. While they cautioned that the situation could be different with elementary-school-age populations, Asher (1983) pointed out that negative sociometric judgments made about nonpreferred children in this age group are probably minor in comparison to their day-to-day treatment by peers. He recommended that any potential difficulties be dealt with by such precautions as emphasizing the confidentiality of each child's responses, and avoiding sociometric testing just before dismissal of the participants for recess or lunch. These practices were adopted in the present research.

Sociometric measures, however, share one significant practical shortcoming. Procedures for administration and scoring are often complicated, time consuming, and expensive. This is especially true of relatively complex peer assessment measures such as the PEI. In this study, the PEI accounted for by far the largest share of time and expense during data collection. In addition to the logistics of obtaining parental consent and of arranging and carrying out classroom administration of the PEI, the duplication and assembly of answer booklets for each classroom required 2 to 3 hours for the investigator,

with secretarial assistance. Scoring of the completed answer booklets was even more time consuming, requiring from 3 to 6 hours for one scorer, depending on the size of the class. As a result, the present version of the PEI might be impractical for many research (and most clinical) applications. One suggestion for reducing this problem will be made later in this section.

In the present research, the Aggression subscale of the PEI was the only behavioral rating measure which successfully discriminated the clinical aggressive and clinical nonaggressive groups from each other as well as from controls. This finding suggests that the PEI is an especially sensitive measure of clinically significant interpersonal aggression. While the Withdrawal and Likeability scores did not distinguish between the two clinical groups, they revealed differences between clinically identified subjects and those selected as controls. It would thus appear that the Withdrawal and Likeability scales also measure peer perceptions which are related to adjustment.

The construction of an eight-item Aggression-Modified scale to reflect a more specific definition of aggression produced findings which were virtually identical to those from the original Aggression scale. Furthermore, the almost perfect correlation between the two versions of the Aggression score (based on a large sample of elementary

school children in regular classrooms) suggests that the Aggression-Modified scale might be substituted for the original Aggression scale with little or no information loss; the preservation of an adequate degree of reliability, and a considerable reduction in the problematically time-consuming administration and scoring procedures for the PEI. If this were done, consideration might also be given to the addition of a few more positively-toned items (either as 'fillers' or as additions to the Likeability scale) to balance the current preponderance of items concerned with negative behaviors. Such a modification might enhance the "palatability" of the PEI to pupils, teachers, and parents, who frequently expressed reservations about this aspect of the PEI during the present research.

The correlations among scores on the PEI subscales are of some interest. The substantial negative correlation between Aggression and Likeability suggests that, while moderate degrees of aggression might be acceptable and even adaptive in elementary school-age boys (Deluty, 1981a), highly aggressive boys are likely to be regarded unfavorably by their peers. Walters (1979) also reported a high correlation (.70) between peer ratings of aggressiveness and rejection.

The finding that the significant correlation between Aggression and Withdrawal scores ($N = 281$) was almost completely attributable to the association of both scores

with Likeability is also of interest in evaluating the PEI. This strong influence of the Likeability factor may indicate that the PEI is subject to some of the same "halo effects" which can bias scores on other peer- and teacher-rating measures. It might be advisable to assess the extent of such an effect in future research with the PEI, and to consider adjusting Aggression and Withdrawal scores for the effect of Likeability.

The pattern of intercorrelations between subscales was quite consistent, whether computed for all 281 scores obtained or for the 36 subjects in the final sample. In the latter case, however, the correlations were of a somewhat smaller magnitude, probably a result of restricted score ranges and the predominantly clinical nature of the sample. The correspondence between these two sets of correlations can be regarded as further evidence for the reliability of the PEI.

While the intercorrelations of the subscales in the original PEI research (Pekarik et al., 1976) were superficially similar in direction and relative magnitude to the present findings, the subscores correlated only minimally with one another. It is difficult to account for this discrepancy, except to note that the Pekarik et al. data were based on pupils from Grades 1 through 9 in predominantly middle-class areas.

The relationships among scores on the PEI and the

teacher-rating and self-rating measures will be discussed below.

Teacher Ratings

As reported in the Results section, scores on all but two of the adjustment-related SBCL subscales (Anxiety and Extraversion) revealed significant differences between clinical and control subjects. The mean scores for both clinical groups on the Aggression and Total Disability subscales were above the level which Miller (1977) suggested was indicative of possible maladjustment. As was the case with the PEI, these findings validate to some degree the method by which clinical and nonclinical subjects were selected and differentiated in this study.

In contrast to the PEI, however, SBCL scores did not discriminate between the two clinical groups. While clinical aggressive subjects received somewhat more "maladjusted" mean ratings than clinical nonaggressives on most SBCL subscales, these differences were not statistically significant. Moreover, the high Aggression and low Anxiety scores of not only the clinical aggressives, but also the clinical nonaggressives, were suggestive of problematic aggression. The possibility of a negative "halo effect" (suggested earlier) and the relative insensitivity of the SBCL for other than global ratings

(Kendall et al., 1981) must be taken into account in interpreting these findings. Nevertheless, these results also call into question the success of the sampling procedure in obtaining two clinical samples of boys who differed in their level of problematic aggression. This issue will be considered further below.

Self-Ratings

The utility of self-report measures such as the CATS depends largely upon the purpose for which they are intended. It has been pointed out that such measures should not be relied upon as measures of behavioral traits, such as aggression, as their scores can be influenced by what the child views as their self-incriminating nature (Eron et al., 1971), and the related tendency to respond not in terms of oneself, but in terms of what is socially desirable (Ledingham et al., 1982). In the present research, statements intended to minimize or counteract such effects were included in the instructions to subjects (see Appendix H).

Nevertheless, a child's self-reports or self-descriptions can in themselves be of interest to the clinician or researcher. It has been suggested that because the individual has access to the largest range of his or her own behaviors, self-ratings may accurately convey the

consistency of behavior across situations (Ledingham et al., 1982). Furthermore, self-ratings can be good indications of children's characteristic self-statements, and of misperceptions or discrepancies between the way they see themselves and how they are seen by others (Bower, 1981; Cartledge & Milburn, 1980; O'Leary & Johnson, 1979). In the present study, the self-report CATS was seen as a means to tap the preferences of subjects in the three groups for specific types of solutions in problem situations.

In this research, clinical aggressive subjects received higher CATS Aggressiveness scores than controls. This replicates a finding reported by Walters (1979), who used a self-report measure similar to the CATS to compare aggressive and nonaggressive elementary-school-age boys. This finding also lends further support to the conclusion from several other studies reported earlier, that irrespective of quantitative differences in performance on problem-solving measures, the preference for behavioral solutions of an aggressive nature may be an important distinguishing feature of highly aggressive boys. Furthermore, as Walters suggested, such a behavioral preference may be especially important with respect to the first behavioral solution chosen by aggressive boys in problem situations.

It is interesting to consider the significant correlations of age with CATS Aggressiveness scores

(positive) and Submissiveness scores (negative), in relation to the possible operation of a prosocial response bias. It is improbable that these correlations represent developmental changes in behavior, especially in the case of aggression which is generally regarded as decreasing with age (Hartup, 1974). One might instead speculate that these findings reflect age-related changes in children's (at least boys') willingness to report their own aggressive and submissive response tendencies. Under this interpretation, there may be an increased willingness in older boys to report themselves as aggressive, as well as a reluctance to attribute submissive behavior to themselves. It might also be suggested that such age-related changes may be more pronounced in the case of children with behavior problems, who comprised two thirds of the 36 subjects upon whom the correlations were based. A related possibility, especially in light of the impulse control problems so often noted in aggressive boys and others with behavioral problems, is that such children are less susceptible than others to the acquisition of a prosocial rating set. With regard to the absence of a significant correlation between age and CATS Assertiveness scores, it is possible that there is a uniform bias toward self-reported assertiveness regardless of age, perhaps also a result of its perceived social desirability. Research into the existence and extent of response biases related to social desirability in the CATS is needed to

fully evaluate these possibilities.

The present results also corroborate several findings reported by Deluty, the originator of the CATS. First, the obtained pattern of correlations among CATS subscale scores, most notably the strong negative relationship of Aggressiveness with both Assertiveness and Submissiveness scores, was similar in the present study and the original CATS research (Deluty, 1979). Second, the greater Assertiveness scores of the controls, relative to both groups of clinical subjects, support Deluty's (1981a) conclusion that Assertiveness scores are associated with behavioral adjustment. The significant correlations, reported earlier, of CATS Assertiveness with PEI Aggression and several SBCL scores also support this conclusion. Finally, the lack of adjustment-related differences between groups, and of correlations with other indices of adjustment, on the Submissiveness subscale was also consistent with Deluty's (1981a) results. As suggested above, this finding might also be related to the operation of a response bias based on the perceived social undesirability of the Submissiveness items.

As was the case with the SBCL, CATS scores did not differentiate between the clinical aggressive and clinical nonaggressive groups. Again, the implications of this finding will be discussed below.

Comparison of Behavioral Rating Measures

Taken together, the data from the three behavioral rating measures provide a number of indications of their similarities, differences, and relative merits. Furthermore, the present results are remarkably consistent with those of previous research.

As noted earlier, the substantial agreement between peer (PEI) and teacher (SBCL) ratings of aggression can be regarded as evidence for the construct validity of each. Such peer-teacher agreement, both in terms of aggression and along various other dimensions (e.g., popularity, rejection), has been reported by a number of researchers (Eron et al., 1971; Glenwick, 1976; LaGreca, 1981; Landau et al., 1984; Ollendick, 1981; Pekarik et al., 1976; Roff, Sells, & Golden, 1972). While impressive, however, this agreement has not been total, and it cannot be concluded that the two sources of data are interchangeable. Kendall et al. (1981) suggested on the basis of past sociometric research findings that agreement between peer and teacher assessments in individual cases is affected considerably by the teacher's biases. In general, the congruence between peer and teacher ratings is greatest with respect to children at the extremes in rating scores. Similarly, Ledingham et al. (1982) demonstrated that the agreement between peer and teacher ratings is a function of the type

of behavior rated, and is greatest with behaviors such as aggression, which are publicly observable and have high perceptual impact (see also Bower, 1981): While they suggested on this basis that the type of behavioral rating measure used (peer vs. teacher) may be a relatively unimportant issue when assessing acting-out behaviors, this was clearly not the case in the present research. Only the peer-nomination measure was successful in making the problematically fine distinction between two clinical samples of boys presumed to display different types of behavioral problems. A similar finding was reported by Ledingham et al. (1982). Peer ratings on the PEI, but not teacher ratings or self-ratings, were able to discriminate between aggressive and aggressive-withdrawn children from Grades 1, 4, and 7.

As noted in the Results section, the high correlations between subscale scores on the PEI and SBCL Total Disability scores suggest that the PEI is sensitive to differences in general behavioral adjustment.

Thus the present findings suggest several advantages of peer ratings over teacher ratings as discriminators of behavioral adjustment. Other researchers have reached the same conclusion. Landau et al. (1984) found that a teacher-ranking procedure was less comprehensive than a peer measure in explaining social behavior variance in kindergarten boys. They suggested that, while teacher

ratings might offer advantages from economical and ethical points of view, important information may be lost if peer perceptions are not evaluated. Similar conclusions with respect to elementary school children were reached by Bower (1981), Cowen, Pederson, Babigian, Izzo, and Trost (1973), Ollendick (1981), and Rolf (1972).

The present study also found a greater degree of correspondence between Aggression scores on the PEI and the SBCL, than between either of these measures and the Aggressiveness score on the self-report CATS. A number of other studies have also found that various types of self-ratings did not correlate as well as teacher ratings with peer ratings (Eron et al., 1971; Ledingham et al., 1982; Pekarik et al., 1976), and attributed this finding to a prosocial rating bias in self-report measures. Such findings support the view that the principal value of self-report instruments lies not in their equivalence to teacher- or peer-rating measures, but in their potential for contrasting the self-perceptions of individuals with the observations of others.

Limitations of the Present Research

The principal limitation of the present research concerns the intention to compare aggressive boys not only to controls, but also to boys with behavior problems of

a nonaggressive nature. Unfortunately, the degree of overlap in several characteristics of the clinical aggressive and clinical nonaggressive groups interfered with this objective. Although it had been expected that the clinical aggressive group would be demonstrably more aggressive and less well adjusted than the clinical nonaggressive group, comparisons of teacher and peer ratings revealed no statistically significant differences along these dimensions. Examination of the illustrative descriptions of subjects from the two clinical groups (see Method section) also suggests that similarities existed in some of the behavioral problems exhibited by members of the two groups. Furthermore, both the clinical aggressives and the clinical nonaggressives obtained a combination of teacher-rating scores considered to be characteristic of problematically aggressive children.

Thus it is acknowledged that the group designation of "clinical nonaggressive" may be somewhat misleading. As could probably be expected in most samples of boys with behavioral (as opposed to emotional or "internalizing" problems), there was evidence of considerable aggressiveness in the clinical "nonaggressive" group. Similarly, the boys in this group could not be regarded as comparable in the degree or quality of their nonaggressiveness to the controls, whose scores on all measures of aggression were much lower and generally within normal limits.

The finding of common features between the two clinical groups is explainable largely by the sampling procedure which was employed. As mentioned earlier, it had initially been planned to select subjects for the two clinical groups on the joint basis of clinical referral and scores on the PEI and SBCL. However, it was soon apparent that this approach, while desirable, was not practical. Specifically, the unexpectedly slow rate and limited number of subject referrals, especially for the clinical nonaggressives, made the use of such stringent selection criteria impossible. While objective criteria for subject selection were used as much as possible (See Method section, and Appendixes M and S), the somewhat subjective judgments of referring clinicians, and to a lesser degree parents, were of necessity a major determinant of subject selection and classification. This probably contributed to the lack of distinction between the two clinical subject groups. As Strayer (1984) suggested, for example, referral judgments of aggression can be based as much on the intensity and character of aggressive behavior, as on its frequency. If this occurred in the present study, some boys who were only occasionally, but dramatically, aggressive may have been included in the clinically aggressive group along with more chronically aggressive children. Similarly, the significant aggressiveness of other children may have been less readily observable, or masked by other problems.

resulting in their referral and classification as clinical nonaggressive subjects.

Although the desired degree of discrimination between the clinical groups was not apparent in the present sample, there are indications that the basis for anticipating these differences was fundamentally sound. The higher mean scores for the clinical aggressives on several indices of aggression and maladjustment were remarkably consistent, although not statistically significant. As well, the exploratory reclassification of subjects by PEI and SBCL scores suggested that the clinical aggressives were more clearly members of a problematically aggressive population than were the clinical nonaggressives. With regard to the control subjects, there was stronger evidence from all measures and from the exploratory reclassification that these subjects were representative of children without evident behavioral problems.

Thus the research strategy of obtaining two distinct groups of behaviorally maladjusted children for comparison to controls and to each other, while not completely successful in the present research, appears to have some value. Further efforts at this type of research may be more effective if additional measures are taken to minimize overlap between the two clinical groups. More stringent, multiple selection criteria are the most obvious precaution, although such an approach requires the availability of

a large pool of potential subjects. As was found in conducting this research, the reliance on busy professionals, both to keep in mind the investigator's request for subjects and to actually consider and refer subjects from their caseloads, presents problems in this regard. On the other hand, the simpler and more commonly adopted alternative of sampling from normal school populations with sociometrics or behavioral checklists presents another dilemma, since it limits the generalizations which can be made to clinical populations (see Asarnow & Callan, 1985; Butler, 1979; Piscione, 1981).

Some other methodological issues may be noted with respect to the present study and others similar to it. First, while correlational studies such as this may be useful in examining the association between problem-solving ability and behavioral adjustment problems, a different research approach (e.g., experimental or training studies) is necessary to determine whether a causal relationship exists.

Furthermore, it must be pointed out that the "known groups" approach of this research and many of the other correlational studies reviewed in this thesis presents interpretation problems. As Butler and Meichenbaum (1981) observed:

The "known groups" strategy makes the assumption that the critical factor on which the groups differ--and which accounts for differences in the social problem-

solving dependent variable--is the variable of theoretical interest, namely social adjustment. However, problems of interpretation are presented by the fact that psychopathological and normal populations clearly differ on a great many variables other than social adjustment . . . that may also influence performance on measures of social problem-solving cognition. (p. 212)

They suggested that the comparative study of subject groups drawn from large, fairly homogeneous populations, but differing in the level of adjustment or psychopathology, might reduce some of these difficulties. However, they also pointed out that even this approach offers little in terms of understanding the individual differences (such as subtle differences in test responding) which may account for some children's deficits in problem-solving performance.

Conclusions

The research reported in this thesis did not provide evidence to support the hypothesized relationships between problem-solving ability and clinically identified aggressiveness or other behavior problems. These findings are consistent with the results of much of the recent research which was reviewed earlier. Efforts to replicate studies indicative of such a relationship have not met with consistent success, and the results of even the most comprehensive training programs have been disappointing.

While the search for cognitive problem-solving mediators of aggression has had limited success, it does

not follow that the importance of such factors can be ruled out in the production and regulation of aggressive behavior. Despite the increased research activity in the area during the past several years, there has been relatively little progress in terms of the variety and elaboration of the research approaches which have been taken. While there is an increasing recognition that social behavior, including aggression, is the product of a complex interplay among cognitive processes and structures, the environment, and overt behavior (Meichenbaum et al., 1981), much of the research to date has relied upon relatively simple models and measures of problem-solving ability. While the use of the PEPSI in this study was an effort to make some improvement in this regard, it now seems necessary to move even farther beyond simple problem-solving measures if more is to be learned about the role of cognitive problem solving in mediating behavior and adjustment. Some promising developments with respect to more comprehensive problem-solving measures were reported in the previous section. In addition, it would appear that efforts should also be made to construct measures which are more realistic and ecologically valid than those which rely on the child's response to hypothetical problem situations.

A number of positive findings regarding other aspects of problem solving have been reported with sufficient frequency to suggest potential for further research.

First, the ability to delay impulsive responding long enough to engage in adaptive problem solving has been shown to be an important factor in adjustment (e.g., Douglas, 1972; Walters, 1979). Further research into the determinants and facilitators of impulse control in social problem situations would be useful. It has been suggested that the development of a specifically social-cognitive measure of impulse control would greatly benefit such research (Walters & Peters, undated).

Second, it has been suggested that the ability or inclination to actually use one's existing problem-solving skills in social problem situations (i.e., the presence or absence of 'production' deficits) may be as important a consideration as the existence or comprehension of the skills themselves. While this possibility has been convincingly proposed and has received some empirical support (Cooney & Selman, 1978; Flavell, 1974; Walters, 1979), further research is needed to explore and validate this proposition.

Third, there is evidence that a significant distinguishing feature of problematically aggressive boys is their fundamental preference for more aggressive behavioral solutions in peer problem situations. The self-report findings of the present study provide further support for this possibility. Such a difference in behavioral preference may be especially important in view of the

limited research findings with respect to cognitive problem solving and behavior. In the absence of identified aspects of problem-solving ability which mediate aggressive behavior, it might be useful to consider these behavioral preferences as a "final common pathway" which is of major practical importance in understanding and remediating maladaptive aggression. An important area of enquiry in this regard concerns the nature of attitudinal differences which may exist between aggressives and others toward specific types of behavior (Asarnow & Callan, 1985; Deluty, 1983).

Further research would also be useful in the areas of metacognitive variables and their relation to aggression and social competence, and the distinction between automatic ('scripted') and deliberate, reflective problem solving in social situations. An important question with respect to the latter area would be the circumstances which lead the individual to place what is usually automatic social behavior under the conscious control of his or her cognitive problem-solving efforts (Meichenbaum et al., 1981).

It should also be recognized that aggression can be emotionally as well as cognitively mediated (Fraczek, 1979). While such affective processes are beyond the scope of this thesis, they are an important consideration in understanding and modifying aggressive behavior.

One of the secondary purposes of this study was to

contribute to further evaluation of the PEPSI as a measure of problem-solving ability. The pilot study conducted with the PEPSI replicated the findings of its constructors (Asher et al., 1972) with respect to its sensitivity to increases in grade level and its reasonable freedom from socioeconomic bias. On the other hand, the principal study suggested possible problems related to the low difficulty level of the Postsolution (Solving Problems III) items. Consideration might be given to the modification or omission of this portion of the PEPSI. The findings of this study also suggest that the PEPSI may be a measure whose use is more appropriate for educational rather than clinical applications.

Several other findings from this research are of interest in terms of the assessment and measurement of aggression and other problem behaviors. The Pupil Evaluation Inventory was found to be a more sensitive measure of aggression than the other behavioral rating measures which were employed. The PEI Aggression subscale alone was able to distinguish two clinical samples of boys assumed to differ in their level of aggression. The PEI also carries the important advantage of a capability to estimate more specific and psychologically significant behavioral characteristics (Aggression, Withdrawal, and Likeability) than most other sociometric measures. However, efforts to elicit such fine judgments from elementary school

children are not without their own difficulties. Secondary analysis of the correlations among PEI subscale scores suggested that the PEI is not immune to "halo effects" resulting from the influence of the perceived likeability of individual peers. The possibility of such a bias in PEI scores should be considered when using this measure. Finally, while the PEI is a promising research instrument, consideration might be given to reducing the time required for administration and scoring. A reduction in the number of Aggression items, as was done in this research through the derivation of the Aggression-Modified scale, is one possibility in this regard.

A high level of agreement was found in this research between the ratings of teachers and peers. It is suggested, however, that teacher-rating scales such as the SBCL are best used as general screening measures, with careful attention to the possible influence of teacher biases in each case.

Self-report measures appear to be useful primarily as indicators of self-perceptions and behavioral preferences, and for comparisons of self-perceptions with the judgments of others. As noted earlier, the present findings using the self-report CATS are especially interesting, as they provide further evidence of differences in basic behavioral preference between aggressive and nonaggressive boys. However, the nature and extent of prosocial response biases

in self-report measures requires further investigation.

It is apparent from the foregoing discussion that the clinical potential of a problem-solving view of aggression remains largely unsubstantiated. A clear relationship between problem-solving ability and aggression has not been established, and preventive and treatment programs based on a problem-solving model have produced disappointing results. However, we are still left with the question of how best to deal with children who are brought to the attention of clinicians because of their aggressive behavior. Some tentative suggestions can be made on the basis of the present findings and the results of other research reported here.

From the standpoint of cognitive processes, there is some justification for suggesting, as did Walters and Peters (undated), that an emphasis on the assessment and treatment of "comprehension" deficits (i.e., in measured levels of specific problem-solving abilities) may be somewhat misdirected, unless clearly indicated in individual cases. As suggested earlier, there appears to be clearer evidence for the importance of impulse control, and possibly the predisposition to implement existing problem-solving skills, in the regulation of aggressive behavior. If this is the case, it would be useful for treatment efforts to emphasize the improvement of the aggressive child's abilities in impulse control (see, for example, Meichenbaum,

1977 and Douglas, 1972) and his or her "initial orientation" to actively and consciously engage in cognitive problem solving (Cooney & Selman, 1978).

Of more direct potential relevance to clinical interventions with aggressive children is the frequent finding that aggressive boys can be distinguished largely on the basis of their preference for aggressive behavioral solutions in problem situations. It might be helpful, as Deluty (1983) suggested, for treatment efforts to focus on the overly positive attitudes which aggressive children may hold toward aggressive response alternatives, and on the cognitive-behavioral modification of these response tendencies. This suggestion raises an interesting parallel with the treatment of alcoholism, where much of the emphasis is on critical behavioral and cognitive "choice-points", such as the decision to take a first drink when under stress. Such cognitive-behavioral therapeutic approaches as the "Turtle" program (Schneider & Robin, 1975, cited in Cartledge & Milburn, 1980) or stress-inoculation training (Meichenbaum, 1977) might also be useful in helping the child establish behavioral predispositions other than aggression. It might also be productive to employ more conventional behavior therapy to improve social skills (Ollendick & Cerny, 1981), to elicit and reinforce prosocial responses or lessen aggressive behavior through negative reinforcement, and to ensure that effective responses

continue to be generated if an initial attempt to solve a problem is unsuccessful (Parke & Slaby, 1983; Patterson et al., 1967; Richard & Dodge, 1982).

To conclude, the results of this study and much of the recent research have given rather little indication of the role of problem-solving ability, at least as it has been defined and measured, as a mediator of aggressive behavior. It appears that if further problem-solving research in this area is to be more informative, it must move farther in the direction of more comprehensive models and measures of problem-solving ability which more accurately represent the manner in which problems are solved in real-life, especially social, situations.

Until more is known about the role of problem-solving ability in the production and regulation of aggressive behavior, there is little reason to expect problem-solving training to be an especially effective preventive or treatment modality. On the basis of the conclusions which have been proposed in this thesis, it may be that interventions which target overt behavior, or cognitive processes which appear to be relatively closely related to overt behavior (e.g., impulse control, attitudes toward specific types of behavior), may have more potential for dealing with the problem of maladaptively aggressive behavior in children.

FOOTNOTES

¹Sex differences in aggression, with aggressive behavior much more prevalent in males than in females, have also been well documented (Feshbach, 1970; Hartup, 1974; Kirschenbaum & Ordman, 1984; Lefkowitz et al., 1977; Parke & Slaby, 1983; Richard & Dodge, 1982; Semler, Eron, Myerson, & Williams, 1967):

²Similar findings had also been reported by Rubin, Daniels-Beirness, and Hayvren (1982). Among kindergarten children (but not preschoolers), sociometric rejection correlated negatively with the number of relevant strategies given, and positively with the proportion of aggressive problem solutions given, on a modified version of the PIPS.

³A critical significance level of .02 was adopted for each comparison. This was determined by dividing the desired level of .05 for all three comparisons by the number of comparisons (P. W. D. Dodd, personal communication, November, 1983).

⁴If the pairwise comparison of Total and Presolution scores are made by performing separate t tests between schools at each grade level, with a critical significance level of .05 for each comparison, the results are the same as for the procedure outlined in footnote 3, except that the difference between the Grade 2 Presolution means becomes

significant. That is, the results from these pairwise comparisons are then the same for both Resolution and Total scores.

⁵ It was decided to employ Grade 3 as the lower limit for grade level rather than Grade 2 as anticipated at the time of the pilot study, to further limit developmental variation and the associated difficulties in interpreting the research data.

⁶ The exclusion categories were determined partly through an informal review of all referrals and initial visits to the Halifax Branch of ACGC during 1982.

⁷ A partial exception was one boy who had been selected and tested as a control subject before it was learned that he had been excused from the class during the administration of the PEI. As it was not practical to select another control subject from the same classroom, this subject's scores were retained. His own PEI booklet, however, was not scored. There is evidence that sociometric ratings of absent children tend to be lower than the ratings of those who are present (Eron et al., 1971). However, this boy was present for at least part of the PEI administration. As well, the frequency with which he was nominated by his classmates across all items did not differ significantly from the classroom mean ($z = -0.27$, $p = .39$), suggesting that his absence did not appreciably affect his "visibility".

⁸The reclassification of subjects by PEI Aggression scores resulted in a marginally nonsignificant F ratio in the analysis of CATS Aggressiveness and Assertiveness scores. The same analysis had been significant under the original classification. The originally nonsignificant F from the analysis of CATS Submissiveness scores became significant when subjects were reclassified by SBCI Aggression scores. Pairwise contrasts between group means remained nonsignificant.

REFERENCES

- Allen, G. J., Chinsky, J. M., Larcen, S. W., Lochman, J. E., & Selinger, H. V. (1976). Community psychology and the schools: A behaviorally oriented multilevel preventive approach. Hillsdale, NJ: Lawrence Erlbaum Associates.
- Alpert, J. L., & Rosenfeld, S. (1981). Consultation and the introduction of social problem-solving groups in schools. Personnel and Guidance Journal, 60, 37-41.
- Asarnow, J. R., & Callan, J. W. (1985). Boys with peer adjustment problems: Social cognitive processes. Journal of Consulting and Clinical Psychology, 53, 80-87.
- Asher, J. W., Feldhusen, J. F., Gruen, G. E., Kane, R. B., McDaniel, E., Stevens, M. I., Towler, J., & Wheatley, G. H. (1971). The development of new measures of cognitive variables in elementary school children; Final report of Phase I (Contract No. OEC-0-70-4952). Washington, DC: U.S. Office of Education.
- Asher, J. W., Feldhusen, J. F., Gruen, G. E., Kane, R. B., McDaniel, E., Stevens, M. I., Towler, J., & Wheatley, G. H. (1972). The development of new measures of cognitive variables in elementary school children; Final report of Phase II (Contract No. OEC-0-70-4952). Washington, DC: U.S. Office of Education.
- Asher, S. R. (1983). Social competence and peer status: Recent advances and future directions. Child Development, 54, 1427-1434.
- Asher, S. R., & Hymel, S. (1981). Children's social competence in peer relations: Sociometric and behavioral assessment. In J. D. Wine & M. D. Smye (Eds.), Social competence (pp. 125-157). New York: Guilford Press.
- Bandura, A. (1973). Aggression: A social learning analysis. Englewood Cliffs: Prentice-Hall.
- Bandura, A., Ross, D., & Ross, S. A. (1961). Transmission of aggression through imitation of aggressive models. Journal of Abnormal and Social Psychology, 63, 575-582.
- Bandura, A., Ross, D., & Ross, S. A. (1963a). Imitation of film-mediated aggressive models. Journal of Abnormal and Social Psychology, 66, 3-11.

- Bandura, A., Ross, D., & Ross, S. A. (1963b). Vicarious reinforcement and imitative learning. Journal of Abnormal and Social Psychology, 67, 601-607.
- Bash, M. A. S., & Camp, B. W. (1980). Teacher training in the Think Aloud Classroom Program. In G. Cartledge & J. F. Milburn (Eds.), Teaching social skills to children (pp. 143-178). New York: Pergamon Press.
- Berkowitz, L. (1974). External determinants of impulsive aggression. In J. deWit & W. W. Hartup (Eds.), Determinants and origins of aggressive behavior (pp. 147-165). The Hague: Mouton.
- Berkowitz, L. (1977). Situational and personal conditions governing reactions to aggressive cues. In D. Magnusson & N. S. Endler (Eds.), Personality at the crossroads: Current issues in interactional psychology (pp. 165-171). Hillsdale, NJ: Lawrence Erlbaum Associates.
- Berndt, T. J. (1981). Relations between social cognition, nonsocial cognition, and social behavior: The case of friendship. In J. H. Flavell & L. Ross (Eds.), Social cognitive development (pp. 176-199). New York: Cambridge University Press.
- Blishen, B. R., & Carroll, W. K. (1978). Sex differences in a socioeconomic index for occupations in Canada. Canadian Review of Sociology and Anthropology, 15, 352-371.
- Blishen, B. R., & McRoberts, H. A. (1976). A revised socioeconomic index for occupations in Canada. Canadian Review of Sociology and Anthropology, 13, 71-79.
- Bower, E. M. (1981). Early identification of emotionally handicapped children in school (3rd ed.). Springfield, IL: Charles C. Thomas.
- Burka, A. A., & Glenwick, D. S. (1978). Egocentrism and classroom adjustment. Journal of Abnormal Child Psychology, 6, 61-70.
- Butler, L. J. (1979). Interpersonal problem-solving skills, peer acceptance and social behaviour in preadolescent children. Unpublished master's thesis, University of Waterloo, Waterloo, Ontario.

- Butler, L. J., & Meichenbaum, D. (1981). The assessment of interpersonal problem-solving skills. In P. C. Kendall & S. D. Hollon (Eds.), Assessment strategies for cognitive-behavioral interventions (pp. 197-225). New York: Academic Press.
- Camp, B. W. (1977). Verbal mediation in young aggressive boys. Journal of Abnormal Psychology, 86, 145-153.
- Camp, B. W., Blom, G. E., Hebert, F., & van Doorninck, W. J. (1977). "Think Aloud": A program for developing self-control in young aggressive boys. Journal of Abnormal Child Psychology, 5, 157-169.
- Camp, B. W., Zimet, S. G., van Doorninck, W. J., & Dahlem, N. W. (1977). Verbal abilities in young aggressive boys. Journal of Educational Psychology, 69, 129-135.
- Cartledge, G., & Milburn, J. F. (Eds.). (1980). Teaching social skills to children. New York: Pergamon Press.
- Chandler, M. J. (1973). Egocentrism and antisocial behavior: The assessment and training of social perspective-taking skills. Developmental Psychology, 9, 326-332.
- Coñger, J. C., & Keane, S. P. (1981). Social skills intervention in the treatment of isolated or withdrawn children. Psychological Bulletin, 90, 478-495.
- Cooney, E. W., & Selman, R. L. (1978). Children's use of social conceptions: Toward a dynamic model of social cognition. In W. Damon (Ed.), New directions for child development (Vol. 1: Social cognition) (pp. 23-44). San Francisco: Jossey-Bass.
- Cowen, E. L., Pederson, A., Babigian, H., Izzo, L. D., & Frost, M.A. (1973). Long-term follow-up of early detected vulnerable children. Journal of Consulting and Clinical Psychology, 41, 438-446.
- Cutrona, C. E., & Feshbach, S. (1979). Cognitive and behavioral correlates of children's differential use of social information. Child Development, 50, 1036-1042.
- Damon, W. (1981). Exploring children's social cognition on two fronts. In J. H. Flavell & L. Ross (Eds.), Social cognitive development (pp. 154-175). New York: Cambridge University Press.

- Davis, G. A. (1973). Psychology of problem solving: Theory and practice. New York: Basic Books.
- Deluty, R. H. (1979). Children's Action Tendency Scale: A self-report measure of aggressiveness, assertiveness, and submissiveness in children. Journal of Consulting and Clinical Psychology, 47, 1061-1071.
- Deluty, R. H. (1981a). Adaptiveness of aggressive, assertive, and submissive behavior for children. Journal of Clinical Child Psychology, 10, 155-158.
- Deluty, R. H. (1981b). Alternative-thinking ability of aggressive, assertive, and submissive children. Cognitive Therapy and Research, 5, 309-312.
- Deluty, R. H. (1983). Children's evaluations of aggressive, assertive, and submissive responses. Journal of Clinical Child Psychology, 12, 124-129.
- Denney, D. R. (1973). Reflection and impulsivity as determinants of conceptual strategy. Child Development, 44, 614-623.
- Dodge, K. A. (1980). Social cognition and children's aggressive behavior. Child Development, 51, 162-170.
- Dodge, K. A. (1983). Behavioral antecedents of peer social status. Child Development, 54, 1386-1399.
- Dodge, K. A., & Frame, C. L. (1982). Social cognitive biases and deficits in aggressive boys. Child Development, 53, 620-635.
- Dodge, K. A., & Newman, J. P. (1981). Biased decision-making processes in aggressive boys. Journal of Abnormal Psychology, 90, 375-379.
- Dollard, J., Doob, L. W., Miller, N. E., Mowrer, O. H., & Sears, R. R. (1939). Frustration and aggression. New Haven: Yale University Press.
- Douglas, V. I. (1972). Stop, look and listen: The problem of sustained attention and impulse control in hyperactive and normal children. Canadian Journal of Behavioral Science, 4, 259-282.
- Douglas, V. I., Parry, P., Marton, P., & Carson, C. (1976). Assessment of a cognitive training program for hyperactive children. Journal of Abnormal Child Psychology, 4, 389-410.

- Dunn, L. M., & Dunn, L. M. (1981). Peabody Picture Vocabulary Test-Revised: Manual for Forms L and M. Circle Pines, MN: American Guidance Service.
- D'Zurilla, T. J., & Goldfried, M. R. (1971). Problem solving and behavior modification. Journal of Abnormal Psychology, 78, 107-126.
- Elardo, P. T. (1977). Project Aware: A school program to facilitate the social development of children. In R. A. Webb (Ed.), Social development in childhood: Day-care programs and research (pp. 161-191). Baltimore: Johns-Hopkins University Press.
- Eron, L. D., Walder, L. O., & Lefkowitz, M. M., & Monroe, M. (1971). Learning of aggression in children. Boston: Little, Brown.
- Feldhusen, J. F., & Guthrie, V. A. (1979). Models of problem solving processes and abilities. Journal of Research and Development in Education, 12(2), 22-32.
- Feldhusen, J., & Houtz, J. (1975). Problem solving and the concrete abstract dimension. Gifted Child Quarterly, 19, 122-129.
- Feldhusen, J. F., Houtz, J. C., & Ringenbach, S. E. (1972). The Purdue Elementary Problem-Solving Inventory. Psychological Reports, 31, 891-901.
- Feshbach, N. D., & Feshbach, S. (1969). The relationship between empathy and aggression in two age groups. Developmental Psychology, 1, 102-107.
- Feshbach, S. (1970). Aggression. In P. H. Mussen (Ed.), Carmichael's Manual of Child Psychology (3rd ed.) (pp. 159-259). New York: Wiley.
- Feshbach, S. (1974). The development and regulation of aggression: Some research gaps and a proposed cognitive approach. In J. deWit & W. W. Hartup (Eds.), Determinants and origins of aggressive behavior (pp. 167-191). The Hague: Mouton.
- Feshbach, S. (1979). The regulation and modification of aggression: Commonalities and issues. In S. Feshbach & A. Fraczek (Eds.), Aggression and behavior change: Biological and social processes (pp. 271-286). New York: Praeger.

- Flavell, J. H. (1974). The development of inferences about others. In T. Mischel (Ed.), Understanding other persons (pp. 66-116). Totowa, NJ: Rowman and Littlefield.
- Flavell, J. H. (1977). Cognitive development. Englewood Cliffs: Prentice-Hall.
- Flavell, J., Botkin, P., Fry, C., Wright, J., & Jarvis, P. E. (1968). The development of role-taking and communication skills in children. New York: Wiley.
- Fraczek, A. (1979). Functions of emotional and cognitive mechanisms in the regulation of aggressive behavior. In S. Feshbach and A. Fraczek (Eds.), Aggression and behavior change: Biological and social processes (pp. 139-157). New York: Praeger.
- Gagné, R. M. (1964). Problem solving. In A. W. Melton (Ed.), Categories of human learning (pp. 293-317). New York: Academic Press.
- Gagné, R. M. (1966). Human problem solving: Internal and external events. In B. Kleinmuntz (Ed.), Problem solving: Research, method, and theory (pp. 128-148). New York: Wiley.
- Gesten, E. L., Flores de Apodaca, R., Rains, M., Weissberg, R. P., & Cowen, E. L. (1979). Promoting peer-related social competence in schools. In Kent, M. W., & Rolf, J. E. (Eds.), Social competence in children (pp. 220-247). Hanover, NH: University Press of New England.
- Gesten, E. L., Rains, M. H., Rapkin, B. D., Weissberg, R. P., Flores de Apodaca, R., Cowen, E. L., & Bowen, R. (1982). Training children in social problem-solving competencies: A first and second look. American Journal of Community Psychology, 10, 95-115.
- Gillespie, J. F., Durlak, J. A., & Sherman, D. (1982). Relationship between kindergarten children's interpersonal problem-solving skills and other indices of school adjustment: A cautionary note. American Journal of Community Psychology, 10, 149-153.
- Glass, A. L., Holyoak, K. J., & Santa, J. L. (1979). Cognition. Reading, MA: Addison-Wesley.
- Glass, G. V., & Stanley, J. C. (1970). Statistical methods in education and psychology. Englewood Cliffs: Prentice-Hall.

- Glenwick, D. S. (1976). Some interpersonal correlates of cognitive impulsivity in fourth-graders. Journal of School Psychology, 14, 212-221.
- Glick, J. (1978). Cognition and social cognition: An introduction. In J. Glick & K. A. Clarke-Stewart (Eds.), The development of social understanding (pp. 1 - 9). New York: Gardner Press.
- Goldfried, M. R., & Goldfried, A. P. (1975). Cognitive change methods. In Kanfer, F. H. & Goldstein, A. P. (Eds.), Helping people change (pp. 89-116). New York: Pergamon Press.
- Gordon, I. J. (1966): Studying the child in the school. New York: Wiley.
- Gottman, J., Gonso, J., & Rasmussen, B. (1975). Social interaction, social competence, and friendship in children. Child Development, 46, 709-718.
- Grossi, V., & Nicholson, L. (1983, June). Reliability and concurrent validity of three sociometric measures with emotionally disturbed children. Paper presented at the meeting of the Canadian Psychological Association, Winnipeg, Manitoba.
- Guilford, J. P. (1967). The nature of human intelligence. New York: McGraw-Hill.
- Hains, A. A., & Ryan, E. B. (1983). The development of social cognitive processes among juvenile delinquents and nondelinquent peers. Child Development, 54, 1536-1544.
- Hartup, W. W. (1974). Aggression in childhood: Developmental perspectives. American Psychologist, 29, 336-341.
- Hartup, W. W. (1976). Peer interaction and the behavioral development of the individual child. In E. Schopler & R. J. Reichler (Eds.), Psychopathology and child development: Research and treatment (pp. 203-218). New York: Plenum Press.
- Hartup, W. W., Brady, J. E., & Newcomb, A. F. (1983). Social cognition and social interaction in childhood. In E. T. Higgins, D. N. Ruble, & W. W. Hartup (Eds.), Social cognition and social development (pp. 82-109). Cambridge: Cambridge University Press.

Hayvren, M., & Hymel, S. (1984). Ethical issues in sociometric testing: Impact of sociometric measures on interaction behavior. Developmental Psychology, 20, 844-849.

Heppner, P. P. (1978). A review of the problem-solving literature and its relationship to the counseling process. Journal of Counseling Psychology, 25, 366-375.

Hetherington, E. M., & Parke, R. D. (1975). Child Psychology: A contemporary viewpoint. New York: McGraw-Hill.

Hill, K. A. (1979). Social perception in childhood. In J. K. Chadwick-Jones, I. I. Lenzer, J. A. Darley, and K. A. Hill (Eds.), Brain, environment, and social psychology (pp. 107-126). Baltimore: University Park Press.

Hops, H., & Greenwood, C. R. (1983). Social skills deficits. In E. J. Mash & L. G. Terdal (Eds.), Behavioral assessment of childhood disorders (pp. 347-394). New York: Guilford Press.

Houtz, J. C., & Feldhusen, J. F. (1975). Problem solving ability of disadvantaged elementary school children under four testing formats: A replicated experiment. Psychology in the Schools, 12, 26-33.

Houtz, J. C., & Feldhusen, J. F. (1976). The modification of fourth graders' problem solving abilities. The Journal of Psychology, 93, 229-237.

Houtz, J. C., & Feldhusen, J. F. (1977). Training problem solving skills in fourth-graders: Supplementary analysis. The Journal of Psychology, 96, 309-313.

Houtz, J. C., Ringenbach, S., & Feldhusen, J. F. (1973). Relationship of problem solving to other cognitive variables. Psychological Reports, 33, 389-390.

Jahoda, M. (1953). The meaning of psychological health. Journal of Social Casework, 34, 349-354.

Jahoda, M. (1958). Current concepts of positive mental health. New York: Basic Books.

Jensen, A. R. (1966). Verbal mediation and educational potential. Psychology in the Schools, 3, 99-109.

- Kane, J. S., & Lawler, E. E. (1978). Methods of peer assessment. Psychological Bulletin, 85, 555-586.
- Kendall, P. C., Pellegrini, D. S., & Urbain, E. S. (1981). Assessment of interpersonal problem solving. In P. C. Kendall & S. D. Hollon (Eds.), Assessment strategies for cognitive-behavioral interventions (pp. 240-285). New York: Academic Press.
- Kendler, H. H., & Kendler, T. S. (1962). Vertical and horizontal processes in problem solving. Psychological Review, 69, 1-16.
- Kendler, T. S. (1964). Learning and problem solving: Comments on Professor Gagné's paper. In A. W. Melton (Ed.), Categories of human learning (pp. 318-323). New York: Academic Press.
- Kirschenbaum, D. S., & Ordman, A. M. (1984). Preventive interventions for children: Cognitive-behavioral perspectives. In A. W. Myers & W. E. Craighead (Eds.), Cognitive behavior therapy with children (pp. 377-409). New York: Plenum Press.
- Krasnor, L. R. (1984, May). Development of social problem-solving thinking in elementary school-aged children. Paper presented at the University of Waterloo Conference on Child Development, Waterloo, Ontario.
- Krasnor, L. R., & Rubin, K. H. (1981). The assessment of social problem-solving skills in young children. In T. V. Merluzzi, C. R. Glass, & M. Genest (Eds.), Cognitive Assessment (pp. 452-476). New York: Guilford Press.
- La Greca, A. M. (1981). Peer acceptance: The correspondence between children's sociometric scores and teachers' ratings of peer interactions. Journal of Abnormal Child Psychology, 9, 167-178.
- Landau, S., Milich, R., & Whitten, P. (1984). A comparison of teacher and peer assessment of social status. Journal of Clinical Child Psychology, 13, 44-49.
- Ledingham, J. E. (1981). Developmental patterns of aggressive and withdrawn behavior in childhood: A possible method for identifying preschizophrenics. Journal of Abnormal Child Psychology, 9, 1-21.
- Ledingham, J. E., Younger, A., Schwartzman, A., & Bergeron, G. (1982). Agreement among teacher, peer, and self-ratings of children's aggression, withdrawal, and likeability. Journal of Abnormal Child Psychology, 10, 363-372.

- Lefèvre, E. R., West, M. L., & Ledingham, J. E. (1982, September). Sensitivity of a peer-nomination technique in detecting changes in children's social behavior. Paper presented at the annual meeting of the Canadian Psychological Association, Montreal.
- Lefkowitz, M. M., Eron, L. D., Walder, L. O., & Huesmann, L. R. (1977). Growing up to be violent: A longitudinal study of the development of aggression. New York: Pergamon Press.
- Levenson, M., & Neuringer, C. (1971). Problem-solving behavior in suicidal adolescents. Journal of Consulting and Clinical Psychology, 37, 433-436.
- Lovaas, O. I. (1961). Effect of exposure to symbolic aggression on aggressive behavior. Child Development, 32, 37-44.
- Luria, A. R. (1959). The directive function of speech in development and dissolution. Word, 15, 341-352.
- McClure, L. F., Chinsky, J. M., & Larcen, S. W. (1978). Enhancing social problem-solving performance in an elementary school setting. Journal of Educational Psychology, 70, 504-513.
- McKim, B. J., Weissberg, R. P., Cowen, E. L., Gesten, E. L., & Rapkin, B. D. (1982). A comparison of the problem-solving ability and adjustment of suburban and urban third-grade children. American Journal of Community Psychology, 10, 155-169.
- McKinney, J. (1973). Problem-solving strategies in impulsive and reflective second graders. Developmental Psychology, 8, 145.
- Meichenbaum, D. (1975). Theoretical and treatment implications of developmental research on verbal control of behavior. Canadian Psychological Review, 16, 22-27.
- Meichenbaum, D. (1977). Cognitive-behavior modification: An integrative approach. New York: Plenum Press.
- Meichenbaum, D., Butler, L., & Gruson, L. (1981). Toward a conceptual model of social competence. In J. D. Wine & M. D. Smye (Eds.), Social competence (pp. 36-60). New York: Guilford Press.

- Meichenbaum, D., & Goodman, J. (1971). Training impulsive children to talk to themselves: A means of developing self-control. Journal of Abnormal Psychology, 77, 115-126.
- Miller, L. C. (1972). School Behavior Check List: An inventory of deviant behavior for elementary school children. Journal of Consulting and Clinical Psychology, 38, 134-144.
- Miller, L. C. (1977). School Behavior Checklist: Manual. Los Angeles: Western Psychological Services.
- Miller, N. E., & Dollard, J. (1941). Social learning and imitation. New Haven: Yale University Press.
- Nasby, W., Hayden, B., & DePaulo, B. M. (1980). Attributional bias among aggressive boys to interpret unambiguous social stimuli as displays of hostility. Journal of Abnormal Psychology, 89, 459-468.
- O'Leary, K. D., & Johnson, S. B. (1979). Psychological assessment. In H. C. Quay & J. S. Werry (Eds.), Psychopathological disorders of childhood (2nd ed.) (pp. 210-246). New York: Wiley.
- Ollendick, T. H. (1981). Assessment of social interaction skills in school children. Behavioral Counseling Quarterly, 1, 227-243.
- Ollendick, T. H., & Cerny, J. A. (1981). Clinical behavior therapy with children. New York: Plenum Press.
- Parke, R. D., & Slaby, R. G. (1983). The development of aggression. In E. M. Hetherington (Volume Ed.) & P. H. Mussen (General Ed.), Handbook of child psychology (3rd ed.) (Vol. 4) (pp. 547-641). New York: Wiley.
- Patterson, G. R., Littman, R. A., & Bricker, W. (1967). Assertive behavior in children: A step toward a theory of aggression. Monographs of the Society for Research in Child Development, 32 (5, Serial No. 113).
- Patterson, G. R., Reid, J. B., Jones, R. R., & Conger, R. F. (1975). A social learning approach to family intervention: Volume 1: Families with aggressive children. Eugene, OR: Castalia Publishing.
- Pekarik, E. G., Prinz, R. J., Liebert, D. E., Weintraub, S., & Neal, J. M. (1976). The Pupil Evaluation Inventory: A sociometric technique for assessing children's social behavior. Journal of Abnormal Child Psychology, 4, 83-97.

- Piaget, J. (1965). The moral judgment of the child. New York: Free Press.
- Piscione, J. A. (1981). A field evaluation of social problem solving: Training with junior high school aged children. Dissertation Abstracts International, 42, 4421A. (National Library of Canada Microfilm No. 53138)
- Richard, B. A., & Dodge, K. A. (1982). Social maladjustment and problem solving in school-aged children. Journal of Consulting and Clinical Psychology, 50, 226-233.
- Roff, M., Sells, S. S., & Golden, M. M. (1972). Social adjustment and personality development in children. Minneapolis: University of Minnesota Press.
- Rolf, J. E. (1972). The social and academic competence of children vulnerable to schizophrenia and other behavior pathologies. Journal of Abnormal Psychology, 80, 225-243.
- Rubin, K. H., Daniels-Beirness, T., & Hayvren, M. (1982). Social and social-cognitive correlates of sociometric status in preschool and kindergarten children. Canadian Journal of Behavioral Science, 14, 338-349.
- Rule, B. G. (1974). The hostile and instrumental functions of human aggression. In J. deWit & W. W. Hartup (Eds.); Determinants and origins of aggressive behavior (pp. 125-145). The Hague: Mouton.
- Rule, B. G., & Duker, P. (1973). Effects of intentions and consequences on children's evaluations of aggressors. Journal of Personality and Social Psychology, 27, 184-189.
- Rule, B. G., Nesdale, A. R., & McAra, M. J. (1974). Children's reactions to information about the intentions underlying an aggressive act. Child Development, 45, 794-798.
- Ryan, T. A., Joiner, B. E., & Ryan, B. F. (1976). Minitab student handbook. North Scituate, MA: Duxbury Press.
- Selman, R. L. (1976). Toward a structural analysis of developing interpersonal concepts: Research with normal and disturbed preadolescent boys. In A. D. Pick (Ed.), Minnesota Symposia on Child Psychology (Vol. 10) (pp. 156-200). Minneapolis: University of Minnesota Press.
- Semler, I. J., Eron, L. D., Meyerson, L. J., & Williams, J. F. (1967). Relationship of aggression in third grade children to certain pupil characteristics. Psychology in the Schools, 4, 85-88.

- Shaffer, D. R. (1979). Social and personality development. Monterey, CA: Brooks/Cole.
- Shantz, C. U. (1975). The development of social cognition. In E. M. Hetherington (Ed.), Review of child development research (Vol. 5) (pp. 257-323). Chicago: University of Chicago Press.
- Shantz, C. U. (1983). Social cognition: In J. H. Flavell & E. M. Markham (Volume Eds.) & P. H. Mussen (General Ed.), Handbook of child psychology. (4th ed.) (Vol. 3) (pp. 495-555). New York: Wiley.
- Shantz, D. W., & Voydanoff, D. A. (1973). Situational effects on retaliatory aggression at three age levels. Child Development, 44, 149-153.
- Shure, M. B. (1981). Social competence as a problem-solving skill. In J. D. Wine & M. D. Smye (Eds.), Social competence (pp. 158-185). New York: Guilford Press.
- Shure, M. B. (1982). Interpersonal problem solving: A cog in the wheel of social cognition. In F. C. Serafica (Ed.), Social-cognitive development in context (pp. 133-166). New York: Guilford Press.
- Shure, M. B., & Spivack, G. (1972). Means-ends thinking, adjustment, and social class among elementary-school-aged children. Journal of Consulting and Clinical Psychology, 38, 348-353.
- Singleton, L. C., & Asher, S. R. (1977). Peer preferences and social interaction among third-grade children in an integrated school district. Journal of Educational Psychology, 69, 330-336.
- Speedie, S. M., Houtz, J. C., Ringenbach, S., & Feldhusen, J. F. (1973). Abilities measured by the Purdue Elementary Problem-Solving Inventory. Psychological Reports, 33, 959-963.
- Spivack, G., Platt, J. J., & Shure, M. B. (1976). The problem-solving approach to adjustment. San Francisco: Jossey-Bass.
- Spivack, G., & Shure, M. B. (1974). Social adjustment of young children: A cognitive approach to solving real-life problems. San Francisco: Jossey-Bass.
- SPSS, Inc. (1983). SPSS^X User's Guide. New York: McGraw-Hill.

- Strayer, J. (1984). Social behaviors, social-cognitive skills, and clinicians' judgments of children referred for aggression. Journal of Clinical Child Psychology, 13, 24-32.
- Urban, E. S., & Kendall, P. C. (1980). Review of social-cognitive problem-solving interventions with children. Psychological Bulletin, 88, 109-143.
- Walters, J. E. (1979). Social and nonsocial problem solving of aggressive and nonaggressive elementary school boys. Dissertation Abstracts International, 40, 2908B. (National Library of Canada Microfilm No. 42536).
- Walters, J. E., & Peters, R. DeV. (undated). Social problem solving in aggressive elementary school boys. (Available from J. E. Walters, Mental Health Clinic, P. O. Box 5001, Fredericton, N.B. E3B 5G6).
- Weintraub, S., Prinz, R. J., & Neale, J. M. (1978). Peer evaluations of the competence of children vulnerable to psychopathology. Journal of Abnormal Child Psychology, 6, 461-473.
- Weissberg, R. P., Gesten, E. L., Carnrike, C. L., Toro, P. A., Rapkin, B. D., Davidson, E., & Cowen, E. L. (1981). Social problem-solving skills training: A competence-building intervention with second- to fourth-grade children. American Journal of Community Psychology, 9, 411-423.
- Weissberg, R. P., Gesten, E. L., Rapkin, B. D., Cowen, E. L., Davidson, E., Flores de Apodaca, R., & McKim, B. J. (1981). Evaluation of a social-problem-solving training program for suburban and inner-city third-grade children. Journal of Consulting and Clinical Psychology, 49, 251-261.
- White, S. H. (1965). Evidence for a hierarchical arrangement of learning processes. In L. P. Lipsett & C. C. Spiker (Eds.), Advances in child development and behavior. (Vol. 2) (pp. 187-220). New York: Academic Press.
- Williams, J. W., & Stith, M. (1974). Middle childhood: Behavior and development. New York: MacMillan.
- Willingham, W. W. (1959). On deriving standard scores for peer nominations with subgroups of unequal size. Psychological Reports, 5, 397-403.

Winer, J. I., Hilpert, P. L., Gesten, E. L., Cowen, E. L.,
& Schubert, W. E. (1982). The evaluation of a kindergarten
social problem solving program. Journal
of Primary Prevention, 2, 205-216.

Table A-1

Referral Sources of Potential Subjects

| <u>Referral Source</u> | <u>Final Sample</u> | | | <u>Excluded^b</u> | | | <u>Total</u> |
|------------------------|---------------------|------------|-----------------------|-----------------------------|------------|-----------------------|--------------|
| | <u>CA</u> | <u>CNA</u> | <u>CO^a</u> | <u>CA</u> | <u>CNA</u> | <u>CO^a</u> | |
| County Schools | 7 | 4 | 4 | 4 | 3 | 2 | 24 |
| City Schools | 2 | - | 2 | 2 | - | 2 | 8 |
| ACGC | 3 | 8 | 6 | 3 | 1 | 2 | 23 |
| Total | 12 | 12 | 12 | 9 | 4 | 6 | 55 |

Note. CA = Clinical Aggressive; CNA = Clinical Nonaggressive; CO = Control.

^aAccording to referral source of corresponding clinical subject. ^bReferred as prospective subjects but not included in the final sample.

APPENDIX B

Table B-1

Reasons for Exclusion from Final Sample of Boys Referred
as Potential Subjects

| <u>Reasons for Exclusion</u> | <u>CA</u> | <u>CNA</u> | <u>CO^a</u> |
|--|-----------|------------|-----------------------|
| Problems judged primarily emotional | 1 | 2 | - |
| Insufficient information | 2 | - | - |
| Not on current caseload | 1 | - | - |
| Moved | 1 | - | - |
| Over 13 years | 1 | - | - |
| Problems judged primarily learning related | 1 | - | - |
| PPVT-R Score < 85 ^b | 1 | 1 | 2 |
| Not present for PEI | - | - | 1 |
| Further subjects not needed | 1 | 1 | - |
| Parental consent denied | - | - | 1 |
| Past mental health contact | - | - | 1 |
| Physical disability | - | - | 1 |

Note. All entries are frequencies of occurrence, according to the group for which potential subjects were considered.
^a Does not include potential control subjects selected as alternates but not required. ^b Excluded after individual testing.

Purdue Elementary Problem-Solving Inventory -Sample ItemsPresolution Items

Item 14 (Subtask 3: Asking questions about the problem)

Two boys are sitting on a bench in a corner of their classroom. A third boy is standing near the bench. All three boys are laughing. A fourth boy is leaving the room. He is crying. The teacher looks angry. Four books are in a pile on the floor near the laughing boys. Which question would be the best one for you to ask if you wanted to find out what the problem is?

- A. Were the 3 boys mean to the small boy?
- B. Are the books interesting?
- C. Can they get a drink?

Item 25 (Subtask 7: Identifying relevant aspects of the problem situation)

Two boys and a barking dog are in a room. One boy is carrying a stack of books from one side of the room to put into a bookcase on the other side of the room. There are three shelves in the bookcase, but no one shelf is high enough for all the books. The bookcase is almost as high as the ceiling. There is a box on the floor in the middle of the room. The second boy is reading at a table in a corner close by. What should the boy think about before he gets to the bookcase? Pick the most important from these three.

- A. How many books are on the shelves?
- B. Who put the bookcase where it is?
- C. Where will he set the books when he gets to the shelf?

Postsolution Items

Item 34 (Subtask 12: Selecting the most unusual solution among several possible solutions)

The chain on one side of a swing is broken into two pieces. Four children are looking at the damage. They wish to swing. What is the most unusual or different way for them to do this?

APPENDIX C. (continued)

- A. They can fix the old swing by tying the two pieces of the chain together with a string.
- B. They can fix the old swing by replacing the broken chain with a new one.
- C. They can make a new swing by tying one chain to a tire.

Item 44 (Subtask 9: Seeing implications of some action)

There is a cabinet with three shelves. There are boxes and other things on the shelves. More boxes are to be put in the cabinet. There is very little space on either the top or bottom shelf. Several heavy paint cans are on the middle shelf. This shelf is sagging. What might happen when more boxes are put into the middle shelf of the cabinet?

- A. The cabinet might fall over.
- B. The shelf might break under the load.
- C. The boxes might not fit.

Note. Verbal descriptions of items from Piscione (1981, pp. 204-210). In the present research, items were presented using a slide-tape format. The Purdue Elementary Problem-Solving Inventory is available from the Gifted Education Resource Institute, Purdue University, West Lafayette, IN 47907.

Children's Action Tendency Scale -Test Items and Record Form

1. You're playing a game with your friends. You try your very best but you keep making mistakes. Your friends start teasing you and calling you names. What would you do?

(Ag) a. Punch the kid who's teasing me the most. or

(Su) b. Quit the game and come home.

(As) a. Tell them to stop because they wouldn't like it if I did it to them. or

b. Punch the kid who's teasing me the most.

a. Quit the game and come home. or

b. Tell them to stop because they wouldn't like it if I did it to them.

2. You and a friend are playing in your house. Your friend makes a big mess, but your parents blame you and punish you. What would you do?

(As) a. Ask my friend to help me clean up the mess. or

(Ag) b. Refuse to talk to or listen to my parents the next day.

(Su) a. Clean up the mess. or

b. Ask my friend to help me clean up the mess.

a. Refuse to talk to or listen to my parents the next day. or

b. Clean up the mess.

4^a. You're standing in line for a drink of water. A kid your age and size walks over and just shoves you out of line. What would you do?

(Ag) a. Push the kid back out of line. or

(As) b. Tell them, "You've no right to do that."

(Su) a. I'd go to the end of the line. or

b. Push the kid back out of line.

a. Tell them, "You've no right to do that." or

b. I'd go to the end of the line.

^a Question 3 has been omitted from the 30-item version (Deluty, 1979).

APPENDIX D (continued)

5. You lend a friend your favorite book. A few days later it is returned, but some of the pages are torn and the cover is dirty and bent out of shape. What would you do?

(As) a. Ask my friend, "How did it happen?"

(Ag) b. Call the kid names.

(Su) a. Ignore it. or

b. Ask my friend, "How did it happen?"

a. Call the kid names. or

b. Ignore it.

6. You're coming out of school. A kid who is smaller and younger than you are throws a snowball right at your head. What would you do?

(Ag) a. Beat the kid up. or

(Su) b. Ignore it.

(As) a. Tell the kid that throwing at someone's head is very dangerous. or

b. Beat the kid up.

a. Ignore it. or

b. Tell the kid that throwing at someone's head is very dangerous.

7. You see some kids playing a game. You walk over and ask if you can join. They tell you that you can't play with them because you're not good enough. What would you do?

(As) a. Ask them to give me a chance. or

(Su) b. Walk away, feeling hurt.

(Ag) a. Interfere with their game so that they won't be able to play. or

b. Ask them to give me a chance.

a. Walk away, feeling hurt. or

b. Interfere with their game so that they won't be able to play.

APPENDIX D (continued)

8. You're watching a really terrific show on television. In the middle of the show, your parents tell you that it's time for bed and turn off the T.V. What would you do?

(Ag) a. Scream at them, "I don't want to!" or
 (Su) b. Start crying.

(As) a. Promise to go to bed early tomorrow night if they let me stay up late tonight. or
 b. Scream at them, "I don't want to!"

a. Start crying. or
 b. Promise to go to bed early tomorrow night if they let me stay up late tonight.

9. You're having lunch at the cafeteria. Your friend has a big bag of delicious chocolates for dessert. You ask if you can have just one, but your friend says; "No." What would you do?

(As) a. Offer to trade something of mine for the chocolate. or

(Ag) b. Call the kid mean and selfish.

(Su) a. Forget about it and continue eating my lunch. or
 b. Offer to trade something of mine for the chocolate.

a. Call the kid mean and selfish. or
 b. Forget about it and continue eating my lunch.

10. A kid in your class brags that they're much smarter than you. However, you know for sure that the kid is wrong and that really you're smarter. What would you do?

(Ag) a. Tell the kid to shut up. or

(As) b. Suggest that we ask each other questions to find out who is smarter.

(Su) a. Ignore the kid and just walk away. or
 b. Tell the kid to shut up.

a. Suggest that we ask each other questions to find out who is smarter. or
 b. Ignore the kid and just walk away.

APPENDIX D (continued)

- 11^b. You and another kid are playing a game. The winner of the game will win a really nice prize. You try very hard, but lose by just one point. What would you do?
- (Ag) a. Tell the kid that they cheated. or
(As) b. Practice, so I'll win the next time.
- (Su) a. Go home and cry. or
b. Tell the kid that they cheated.
- a. Practice, so I'll win the next time. or
b. Go home and cry.
-

^bQuestions 12 and 13 have been omitted from the 30-item version (Deluty, 1979):

Pupil Evaluation Inventory - Test Items

Mark the names of those boys who:

1. are taller than most (filler item for illustration)
2. help others (Like)
3. can't sit still (Agg)
4. try to get other people into trouble (Agg; Agg-Mod)
5. are too shy to make friends (With)
6. whose feelings are too easily hurt (With)
7. act stuck-up and think they are better than everybody else (Agg)
8. play the clown and get others to laugh (Agg)
9. start a fight over nothing (Agg; Agg-Mod)
10. never seem to be having a good time (With)
11. are upset when called upon to answer questions in class (With)
12. tell other children what to do (Agg)
13. are usually chosen last to join in group activities (With)
14. are liked by everyone (Like)
15. always mess around and get into trouble (Agg)
16. make fun of people (Agg; Agg-Mod)
17. have very few friends (With)
18. do strange things (Agg)
19. are your best friends (Like)
20. bother people when they are trying to work (Agg; Agg-Mod)
21. get mad when they don't get their own way (Agg)
22. don't pay attention to the teacher (Agg)
23. are rude to the teacher (Agg; Agg-Mod)
24. are unhappy or sad (With)
25. are especially nice (Like)
26. act like a baby (Agg)
27. are mean and cruel to other children (Agg; Agg-Mod)
28. often don't want to play (With)
29. give dirty looks (Agg; Agg-Mod)
30. want to show off in front of the class (Agg)
31. say they can beat everybody up (Agg; Agg-Mod)
32. aren't noticed much (With)
33. exaggerate and make up stories (Agg)
34. complain, nothing makes them happy (Agg)
35. always seem to understand things (Like)

Note. Abbreviations in parentheses following each item refer to the subscale score to which the item applies.
 Agg = Aggression; With = Withdrawal; Like = Likeability;
 Agg-Mod = Aggression-Modified.

APPENDIX F

School Behavior Checklist - Subscales and Sample Items

| <u>Subscale</u> | <u>n^a</u> | <u>Sample Items</u> |
|----------------------------|----------------------|---|
| Low Need Achievement (LNA) | 28 | 40. School performance is far below capabilities 52. "Drags feet" when requested to do something |
| Aggression (AGG) | 36 | 5. Starts fighting over nothing 62. Is stubborn |
| Anxiety (ANX) | 18 | 24. Is afraid of making mistakes 75. Prefers to be alone and play alone |
| Academic Disability (AD) | 8 | 9. Reading ability at least one grade below age expectation 43. Seems dull; slow to catch on |
| Hostile Isolation (HI) | 7 | 32. Does not forget things which anger her/him 71. Never sticks up for self when picked on by other children |
| Extraversion (EXT) | 12 | 35. Likes an audience all the time 80. Seems as happy as most children |

^aNumber of items in subscale.

APPENDIX G

Instructions to Subjects - Purdue ElementaryProblem-Solving Inventory

We're going to do something a little different now, and I think you'll find it fun. This isn't something you have to do.

I'm going to show you some pictures on this screen. Things will be happening in the pictures, and the man on the tape will ask questions about them.

The questions aren't about schoolwork, but about everyday things. Some questions are for younger children and will seem very easy; others are for older kids and are kind of hard. Nobody gets every question right.

For every question, there will be some boxes in the answer book. (Experimenter points out boxes to child.) After you've listened to the whole question, I want you to mark an X in the box you think has the right answer in it.^{a, b}

I'll start the tape now. Watch the screen and listen carefully to the man on the tape. He'll tell you what to do.

If you don't understand what to do or think you're on the wrong page, tell me and I'll help you.^{c, d}

Any questions?

^aFor group administration (pilot study): "One of the boxes has the right answer in it, and that's the one you mark with an X."

^bFor group administration (pilot study), the following was inserted:

It's really important to do your own work. That means not showing your answers or looking at other children's. If you know the answer, don't say it out loud. Just mark it in your book.

^cFor group administration (pilot study): "Raise your hand and we'll help you."

^dFor group administration (pilot study): "Remember to do your own work, and don't call out the answers."

APPENDIX H.

Instructions to Subjects - Children's ActionTendency Scale

We're going to read some very short stories together, and I want you to imagine that you are in the stories. I'll ask you some questions to find out what you would do if the things in the stories were happening to you. It's very important to tell me what you really would do, not what you think you should do. Nobody else but me will know what you answered.

Note. If the child does not choose one of the paired responses:

- Repeat item as needed.
- Say "Go ahead and choose what you would do."
- Say "Remember these are all make-believe stories, and nobody but me will know your answer. Please choose what you would do."

APPENDIX I

Instructions to Subjects - Pupil Evaluation Inventory

"We're going to do something a little different today. I would like you to help me find out what kinds of things boys do at different ages and in different grades. To do that, I am going to ask the whole class to play a game using these special books. This isn't something you have to do.

(Experimenter hands out answer booklets, and asks the children to place their names on their booklets.)

Watch while I show you how these books work. ~~See~~, the name of every boy in the class is at the top of the page. Along the side here are some sentences that will fit some boys but won't fit others. I'll read them out loud one by one while you follow along in your books. After I've read each sentence, I want you to look around the class at all of the boys and put a big X under the name of every boy who fits what we've just read. It's really important to do your own work. That means not calling your answers out loud, or showing them to other children, or copying them.

Let's do the first one together. You can use the piece of green cardboard to cover up the questions you haven't done yet so you don't get mixed up.

(Experimenter demonstrates use of booklet with Item 1 and responds to any questions or difficulties.)

Now you're ready to do some yourself. If you have any questions, raise your hand and we will help you. When we've finished, I'll take the books with me. Nobody but me will know what your answers were. Please remember to do your own work and don't call your answers out loud.

(Experimenter administers test procedure. When procedure is completed, have children turn their answer booklets over before they are collected.)

Thank you for doing this with me. I will be seeing one or two of you on your own on another day to try some other things.

APPENDIX J

Pupil Evaluation Inventory - Scoring Procedure
for Answer Booklets

For each classroom:

1. List all boys* from the class who were not present or did not participate in the PEI. Enter the name of each remaining boy in a separate column on each page of the Scoring Form.**
2. For each answer booklet:
 - a. Mark out the columns under the names of the boys listed in 1. above. Scores will not be computed for these boys.
 - b. Mark out the column under the name of the boy whose booklet is being scored (self-ratings are not counted).
 - c. For each subscale, record the number of nominations (Xs) received by each boy on the items which apply to that subscale. (The Scoring Form separates items by subscale.) Enter these as tallies under each boy's name on the Scoring Form. This can be done by tape-recording the contents of each row and entering the tallies for all booklets when the recording is played back (one scorer), or reading row contents to a second scorer who enters the tallies on the Scoring Form.
3. After all answer booklets have been entered:
 - a. For each subscale, total the number of tallies in each column and enter the total in the row marked "Total Received" on the Scoring Form.
 - b. To compute the subscale score for each boy, divide the Total Received by the product of (the number of raters - 1) and (the number of items on the subscale). This yields the proportion of possible nominations received, excluding self-ratings.
 - c. Convert subscale scores to z scores, based on the classroom mean and standard deviation.

*If scores are being computed for boys only. **The Scoring Form was arranged as an item-by-peer matrix similar to the PEI answer booklet. Items were grouped on separate pages by subscale. Spaces and prompts for scoring calculations were incorporated.

APPENDIX K

Memorandum to Subject Referral Sources

TO: Professional Staff, Special Services Department
Halifax District School Board^{a, b}

FROM: David Cox

RE: Subjects for Children's Problem Solving Study (1983-
1984 School Year)

DATE: September 15, 1983

I am writing to request your assistance in locating subjects for a study of cognitive problem solving ability in elementary school children. Specifically, I am interested in two groups of boys. The first would be comprised of those who are referred and seen because of repeated problematic aggressive behavior. The second group would include boys seen for behavioral problems of a nonaggressive nature.

This study is being conducted during the 1983 school year as my Masters research in the Applied Psychology program at Saint Mary's University. Its purpose is to test the proposition that problematically aggressive children differ from children with no behavior problems, as well as from those with nonaggressive behavior problems, in the type and effectiveness of the cognitive problem solving skills and strategies they employ.

The assistance I am requesting from you would involve the identification and referral of boys meeting the criteria for inclusion in the study (see below) and the procurement of preliminary verbal consent from parents, principals, and teachers for their participation. You would also be asked to provide some basic information concerning the child in a brief questionnaire. I would assume all further responsibility for obtaining written consents, and arranging and carrying out the testing. Of course, any continuing support and advice you are able to offer in carrying out the research would be most appreciated.

Once the necessary written consents have been obtained, a peer-nomination sociometric measure would be administered to the entire classroom of the referred child, who would not be singled out in any way. This procedure involves asking that each child consider some descriptions of behavior, and choose confidentially which of his/her male

APPENDIX K (continued)

classmates each description fits the most closely. The referred child would then be tested using three measures: the Peabody Picture Vocabulary Test - Revised, the Purdue Elementary Problem Solving Inventory, and the Children's Action Tendency Scale. For half the children referred, two other boys in the class who do not demonstrate persistent behavioral, emotional, learning or peer problems would be selected and tested as part of the "control" group of the study. The teacher would be asked to complete a standardized behavior check list on all boys tested individually. Though referral of subjects can begin in September, 1983, no testing will take place before November.

I am interested in boys who meet the following criteria:

(See Method section of this thesis for criteria)

These criteria are reproduced on a separate sheet attached, to retain as a quick reference.

I hope to receive referrals for subjects as early in the school year as possible, until a sample of 12 boys has been tested for each of the three groups.

I thank you in advance for your assistance with this project.

Sincerely yours,

David Cox, M.S.W.

Note. Wording varied according to referring organization (See notes a and b below) to reflect slight differences in referral and research procedures.

^a or Halifax County and Bedford District School Board

^b or Halifax and Sackville Branches, Atlantic Child Guidance Centre

APPENDIX I

Memorandum to Principal and TeacherCHILDREN'S PROBLEM SOLVING STUDY

TO: Principal and Teacher

FROM: David Cox

RE: Research Procedure

As a member of the Special Services Department or myself has already mentioned to you, a pupil in your school has been selected to participate in a research study concerning the problem solving ability of elementary school boys. I am writing to outline the nature of this study and to request your assistance in carrying it out. The study is part of my Masters Thesis research in Psychology at Saint Mary's University.

Before beginning the study, I would need a list of all children in the classroom of the selected child, including birthdates. This may already have been obtained from you.

The research procedure would first involve the administration of a peer-rating sociometric measure to the entire classroom of the child chosen for the study, taking care not to single him out in any way. Parental consent forms for participation in this procedure would be sent home with each child. When these have been returned to the School, a mutually agreeable date and time will be arranged to administer the procedure. My preference would be the first or earliest possible period in the morning. I would contact the School or parent on the morning of the testing to verify that the selected child is present. Administration would probably take one hour or less, and the teacher's presence and assistance would be appreciated. The procedure involves asking that each child consider some descriptions of behavior, and to choose confidentially which of his/her male classmates each description fits the most closely.

In some instances, on the basis of the sociometric procedure and in consultation with the classroom teacher, I will next select two boys from the class who are close in age to the selected child, and who do not appear to have learning, behavioral, or emotional problems. I will obtain parental consent by mail and/or telephone contact

APPENDIX I. (continued)

for the further participation of these children. One or both of these children, as well as the originally selected child, will be seen individually at school and administered three tests: a vocabulary test, a problem solving inventory which follows a slide-tape format, and a test in which the child indicates his most likely response in a peer problem situation. Total testing time for each child would be approximately 60 minutes. The teacher will be asked to complete a standardized behavior check list on the children tested individually.

Summary

I have summarized for easier reference the aspects of this research for which I am requesting your assistance:

1. Providing a class list, including birthdates, for the classroom of the selected child.
2. Sending parental consent forms home with the child for the classroom sociometric measure, and advising me when all consent forms have been returned to the School.
3. Making available a time for the classroom sociometric procedure and, if possible, the presence of the teacher during its administration.
4. The teacher's assistance in choosing boys from the class to match the selected child, and in completing behavioral check lists on all children tested individually.
5. Providing a time and space for individual testing on one later date.

This study is being carefully planned to minimize disruption of School routine. When the study is completed, I will provide a summary of the results, which it is anticipated will have educational implications of interest to you.

Your questions and comments are encouraged. I can be contacted at 422-1611. Thank you in advance for your help.

Sincerely yours,

David Cox, M.S.W.

Referral and Information Form

CHILDREN'S PROBLEM SOLVING STUDY

Referral and Information Form

CONFIDENTIAL

Your Name: _____

Office Location: _____

Phone: _____

GENERAL INFORMATION

Child's Name: _____

School: _____

Parent or Guardian: _____

Location of

Address: _____

School: _____

Grade: _____

Date of Birth: _____

Regular Class Yes No
(If Special Class, cancel referral)

Race: Caucasian Other

(If other, cancel referral)

Have you spoken to the parent about this child's participation? Yes No

Has the parent indicated willingness for the child to participate? (If Yes, a consent form will be sent to the parent) Yes No Unsure

Have you spoken to the school principal about this child's participation? Yes No

Is the school principal willing to permit sociometric and individual testing? Yes No Unsure

CHILD'S PROBLEM

1. Aggression - Repeated, Problematic, Interpersonal Yes No

2. Other Behavioral Problems (e.g., disruptiveness, noncompliance, stealing) Yes No Don't Know
Specify: _____

APPENDIX M (continued)

- | | | | |
|---|------------------------------|-----------------------------|-------------------------------------|
| 3. Problem of an Emotional more than a Behavioral Nature (e.g. fears, anxiety, depression, etc.). Specify: _____ | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
| 4. Significant Learning Problems Specify: _____ | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
| 5. Behavioral Problems Primarily Related to Learning Problems Specify: _____ | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
| 6. Limited Intellectual Ability | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
| 7. Neurological or Physical Impairment Specify: _____ | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
| 8. Severe Emotional Disturbance Specify: _____ | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
| 9. Parents or School out of Control of Child's Behavior in Many or Most Areas ^a Specify: _____ | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
| 10. Child referred because of Enuresis (Bedwetting) | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
| 11. Child referred because of Encopresis (Soiling) | <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |

INTERVENTION

Has the child had contact with:

Atlantic Child Guidance Centre

| | | |
|------------------------------|-----------------------------|-------------------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
|------------------------------|-----------------------------|-------------------------------------|

IWK Hospital,

- Psychiatry

| | | |
|------------------------------|-----------------------------|-------------------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
|------------------------------|-----------------------------|-------------------------------------|

- Psychology

| | | |
|------------------------------|-----------------------------|-------------------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
|------------------------------|-----------------------------|-------------------------------------|

- Neurology

| | | |
|------------------------------|-----------------------------|-------------------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
|------------------------------|-----------------------------|-------------------------------------|

Other Mental Health or Counselling Service
Specify: _____

| | | |
|------------------------------|-----------------------------|-------------------------------------|
| <input type="checkbox"/> Yes | <input type="checkbox"/> No | <input type="checkbox"/> Don't Know |
|------------------------------|-----------------------------|-------------------------------------|

APPENDIX M (continued)

Comments and Additional Information

Please feel free to contact me (office: 422-1611) if you have any questions or comments. Thank you for your help.

David Cox, M.S.W.

PLEASE RETURN COMPLETED FORM AS SOON AS POSSIBLE

^a An affirmative response to this item was originally intended to be an indication for exclusion of the potential subject from the final sample. However, this item was removed from consideration shortly after beginning the study because it could not be adequately clarified or defined.

^b Izaak Walton Killam Hospital for Children, Halifax, N.S.

Instructions to Raters - Pupil Evaluation
Inventory - Aggression-Modified Scale

June, 1984

Dear Staff Member:

I am writing to request your assistance in making some modifications to the Pupil Evaluation Inventory (PEI), a peer-nomination sociometric measure I have been using in my M.Sc. research this year.

For each item on the PEI, children are asked to consider a behavioral description and indicate those boys in their class whom the description fits. The measure yields a number of subscale scores for each boy in the class.

The items listed below form the Aggression subscale. However, using all of these items results in an Aggression score which reflects a fairly broad definition of aggression. I wish to devise a modified Aggression score containing only those items which correspond to the following definition of aggressive behaviors:

Aggressive behaviors are defined as intentional physical and verbal responses that are directed toward an object or another person and that have the capacity to damage or injure.

Please consider the following items and place a check mark beside the numbers of those which you consider to be consistent with the above definition.

3. can't sit still
4. try to get other people into trouble
7. act stuck-up and think they are better than everyone else
8. play the clown and get others to laugh
9. start a fight over nothing

APPENDIX N (continued)

12. tell other children what to do
15. always mess around and get into trouble
16. make fun of people
18. do strange things
20. bother people when they are trying to work
21. get mad when they don't get their way
22. don't pay attention to the teacher
23. are rude to the teacher
26. act like a baby
27. are mean and cruel to other children
29. give dirty looks
30. want to show off in front of the class
31. say they can beat everybody up
33. exaggerate and make up stories
34. complain, nothing makes them happy

I hope you will give this task your earliest possible consideration. Thank you in advance for your help.

Sincerely,

David Cox

APPENDIX O

Parent Consent Form - Pilot Study

Dear Parent or Guardian:

In the near future, I shall be conducting a short study in your child's classroom. The purpose of the study is to discover how children understand and solve problems they are likely to encounter in real life.

Children will be asked to answer questions about cartoon drawings of everyday problem situations. The cartoons are not upsetting, and no personal or family information is obtained. Your child's answers will not be released to anyone, and will be used only to obtain class averages.

I am conducting this study under the direction of the Psychology Department of Saint Mary's University. The School Board and Principal have approved the study.

I hope you will consent to your child's taking part in this study. You have the right to refuse consent or request further information. If you have any questions, please feel free to contact me at my office (422-1611).

Please have your child return this form to his/her teacher as soon as possible. Thank you for considering this request.

Sincerely yours,

David Cox, M.S.W.

Name of Child: _____

I DO give permission for my child's participation: _____

I DO NOT give permission for my child's participation: _____

Signature of parent or guardian: _____

APPENDIX P

Parent Consent Form - Pupil Evaluation InventoryCHILDREN'S PROBLEM SOLVING STUDY

Parent Consent Form

Dear Parent or Guardian:

In the near future, I shall be conducting a short study in your child's classroom. The purpose of this study is to discover how children observe each other's behavior. It is part of a study of child's problem solving which I am conducting in the Psychology Department of Saint Mary's University. The School Board and Principal have also approved this study.

If your child participates in the study, he/she will be asked to consider some descriptions of children's behaviors and to confidentially choose which of his classmates they fit the most closely.

I hope you will consent to your child's taking part in this study with his/her classmates. Your child will be unable to participate if you do not give your consent. If you have any questions, please feel free to contact me (422-1611). I will provide a summary of the results of the study when it is completed.

Please have your child return the lower part of this form to his/her teacher as soon as possible. Thank you for considering this request.

Sincerely yours,

David Cox, M.S.W.

(Detach and Return to School with your Child)

Name of Child: _____

I DO give permission for my child's participation: _____

I DO NOT give permission for my child's participation: _____

Signature of parent or guardian: _____

APPENDIX Q

Parent Consent Form - Clinical Aggressive and
Clinical Nonaggressive Subjects
CHILDREN'S PROBLEM SOLVING STUDY

Parent Consent Form

Dear Parent or Guardian:

Recently, (Name) of (Referral Source) contacted you concerning your child's participation in a brief research study at school. I am writing to ask for your written permission for your child to take part.

The purpose of the study is to learn how some children solve real life problems. I am conducting the study in the Psychology Department of Saint Mary's University. The School Board and Principal have also approved the study.

If your child participates, he will first be asked (along with the rest of the class) to consider some descriptions of child's behaviors and to confidentially choose which of his classmates they fit the most closely. Your child will not be singled out in any way. I will contact you or the school on the day of the study to make sure he is present. Your child's teacher will be asked to complete a confidential check list of his behavior.

(Name) will be given a questionnaire concerning his/her work with your child. It will not ask questions about confidential family matters.

I will then see your child and one or more of his schoolmates one at a time; and give up to three tests. The first is a short vocabulary test. In the second he answers questions about cartoon slides of everyday situations. In the third, your child chooses how he would react in social problem situations. The testing takes approximately 90 minutes. All information will be kept completely confidential.

I hope you will consent to your child's taking part in this study. He will be unable to participate if you do not give your consent. If you have any questions please feel free to contact me (422-1611). I will provide a summary of the results of the study when it is completed.

APPENDIX Q (continued)

Please return the lower part of this form in the enclosed envelope as soon as possible. If you are giving your consent, please complete the attached questionnaire and return it at the same time. Thank you for considering this request.

Sincerely,

David Cox, M.S.W.

Please note: Your child will soon be bringing another consent form home for the part of the research which is done with his whole class. The only reason for sending a second form home with him is so that he is treated the same as the other children in his class, who will be bringing home the same form. Though you have already given all the consent necessary by signing the attached form, I would suggest signing the second form and returning it to school so he is not singled out in any way.

(Detach and Return in the Stamped Envelope Provided)

Name of Child: _____

I DO give permission for my child's participation: _____

I DO NOT give permission for my child's participation: _____

Signature of parent or guardian: _____

APPENDIX R

Parent Consent Form - Control SubjectsCHILDREN'S PROBLEM SOLVING STUDY

Parent Consent Form

Dear Parent or Guardian:

As you will recall, you recently allowed your child to participate with his classmates in a short study. I am now inviting a few boys from the class, including your child, to participate in the final part of the study. Its purpose is to learn more about how children solve real life problems.

Your child was selected because he is close in age to another child already involved. If he participates, his teacher will be asked to complete a confidential check list of his behavior. I will then see him individually and give up to three tests. The first is a short vocabulary test. In the second, he answers questions about cartoon slides of everyday situations. In the third, your child chooses how he would react in social problem situations. The testing takes approximately 90 minutes. All information will be kept completely confidential.

I hope you will consent to your child's taking part in this study. He will be unable to participate if you do not give your consent. If you have any questions, please feel free to contact me (422-1611). I will provide a summary of the results of the study when it is completed.

Please return the lower part of this form in the enclosed envelope as soon as possible. If you are giving your consent, please complete the attached questionnaire and return it at the same time. Thank you for considering this request.

Sincerely yours,

David Cox, M.S.W.

(Detach and Return in the Stamped Envelope Provided)

Name of child: _____

I DO give permission for my child's participation: _____

I DO NOT give permission for my child's participation: _____

Signature of parent or guardian: _____

APPENDIX S

CHILDREN'S PROBLEM SOLVING STUDY

Parent Questionnaire

CONFIDENTIAL

Name of Child: _____ Home Telephone: _____

Date of Birth: _____

Address: _____
_____Father's Occupation: _____ (If temporarily
unemployed, give
Mother's Occupation: _____ usual occupation).Has your child ever obtained help for a behavior, emotional,
or learning problem from:- The School System (e.g. School Psychologist, Social Worker, Guidance
Counsellor, Resource Teacher, etc.)? Yes No- A Children's Hospital or other Medical Service (e.g. Neurologist,
Psychiatrist, Psychologist, Pediatrician,
Social Worker, etc.)? Yes No- The Atlantic Child Guidance Centre Yes No- Other Counselling or Mental Health Service not covered above
(Specify: _____)If you answered Yes to any of the above, what was the
type of problem, the age of your child at the time,
and the type of help received? (This information
would be helpful for this research, but you are free
not to answer if you prefer).

THANK YOU FOR YOUR COOPERATION.

Please return this questionnaire in the stamped envelope
provided.

David Cox, M.S.W.

APPENDIX T

Table T-1

Mean Test Scores and Subject Characteristics - Subjects
Reclassified by Pupil Evaluation Inventory (PEI) and School
Behavior Checklist (SBCL) Aggression Scores

| | Reclassified by PEI | | | Reclassified by SBCL | | |
|------------|---------------------|-------|-------|----------------------|-------|-------|
| | CA | CNA | CO | CA | CNA | CO |
| PEPSI Tot | 35.9 | 37.4 | 37.1 | 36.0 | 36.9 | 37.5 |
| PEPSI Pre | 17.3 | 17.8 | 17.9 | 17.2 | 17.8 | 18.1 |
| PEPSI Post | 18.6 | 19.7 | 19.2 | 18.8 | 19.2 | 19.4 |
| CATS Agg | 7.3 | 5.9 | 3.2 | 8.6 | 4.8 | 3.0 |
| CATS Ass | 14.5 | 15.9 | 17.0 | 14.4 | 15.6 | 17.4 |
| CATS Sub | 8.2 | 8.2 | 9.8 | 7.0 | 9.6 | 9.6 |
| Age | 126.2 | 129.3 | 127.5 | 132.9 | 121.7 | 128.3 |
| PPVT-R | 101.2 | 102.3 | 108.3 | 103.3 | 102.0 | 106.5 |
| SES | 43.2 | 46.8 | 50.9 | 46.1 | 47.0 | 47.8 |

Note. CA = Clinical Aggressive; CNA = Clinical Nonaggressive; CO = Control. PEPSI Tot, Pre, and Post = Purdue Elementary Problem-Solving Inventory: Total, Presolution, and Postsolution scores, respectively. CATS Agg, Ass, and Sub = Children's Action Tendency Scale: Aggressiveness, Assertiveness, and Submissiveness scores, respectively. Age in months. PPVT-R = Peabody Picture Vocabulary Test-Revised. SES = Socioeconomic status.
 n = 12.

APPENDIX U

Table U-1

Summary of Analysis of Variance Under Alternate Methods
of Subject Classification

| | Classification method | | |
|---------------------|------------------------|---------------|----------------|
| | Original (Referral) | PEI Scores | SBCL Scores |
| PEPSI Total | .45 | 1.01 | .93 |
| PEPSI, Presolution | .76 | 1.55 | .76 |
| PEPSI, Postsolution | .08 | .31 | .42 |
| CATS Aggressiveness | 6.86** | 3.24 | 6.93** |
| CATS Assertiveness | 6.54** | 3.21 | 5.12* |
| CATS Submissiveness | 2.77 | 1.39 | 3.80* |
| Age | 1.07 | .11 | 1.59 |
| PPVT-R | 1.18 | 1.34 | .46 |
| SES | 2.27 | 1.09 | .05 |

Note. All entries are F ratios. One-factor analyses of variance with three levels: Clinical Aggressive, Clinical Nonaggressive, and Control. Degrees of freedom: 2 and 33. PEPSI = Purdue Elementary Problem-Solving Inventory. CATS = Children's Action Tendency Scale. PPVT-R = Peabody Picture Vocabulary Test-Revised. SES = Socioeconomic status.

* $p < .05$ ** $p < .01$