

EXTERNAL CORRELATES AND RELATION TO IMPAIRMENT FOR AN EMPIRICALLY
BASED TYPOLOGY OF CHILDREN'S BEHAVIOR IN THE CLASSROOM

by

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(Under the Direction of Randy W. Kamphaus)

ABSTRACT

There are many inconsistencies in the classification and assessment of childhood behaviors. The established classification systems used for children are either nonspecific, like the IDEA system or not derived from empirical data, like the DSM system. Finally, the classification systems currently in use for children use the absent vs. present model not allowing for the study of children's behavior at differing levels of severity. The current study examines an empirically based typology of 6 to 11-year-old children's behavior in the classroom and determines if this typology holds the potential to be a useful classification system for child behavior problems in school. Many dimensional systems have been developed, but few have adhered to rigorous standards in their development, thus many have not produced replicable results. The current study sought to externally replicate the typology found by the BASC-TRS-C normative sample. External replication was conducted on a referred sample of children between the ages of 6 and 11. The results showed that the problem clusters were substantially replicated in the referred sample. The obtained clusters were then compared on several external correlates of

cognition, school behavior, academic achievement, and overall functional impairment. Contrary to expectations, no significant difference between the clusters were found. Potential reasons for these results are considered with implications for future tests of the utility of a cluster analytic typology discussed.

INDEX WORDS: Classification, Behavior Rating Scales, BASC-TRS-C, Typology, External correlates, Impairment, Cluster analysis

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DEDICATION

This work is dedicated to my family. To my mother, Mrs. Mary Powell, and late father, Mr. Willis Anthony Powell, who were always steadfast in their love and support for me. To my sister, Kathryn Powell, for her encouragement and support throughout this enormous task. To my brother, Anthony Powell, for his never ending faith in me. And to my nephews, Christopher, Dylan, and Zachary, for being the source of continual joy and inspiration.

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CHAPTER 1

INTRODUCTION

Classification systems for child psychopathology are necessary for three main reasons. The first is to provide a means of communication among professionals (Blashfield, 1984; Quay, 1986). Without a common system of classification, different "languages" are developed by individual researchers and practitioners and, as a consequence, communication between professionals is ineffective as the same terminology may be defined differently in different systems (Kamphaus & Frick, 1996). The use of a common language is also important for researchers studying psychiatric phenomena (Cantwell, 1996). For instance, a valid and reliable classification system is necessary for researchers to determine if research findings apply to a particular case (Kamphaus & Frick, 1996). Finally, classification systems are useful in determining whether a child needs services (Kamphaus & Frick, 1996). Mental health facilities, insurance companies, and special education departments usually require that a child be assigned a classification in order to be eligible for services. Over the last two decades, there has been a large amount of research conducted into the measurement and classification of childhood behaviors (e.g., Curry & Thompson, 1985; Edelbrock & Achenbach, 1980; Fergusson & Horwood, 1995; Kline, Lachar, & Boersma, 1993).

Classification systems are used to determine when psychological functioning is abnormal, deviant, or in need of treatment, and to distinguish between different dimensions or types of psychological functioning (Kamphaus & Frick, 1996). Achenbach (1982) observed that assessment and classification are related in that assessment aims to identify the distinguishing features of individual cases and classification is the grouping of cases according to their distinguishing features. Thompson, Kronenberger, and Curry (1989) suggested that "the empirical identification of clinically and theoretically relevant dimensions is a necessary step toward the development of a classification system" (p. 560).

There have been objections to the classification of psychopathology based on the assumption that it lacks substance or meaning and produces harmful effects like social stigma (Achenbach & Edelbrock, 1978; Cantwell, 1996). However, there is general agreement that the advantages of classification far outweigh the disadvantages and for these reasons, it is imperative that a good classification system be developed (Cantwell, 1996).

Classification of child behavior problems

Childhood behavior problems in the classroom are generally defined according to three essential features: disruptive to others in the classroom, inability to perform at expected levels, and inability to form satisfactory social relationships (Kline, Lachar, Gruber, and Boersma, 1994) as exemplified by the Individuals with Disabilities Education Act (IDEA, 1997). IDEA is typically used for special education diagnosis in public schools. However, the broad, nonspecific

nature of these criteria has resulted in considerable symptomatologic diversity among those diagnosed with emotional and behavioral disorders (Kamphaus et al., 1997; Kline et al., 1993). There are many subcategories of emotional and behavioral disorders that differ from each other in important ways (e.g., internalizing versus externalizing disorders).

One potential problem with IDEA (1997), is that children in the schools are labeled with the nonspecific "emotional and behavioral disorder" (Kamphaus et al., 1997; Kline et al., 1993) instead of more precise and more descriptive labels. The Diagnostic and Statistical Manual (DSM; American Psychiatric Association, 1994) system improves upon IDEA as it applies more specific labels to syndromes, however, the behaviors contained in the criteria are not necessarily derived from empirical data, nor are they always based on theory about childhood disorders (Morey, 1991; Waldman, Lilienfeld, and Lahey, 1995).

Another problem with IDEA is that the nonspecific categories of the model also do not allow for study of children's behavior at differing levels of severity. The DSM and IDEA models are similar in that they both employ a dichotomous, absent vs. present model when identifying children.

Systems based on empirical rating scales provide further improvement, but problems still remain. Currently, when measured by individual rating scales, behavior problems are represented in a univariate manner, which underrepresents the co-occurrence of problems. The behaviors on the measures are typically grouped into

categories such as "Withdrawn" or "Hyperactive", yet these groupings do not provide an actual diagnosis and the rating scales often fail to provide guidance on how to interpret combinations of these behavior groupings. The various permutations of profiles found on behavior rating scales vary widely. In fact, the different types of behavior problems of children with specific profiles represent heterogeneous groups rather than the generic "emotional and behavioral disorder" label children with these profiles generally receive in the schools. In direct contrast, there are subtypes of behavior problems that can be characterized by profiles derived from behavior groupings on the rating scales (Curry & Thompson, 1985). Moreover, many of the same behaviors included on rating scales are listed in the criteria for each of the disorders or constructs that the DSM-IV (American Psychiatric Association, 1994) delineates, but in different combinations and intensity.

Taxonomic classification systems for childhood disorders, an alternative to the IDEA and DSM categorical (absent versus present) approaches, are more meaningful as they are based on empirical findings rather than clinical impressions (Fergusson & Horwood, 1995). The DSM classification system is superior to the IDEA system as the reliability and validity of special education categories is very poor. There are no precise widely accepted operational definitions of the educational disability classifications and placement varies from state to state (Kline et al., 1993). Thus, empirical research examining these educational categories is not likely to provide insight into the constructs of child emotional and behavioral problems, nor would

information gained from such a study be generalizable. As pointed out before, a good classification system is necessary for meaningful communication between professionals and researchers (Cantwell, 1996).

The need for a useful, well-differentiated, and reliable taxonomy of child psychopathology has stimulated numerous efforts to derive syndromes empirically from behavior problems reported by parents, teachers, and clinicians (Edelbrock & Achenbach, 1980). This study will build on this effort by examining the relatively new taxonomy (Kamphaus et al, 1997) derived from cluster analyses with the Behavior Assessment System for Children - Teacher Rating Scales (Huberty, DiStefano, & Kamphaus, 1997; Kamphaus et al., 1997; Kamphaus, Petoskey, Cody, Rowe, & Huberty, 1999; Reynolds & Kamphaus, 1992).

According to Kamphaus and Frick (1996), research in the area of classification of child behavior problems is important for several reasons. First, the identification of behaviorally similar subtypes of children with behavior problems may lead to clarifications regarding etiology; that is, behaviorally similar subtypes of children with behavior problems may share specific pathological etiological conditions. Second, membership in specific, behaviorally defined subcategories of behavior problems might have prognostic significance (e.g., children with higher adaptive skills may have a better prognosis). Thirdly, research of this type can contribute to the validity of both the assessment measure and the compendium of behavioral and emotional problem constructs of childhood.

The Taxonometric Approach

In their 1995 study, Fergusson and Horwood showed that symptoms of disruptive behavior disorders (such as ADHD, ODD, and CD) showed evidence of dimensional properties in which the severity of disturbance varied from none to severe. Their analysis also suggested the presence of continuous dose-response relationships between symptom severity and outcome risk. On the other hand, they noted that using diagnostic classifications based on DSM-III-R criteria did not predict future outcomes as well as classification systems based on dimensional measures (Fergusson & Horwood, 1995).

It is also important that adaptive behavior be part of the spectrum of child classroom behavior as examining both adaptive and maladaptive behaviors allows for a more accurate picture of naturally occurring clusters or types (Achenbach, 1995). Nosological systems such as the DSM begin identifying and grouping sets of behavior based on clinical impressions and judgments about children seen as clients. Naming behavioral disorders in this manner can result in the development of artificially forced constructs, and other important concurrent behaviors being overlooked as part of the syndrome (Achenbach, 1995). When a choice is forced between the presence or absence of disorders, the variations in the severity and frequency of children's problems may be neglected. Furthermore, these omitted behaviors often contribute to the development of the construct. Assessing adaptive behavior in addition to maladaptive behavior also helps to distinguish between normal and pathological functioning.

According to Achenbach, assessment of adaptive functioning in the school provides a standard by which most children can be measured.

Rating scales allow symptoms to be examined dimensionally and subsequently examined together to make classification decisions. In contrast, the DSM employs a static set of criteria for each diagnosis. Each criterion is considered individually and determined to be either absent or present. Based on a predetermined number of symptoms present, the subject is then classified as a case or non-case. Recently, studies examining the relationship of external correlates and functional impairment (e.g., Kamphaus et al., 2003; LaCombe, Kline, Lachar, Butkus, & Hillman, 1991; Lahey et al., 1994; McConaughy, Achenbach, & Gent, 1988) have been used to help refine classification systems, determine an optimal number of symptoms required for a diagnosis, and to aid in reconciling the permutations of sets of symptoms.

Cantwell (1996) observed that categorical classification systems such as the DSM, ICD, and IDEA methods, fail to identify sub-syndromal conditions that produce functional impairment because the children exhibiting these conditions are not identified when an absent versus present model is used for classification.

In light of these issues, researchers are beginning to look for homogeneous subtypes of children with behavior problems or taxons (naturally occurring behavioral types) (Meehl, 1995). Several researchers (Frankel, Hanna, Cantwell, Shekim, and Ornitz, 1992; McConaughy et al., 1988; Kline et al., 1993; Achenbach, 1995; and Kamphaus et al., 1997) have attempted to subcategorize children based

on the presence of specific behavior types. Multivariate analyses, such as cluster analysis, have been used to derive taxonomic constructs for children across samples and assessment procedures. The Child Behavior Checklist (CBCL; Achenbach, 1991) and the Personality Inventory for Children (PIC; Wirt, Lachar, Klinedest, & Seat, 1984) had been the primary instruments used in developing these classification schemes. The Teacher Rating Scales of the Behavior Assessment System for Children (BASC-TRS) is a relatively new system upon which taxonomic systems derived from them are currently being researched (DiStefano et al., 2003; Kamphaus et al., 1997; Huberty et al., 1997; Kamphaus et al., 1999; Kamphaus et al., 2003).

The current study examines an empirically based typology of six to eleven-year-old children's behavior in the classroom (Kamphaus et al., 1997) and, determines if this typology holds the potential to be a useful classification system for child behavior problems in school.

CHAPTER 2

REVIEW OF THE LITERATURE

Classification of mental disorders has been an important part of understanding and researching psychopathology. There are two primary methods by which behaviors or symptoms are grouped or organized: categorical and dimensional. The disorders may be named or characterized by a set of criteria (categorical) or by a distinct profile on a set of dimensions (dimensional). The primary systems currently in use are of the categorical type. Categorical systems include the Diagnostic and Statistical Manual (DSM-IV; APA, 1994) and the International Classification of Disorders (ICD-10; WHO, 1990) classification systems. The latter type described, dimensional systems, are less widely used but offer many advantages over the more traditional categorical systems. Dimensional systems are typically based on empirical measures of several behavioral dimensions. The advantages of the dimensional approach include better accounting for children whose problems vary in degree or severity, as well as more empirical strength, predictive validity, and statistical reliability than categorical approaches. Many dimensional systems have been developed, but few have adhered to rigorous standards in their development, thus many have not produced replicable results. The development of meaningful typology relies upon the use of a measure with good internal validity, the use of a large representative sample, and the use of sound statistical practices to ensure internal validity

of the obtained cluster groups. The BASC-TRS-C typology improves upon the previously developed typologies in many of these ways. After a meaningful typology is developed, it must be validated to establish its clinical utility. Evidence of validity is typically obtained by characterizing the cluster groups or behavior types using external variables of clinical importance.

History of Classification

The classification of mental disorders for adult psychopathology has a lengthy history dating back to the middle 1800s (Cantwell & Baker, 1988; Mattison & Hooper, 1992). Classification refers to the process of placing psychological phenomena into distinct categories according to some specified set of rules (Kamphaus & Frick, 1996). The International Classification of Diseases (ICD) and the Diagnostic and Statistical Manual of Mental Disorders (DSM) were among the first formal diagnostic classification systems of mental disorders developed and remain the premier systems in use today.

In 1965, Anna Freud described a developmental profile based on psychoanalytic constructs and this was the first classification system to give substantial consideration to child psychopathology. Freud's system was followed by the development of systems that were also based on psychoanalytic thinking (Cantwell, 1996). The sixth edition of the ICD was the first formal diagnostic version in that series to include mental disorders. The DSM-I (APA, 1952) and the ICD-8 (WHO, 1967) systems contained few descriptions of child psychopathology (Cantwell, 1996). Research on child psychopathology in the seventies stemmed largely from theories about adult psychopathology (Achenbach, 1995).

Now there have been advances in methodology geared toward children (Achenbach, 1995).

Categorical and Dimensional Methods

Many authors have made distinctions between categorical and dimensional systems (Cantwell, 1996). The primary classifications systems in use today are categorical (e.g., DSM-IV). The child either meets or does not meet the criteria for a disorder, a dichotomous decision. Cantwell lists a number of advantages of categorical classification schemes. One advantage is that a diagnosis described by a single term allows one to summarize a variety of clinical concepts to others in a discrete fashion (Cantwell, 1996). A second advantage is that clinical decisions, such as whether medication will be prescribed, are typically based on whether a disorder is present or not.

One significant weakness in the DSM-IV and ICD 10 systems concerns the relationship of the diagnostic process or assessment to diagnostic classification. Cantwell (1996) pointed out that there has been only a very limited operation of the diagnostic criteria that specifies which instrument and what informants are used, and how the presence and severity of the criteria are determined. Cantwell (1996) suggested that the value of diagnostic criteria may be suspect without using a specific diagnostic process with specific diagnostic criteria to make the diagnosis. Another weakness of categorical schemes (and sometimes of dimensional measures) is in addressing the issue of subthreshold or subsyndromal psychopathology (Cantwell, 1996). When categorical diagnostic schemes are used for classification that

require the presence of a certain specific set or number of symptoms, or when dimensional measures require a cutoff to be considered "clinical", there will be children who just miss the cutoff scores. A dimensional approach is not likely to exclude children from a study because they are not diagnosed, promoting a greater understanding of the full range of child behavior (Kamphaus et al., 1997).

Categorical systems are those that confer a diagnosis based on whether a particular set of criteria is met. The child either has or does not have the disorder. Dimensional systems, however, are based more on profiles. Each symptom is examined on a continuum and reported based on its relationship with other dimensions. Advantages of dimensional systems include the ability to describe multiple symptom patterns present in an individual and more statistical reliability (Cantwell, 1996).

Multivariate techniques are often used to derive typologies from dimensional measures (e.g., Curry & Thompson, 1985; Edelbrock & Achenbach, 1980; Frankel et al., 1992; Kamphaus et al., 1997; Thompson et al., 1989). Cluster analysis, one class of multivariate techniques, simultaneously separates sets of subjects based upon either their similarities or differences across several measures or subscales (Frankel et al., 1992). The derived clusters are described by their mean values on each scale and called cluster profiles. According to Frankel et al. (1992), there are a few problems, however, inherent in the use of cluster analytic techniques to develop typologies. First, cluster solutions usually do not detect rarely occurring disorders of childhood, because cluster groups containing only a small number of

members are typically discarded. Second, minor differences in the clustering algorithm may produce considerably different classification of subjects and pose a problem in replication of the study. Thirdly, cluster analytic methods will classify subjects even if subjects theoretically should not be classified (Frankel et al., 1992).

Previous Dimensional Typologies

Edelbrock and Achenbach (1980) constructed one of the first typologies of behavior problem patterns using the Child Behavior Profile (CBP). Subjects in this study were 2,683 children, aged 6 to 16, seen at 30 mental health facilities. The racial composition of the sample was 78.4% white and 21.6% black. A CBP score for each child was computed from checklists completed by their parents. The CBP consisted of behavior problem and social competence scales scored from the CBCL.

Profile types were identified for the subjects, grouped by age and sex, using separate hierarchical cluster analyses performed on the subscales of the CBP. The social competence scales were ultimately not used in developing their cluster-based solution. The authors found, through their initial cluster analyses using both behavior problem and social competence scales, that the social competence scale contributed little to the identification of differentiated profile types.

Edelbrock and Achenbach (1980) used standard scores based on samples of clinically referred children rather than those based on normal children in order to avoid what they termed as bias in the cluster analyses and to develop a system that differentiated maximally among the clinically referred children. This was done because the referred children tended to have high scores on all the scales when they were

compared to normals and because the means and standard deviations of clinical samples tended to differ from normal samples. Their aim was to create a classification system for children with impairment.

For each age and sex group, profile types that replicated across two samples of 250 profiles each were retained. A significant intraclass correlation (ICC) between cluster centroids obtained in different samples indicated that the pattern and elevation of scores on the CBP was shared by a group of children in each sample, and based on this, the profile type was thought to be reliable.

Using the hierarchical clustering procedure, Edelbrock and Achenbach (1980) obtained six reliable profile types for boys aged 6 to 11 and boys aged 12 to 16. Seven reliable profile types were obtained for girls aged 6 to 11 and girls aged 12 to 16. For boys 6 to 11 the clusters were named: Schizoid-Social Withdrawal; Schizoid; Hyperactive; Depressed-Social Withdrawal-Aggressive; Somatic Complaints; and Delinquent. For boys aged 12-16 the clusters obtained were named: Schizoid; Uncommunicative; Immature-Aggressive; Hyperactive; Uncommunicative-Delinquent; and Delinquent. For girls aged 6 to 11, the clusters obtained were as follows: Depressed-Social Withdrawal; Somatic Complaints; Schizoid Obsessive; Sex Problems; Hyperactive; Delinquent; and Aggressive-Cruel. Finally, for girls 12 to 16, the clusters obtained were: Anxious-Obsessive, Somatic Complaints; Hyperactive-Immature; Delinquent; Anxious-Obsessive-Aggressive; Aggressive-Cruel and Depressed-Withdrawal-Delinquent.

Some profile types were similar across groups. Profile types reflecting primarily delinquent behavior and types representing

hyperactive behavior were found in all four groups. A profile pattern representing somatic complaints was present in three of the four groups. The Aggressive-Cruel type was found in both ages groups of girls and the Schizoid type was found in both age groups of boys.

The authors specified a minimum intraclass correlation ($ICC < 0$) so that children whose Child Behavior Profiles (CBPs) were not very similar to any of the profile types would be left unclassified. In addition, they did not try to classify children having a score of 25 or less on the behavior problem portion of the checklist because a change of only 1 or 2 points on certain scales could have changed their pattern of scores on the profile, thus representing unreliable profile patterns for purposes of classification. Similarly, Edelbrock and Achenbach (1980) also excluded children with a total score of 100 or more on the checklist because they tended to have extreme scores on all the scales resulting in profile patterns determined primarily by differences in the standardization of the scales, rather than the relative concentration of behavior problems.

Edelbrock and Achenbach (1980) conducted further analyses to determine if classifications according to the profile types were related to age, race, SES, and adaptive competencies. Differences between classified children and those not classified were also examined. Some profile types were found to differ significantly on the demographic variables (e.g., age, sex, race, SES), but the effect sizes were small and the findings were not consistent across age and sex groups. Significant race differences were found among profile types only for boys and girls aged 6 to 11. Significant differences

among profile types on the social competence (adaptive) scales showed larger effect sizes and were more consistent across age and sex groups. Significant differences were found among all profile types on the School and Social scales. Differences were also detected between the classified and unclassified children. Children with total behavior problem scores greater than or equal to 100 or very high scores obtained lower social competence ratings than classified children, whereas, children with total behavior problem scores less than or equal to 25 or very low scores, obtained higher competence ratings. For those children whose behavior profile patterns did not resemble any profile types ($ICC < 0$), significant differences reflected social competence scores that were higher than those obtained for classified children, except among girls aged 12 to 16.

To assess the proportion and similarity of the subjects classified, Edelbrock and Achenbach (1980), made several classifications for each age and sex group using ICC cutoff points ranging from .00 to .90, at intervals of .10. The results of the four groups were almost identical, so they were averaged. Analyses of power and the coverage (or number of subjects classified) obtained suggested that a cutoff point in the range of .20 to .30 would maximize the ability to detect significant differences among the groups but still classify a high proportion of children.

To determine the reliability of classifying children according to the profile types, the agreement between the classification of children's CBPs obtained from their mothers and a clinician was computed. Three measures of agreement were reported: percent

agreement, the Cohen kappa statistic, and the ratio of the obtained kappa to the maximum possible kappa. Across all groups, agreement for the lower level or narrow band profile types averaged 74 percent. Within each age and sex group, the kappa values indicated substantially higher than chance agreement.

In 1985, Curry and Thompson conducted a study in which hierarchical cluster analysis was performed on the Missouri Children's Behavior Checklist (MCBC) scores of two matched samples (n = 65 for each) of psychiatrically referred children to determine if the patterns were the same as those derived from cluster analysis of the developmentally disabled population. Previous studies with the developmentally disabled population indicated a four-cluster solution (Curry & Thompson). Curry and Thompson obtained a seven cluster solution in their study that showed a degree of coverage in describing developmentally disabled children that was approximately equal to its coverage in describing psychiatrically referred children. They concluded that the seven-cluster solution was the more adequate classification system as it was able to classify more of the child psychiatry children and as many of the developmentally disabled children. The seven profiles were named as follows: Inhibited-nonaggressive, Low Social Skills, Behavior Problem-free, Mildly Aggressive, Aggressive-active, Aggressive-inhibited, and Undifferentiated Disturbance. There was one "unclassified" cluster for subjects who did not fit any profile. Membership in the seven clusters was examined as a function of age and sex. Using an ANOVA, Curry and Thompson found that membership in a cluster could not be predicted on

the basis of age, however, there was a significant tendency for classified subjects to be older than those who were unclassified. A chi-squared test indicated there was no difference in sex proportion between classified and unclassified subjects, however, membership in the Low Social Skills cluster was related to sex, males were lower.

Frankel et al. (1992) conducted a study in which they performed a cluster analysis upon clinical and normal populations using the Achenbach Child Behavior Checklist (CBCL). CBCL ratings were collected on boys aged 6 to 11 years who were divided into three groups. The first group, Mixed Behavior Problem (Mixed), consisted of 106 boys referred to a parent training clinic within the Child Psychiatry Outpatient Service of a large university hospital. The subjects in this group had been given various DSM-III diagnoses including, but not limited to, Attention Deficit Disorder (either with or without hyperactivity) (ADHD), Conduct Disorder (CD), Oppositional Defiant Disorder (ODD), and the DSM-IV code for "parent-child problem", not due to a psychiatric disorder. The Mixed group was randomly subdivided into two groups of 53 subjects each. The second group was called ADHD and was composed of 53 subjects. Twenty-eight of the boys in this group satisfied the criteria for ADHD alone, and the remaining 25 satisfied the criteria for ADHD and either ODD or ODD and CD. The two normal samples comprised of 29 and 40 subjects, were screened with the Diagnostic Interview for Children and Adolescents (DICA) and DSM criteria to ensure that they evidenced no diagnosable psychopathology.

The cluster analysis methods and procedures previously used in studies by Curry and Thompson on child behavior checklists were

adapted for use in this study. A separate cluster analysis was performed for each sample based upon raw scores for each of the CBCL scales. The clustering technique began by assigning each subject to their own cluster and successively combining the two closest clusters until all subjects were in one cluster. Formation of larger clusters was associated with increases in the normalized maximal distance between two clusters to be fused. The criteria used by Curry and Thompson (1985) to determine the number of clusters was also used in this study: 1. Adequate numbers of subjects (8 or more) within each cluster, 2. Cutoff before large local changes in the normalized maximal distance could be fused, and 3. A local minimum increment in this normal maximized distance. Hotelling's T^2 was used to determine which clusters had been replicated across samples.

Four cluster profiles (Clusters I, II, III, and IV) emerged from the data and each was replicated across at least two of the five samples. Furthermore, the shapes of all the profiles (using the raw score data) were similar, differing primarily in overall magnitude. The magnitude of the CBCL scale scores increased over the four clusters with Cluster I having lowest magnitude to Cluster IV with the highest. (However, the similarity in the profile shapes was not retained when the raw scores were transformed into T-scores.) Comparisons of T^2 between individual profiles across clusters tended to confirm differences between them. Twelve of 15 profile pair comparisons of Cluster I with the other clusters indicated highly significant differences (p 's < .006). All of the profile pair comparisons between Cluster II and Cluster IV were statistically

significant (p 's < .03). Profile pair comparisons of Cluster III with the others only approach significance as 5 of 11 comparisons had p 's less than .15.

The clusters were identified according to the sample the majority of its members belonged to prior to the analyses. Cluster I was composed exclusively of boys screened as having no significant behavior problems and it represented profiles replicated only in the two normal samples. Samples drawn from a clinic specializing in externalizing behavior problems were represented in Clusters II, III, and IV. Boys with ADHD only tended to be classified in Cluster II. Boys in the ADHD/ODD/CD group tended to be classified in Cluster III. Boys with the most severe behavior problems had parents who tended to score higher on the MMPI-168 Acting Out scale. In contrast, the lower scores of parents of boys with ADHD only were consistent with previous results suggesting that parental antisocial traits are not associated with ADHD in boys unless conduct disorder is also present.

After t -score transformation, the relationship between the derived clusters and CBCL based categorizations was explained. Clusters I and II members would be classified as "behavior problem free" based upon the failure of any CBCL scale score to exceed the cutting score (t -score > 70). Cluster III members would be described as "pure externalizing" as the Aggression, Hyperactivity, and Delinquency CBCL scales exceeded the cutting score, while scores on the Internalizing scales did not. Cluster IV was described as "mixed internalizing/ externalizing" as the Total Behavior Score (overall score) exceeded the recommended cutting score.

Stepwise discriminant analysis was conducted to establish the relative contribution of demographic variables (maternal education, SES, child age, and white vs. non-white) and each of the CBCL scales in defining clusters. The four variables making statistically significant contributions to cluster membership were Aggressive, Depressed, Hyperactive, and Obsessive/Compulsive CBCL scales. All of the demographic variables had F's that failed to reach statistical significance.

The overall agreement of cluster assignment with DSM-III-R diagnosis was 80.9 percent and was statistically significant. The clusters were not significantly related to demographic variables.

Thompson et al. (1989) derived a behavior classification system based on the Missouri Children's Behavior Checklist (MCBC) ratings. Subjects were three samples of children aged 4 to 14 years. One group of children were referred to a center for the evaluation of developmental disabilities (n = 471), members of the second group (n = 155) were referred to an outpatient child psychiatry clinic, and the third group of children had chronic illness such as cystic fibrosis, juvenile diabetes, cancer, or spina bifida (n = 184). There was also a nonreferred control group (n = 44).

Raw scores for each subject were transformed into t-scores and factor analyzed. The factor analysis yielded three factors labeled Externalizing, Internalizing, and Sociability. Hierarchical cluster analysis of scores on the three factors were conducted separately for each sample. Cluster analysis was not performed on the control group because of the small sample size. In order to test the validity of the

obtained cluster solutions, each sample was split into parallel subsamples, A and B, and intraclass correlations were calculated. The clusters that replicated were examined for similarity of profile shape across the three samples to arrive at what the authors termed, a "comprehensive and parsimonious" set of six behavior profile clusters.

Three of the obtained clusters were behavior problem profiles (Internal, External, and Mixed Internal and External), characterized by elevated scores on one or both of the behavior problem factors (Internalizing and Externalizing). Three clusters were behavior problem free profiles (Low Social Skills, Problem-Free, and Sociable) distinguished from each other by the degree of elevation on the Sociability factor. Thus, the classification matrix is based on two dimensions: externalizing and internalizing behavior problems and sociability.

The children in each of the samples were classified according to classification rules based on MCBC t-scores and the three factors. Cases that were not classified into one of the six clusters and had a t-score greater than or equal to 63 (90th percentile) formed a heterogeneous group called Undifferentiated Disturbance. Cluster membership varied significantly as a function of sample (Developmental Disabilities, Psychiatric Problems, Chronic Illnesses).

Thompson et al. (1989) suggest that combining behavior problem and social relationship dimensions would enable the formulation of a multidimensional classification matrix that offers the potential for increasing the accuracy of prognostic assessments for specificity of intervention along multiple dimensions simultaneously.

Development of a Typology

A typology would provide an effective descriptive system for conveying general information about a child and help to refine predictions about that child. It would also aid in developing intervention and prevention strategies designed to meet the needs of a particular type. LaCombe et al. (1991) suggested that diagnostic or classification systems should ideally provide clinicians with four types of information: (a) an accurate description of current patient status (i.e., concurrent validity); (b) prediction of long-term course and outcome (predictive validity); (c) identification of possible etiological factors (postdictive validity); and (d) the specification of treatment recommendations.

The research on typologies of child psychopathology generally has followed a common path. The first is to identify types empirically using a multivariate approach, typically cluster analyses, and focus on replicable types. The types are then interpreted through construct validation studies with the use of multiple independent data sources. Issues of generalizability are weighed, particularly across gender, developmental period, ethnicity, and culture. The goal is to work toward a hierarchical taxonomy that classifies both broad and narrow types.

Further, a typology should address subsyndromal disorders based on dimensional information. According to Cantwell (1996), classification systems must consider subsyndromal disorders as these conditions are associated with functional impairment, although below the level of functional impairment associated with the presence of a

definite psychiatric disorder. Fergusson and Horwood, in their 1995 study, demonstrated that disruptive behavior symptoms in children showed evidence of dimensional properties in which the severity of symptoms varied from none to severe. They also found that diagnostic classification systems based on the DSM criteria, rather than an empirical or phenomenological based typology, produced measures that were less optimal predictors of future outcomes.

Fergusson and Horwood (1995) also suggested that using a referred population is a worthwhile endeavor particularly when studying low prevalence groups. When symptom variation is examined in a general population sample, one runs the risk of obtaining skewed data (Fergusson & Horwood). When Fergusson and Horwood applied DSM-III-R criteria to their general population sample, the majority of the cases were classified as noncases and only a small minority were classified as cases. The lack of predictive power of the DSM-III-R criteria largely reflected the fact that the majority of the sample was classified into a single class of noncases when, according to Fergusson and Horwood's findings, there was considerable symptom variation among the subjects in this large group. They acknowledged that in clinical samples, where most of the subjects are cases, a different situation could emerge. They suggested categorical distinctions between subjects could prove to be more informative and have greater predictive validity than is the case for general populations. Diagnostic categories and criteria in the DSM are not based on data from actual samples of troubled children.

In order to assess the utility of classification systems, they must be evaluated. Blashfield and Livesley (1991) identified many similarities between psychiatric classification systems such as the DSM and psychological tests. They stressed that reliability and validity are not only essential to evaluating tests, but to evaluating classification systems as well. Along the same vein of evaluation of classification systems, Morey (1991) suggested that psychiatric classification be viewed as a collection of hypothetical constructs and that establishing construct validity for the typology be established accordingly.

Kline et al. (1994) evaluated a profile matching classification model for the Personality Inventory for Children (PIC), a parent-informant questionnaire of child adjustment status, for use as a screening measure in school assessments. The PIC profiles of children were compared to the mean profiles of children in regular classrooms, and to the mean profiles of children who are learning disabled, emotionally-behaviorally disturbed, or mentally impaired. Two empirically based typologies were constructed for the PIC, one constructed within psychiatric samples and the other within samples of learning disabled children. Kline et al. (1994) sought to develop a special education-based classification model for the PIC as an alternative to a hierarchical model developed by the authors in previous research.

Three samples were used in this study: a derivation sample, a replication sample, and a clinic sample. The derivation sample contained 248 children (mean age = 10.0 years; 68% boys, 98%

Caucasian). The makeup of the sample was as follows: enrolled in regular classrooms, 22.6%; in self-contained learning disabilities classroom, 12.1%; emotionally impaired, 9.7%; educable mentally impaired, 12.1%; trainable mentally impaired, 11.7%; mainstreamed children with learning disabilities, 15.3%; and regular education students (with grade appropriate achievement) who received school social work services, 16.5%. The replication sample was comprised of 423 subjects (mean age = 10.2; 72% boys, 100% Caucasian).

Approximately 33.8% were in regular education classes, 15.8% were enrolled in self-contained classes for the emotionally impaired, 8.8% were in self-contained classes for the educable mentally impaired, and 41.6% were classified as learning disabled. The clinic sample was formed because the derivation and replication samples had so few non-Caucasian children. A sample of 240 children (mean age = 11.4; 71% boys; 50% Caucasian, 50% African American) were matched on Full Scale IQ scores on the Wechsler Intelligence Scale for Children - Revised (WISC-R).

Intra-class correlations (r_i) were used to determine similarity between each child's PIC profile to the mean profiles of the seven educational groups in the derivation sample. Seven r_i values were calculated for each child. Classification accuracy was estimated based on the two greatest similarity coefficients. The classification was counted as correct if the child's actual education group was indicated among his or her highest r_i values. Those cases which had intraclass correlations that were all zero or negative ($r_i \leq 0$) were excluded from

further analyses. The accuracy of the profile-matching system was compared to that of the hierarchical system.

Overall, classification based on profile-matching or intraclass correlations was slightly more accurate than the hierarchical method in the derivation sample (71% vs. 65%), and equally accurate in the replication sample (62% vs. 63%). In the derivation group, the profile-matching model was somewhat more accurate in the classification of regular children who were receiving counseling (65% vs. 41%), and learning disabled children in self-contained classes (60% vs. 43%). Neither model was very accurate in the classification of emotionally impaired children (55% and 50% for the profile-matching and hierarchical methods, respectively) and "mainstreamed" learning disabled children (33% and 45% respectively). Similarly, in the replication group, relatively few PIC profiles of emotionally impaired children were accurately classified (29%).

To evaluate whether the profile-matching method differentially identified Caucasian versus African-American children as needing special education services, a two-group multivariate analysis of variance was conducted across the values of the seven similarity coefficients. The overall multivariate mean difference was marginally significant (Wilks' lambda = .93, $F(7, 226) = 2.45$, $p < .05$), but this effect accounted for less than 4% of the variance among similarity coefficients. None of the univariate comparisons (i.e., t tests) of the two groups on the individual coefficients were significant, and the range of point-biserial correlations between race and each of the similarity indexes was $-.05$ to $.10$. The authors concluded that the

profile-matching model did not differentially classify Caucasian and African-American children.

The BASC-TRS Typology

The typology derived from the BASC-TRS-C is one with many benefits over previous typologies. First, there is strong internal validation for the clusters. Huberty et al. (1997) used several methods to identify the most parsimonious number of clusters. First, the cubic clustering criterion was plotted and studied in order to identify the "elbow" that suggested that 7 to 11 clusters were present at the elbow, with 4 to 14 clusters being nearby. In order to gauge the degree to which clusters would cross-validate, cluster solutions were computed for five through eight clusters and compared. These analyses identify five clusters that appeared in every solution and one cluster that emerged consistently in the six- through eight-cluster solutions. An examination of the substantive meaningfulness of the six-, seven-, and eight-cluster solutions led to the conclusion that the seven-cluster solution was the most reasonable.

Internal validation of a seven-cluster solution was conducted in part by dividing the sample into half-samples three times and clustering each half-sample. Seven comparable clusters consistently appeared in the six- through eight- cluster solutions for the half-samples. The linear discriminant functions (LDFs) were computed for each half-sample, as were correlations between LDF scores and scaled scores. Correlations between structures r 's for the pairs of half-samples were then computed and the coefficients were found to be high.

A cluster was not retained if it was differentiated from others only by level or shape or if it lacked meaningfulness when considered in the context of the child psychopathology research. Cluster meaningfulness was determined using several rational criteria, including 1.) their deviance from average, 2.) gender distribution, 3.) similarity of profile shape to well-recognized syndromes, 4.) predictable characteristics of subtypes based on related research, 5.) similarity to subtype dimensions that have been previously identified in the child psychopathology literature, 6.) size of cluster, and 7.) consistency with BASC-TRS validation research. The final analyses assessed the degree to which cluster members were differentiated by external criteria. Using a yoked sample of children with both teacher and parent ratings, multivariate group contrasts revealed that teacher-rated clusters could be differentiated on the basis of BASC parent ratings of behavior problems and adaptive skills.

A second improvement over previously derived typologies of child psychopathology, is the use of a nationally representative sample. The BASC-TRS-C norming data were collected at 116 sites representing various regions of the United States. The sites were selected to represent a diverse sampling of the population by geographic region, SES, ethnicity, and child exceptionality. The TRS-C sample used for these analyses included 1127 elementary school children (ages 6 to 11) who were attending both public and private schools. The TRS-C sample was formally stratified to approximate the 1986-1988 U.S. Census Bureau statistics. Stratification variables were grade, gender, and ethnicity. African-American and Hispanic children were oversampled to

a limited extent to ensure adequate representation. In addition, an attempt was made to include children with known exceptionalities in proportion to population statistics. The diagnostic label or special education category that applied to any sample participant was provided. Characteristics of the normative sample closely approximated the population attributes with respect to distribution of parental level of education and percentages of children receiving special education services (Reynolds & Kamphaus, 1992).

The BASC-TRS-C typology exhibited many similarities to typologies of child behavior previously derived from other measures (see Table 1). The similarities observed to previously obtained typologies (e.g., Curry & Thompson, 1995; Achenbach, 1991) suggest replicability across samples and measures, providing validity evidence for the constructs.

Kamphaus et al. (1997) identified clusters that potentially overlapped those found by Curry and Thompson (1985) and by Achenbach (1991). The similarities between Kamphaus et al. (1997) and Curry and Thompson results included the Physical Complaints and Worry and Inhibited-Nonaggressive clusters; the Well-Adapted and Average and Behavior Problem-Free clusters; the Mildly Disruptive and Mildly Aggressive clusters; the Disruptive Behavior Disorder and Aggressive-Active clusters; and the Severe Psychopathology and Undifferentiated Disturbance clusters.

Similarly, the Somatic Complaints cluster found by Achenbach resembled the Physical Complaints and Worry cluster on the BASC; the Thought Problems cluster resembled the Severe Psychopathology cluster; the Attention Problems cluster showed similarities to Learning

Problems cluster; and the Delinquent Behavior cluster was similar to the Disruptive Behavior Disorder cluster. A cluster resembling to the BASC-TRS-C Learning Problems cluster did not emerge on the MCBC (Curry & Thompson) typology. This is likely due to the fact that different informants are used on the two measures- the MCBC uses a parent informant whereas the BASC-TRS uses a teacher informant. Similarly, "problem-free" or average groups did not emerge on the TRF (Achenbach) typology. This can probably be attributed to the fact that the TRF does not include items assessing adaptive behavior as the BASC-TRS does. Table 1 illustrates the similarities (and differences) between the cluster solutions and the types of behavioral profiles that emerged on the BASC-TRS, MCBC and TRF.

In an effort to build upon prior efforts (e.g., the BASC-TRS-C typology) to produce a meaningful typology of child behavior for children aged 6 to 11 years, Kamphaus et al. (1999) performed a cluster analysis on the BASC Parent Rating Scales (BASC-PRS) norming data (Reynolds & Kamphaus, 1992). The method used in deriving this typology was similar to that used with the BASC-TRS data. The data were inspected for irregularities prior to clustering. Euclidean distance was used as the similarity index. The Ward method, a hierarchical agglomerative procedure, was used to identify initial cluster solutions because of its tendency to produce homogeneous clusters in which within-cluster variance is minimized. The Ward method was also used to identify the initial centroids. The Ward solution was followed with a K-means analysis so that the cluster

TABLE 1

TYPOLGY COMPARSION

BASC-TRS Typology	MCBC¹	Achenbach TRF²
Well-Adapted	Behavior Problem-Free	
Average		
Disruptive Behavior Disorder	Aggressive-Active	Delinquent Behavior
Learning Disorder		Attention Problems
Physical Complaints/Worry	Inhibited-Nonaggressive	Somatic Complaints
Severe Psychopathology	Undifferentiated Disturbance	Thought Problems
Mildly Disruptive	Mildly Aggressive	
	Low Social Skills Aggressive/ Inhibited	Withdrawn Anxious/Depressed Social Problems Aggressive Behavior
7 cluster solution	7 cluster solution	8 cluster solution

¹Curry & Thompson, 1985²Achenbach, 1991

membership of a child could change from that determined by the Ward solution.

Several methods were used to identify the most parsimonious cluster solution. The cubic clustering criterion was plotted and studied in order to identify the "elbow" that suggested the number of clusters present. The plot suggested that 7 to 11 clusters were present at the elbow, with 4 to 14 clusters nearby. The meaningfulness of clusters was determined using several rational criteria, including 1.) their deviance from average, 2.) gender distribution, 3.) similarity of a cluster profile to well-recognized syndromes, 4.) predictable characteristics of the subtypes based on related research, 5.) similarity to subtype dimensions that have been previously identified in the child psychopathology literature, 6.) size of cluster, and 7.) consistency with BASC-PRS validation research. The final analyses assessed the degree to which cluster members were differentiated by external criteria. Using a yoked sample of children with both parent and teacher ratings, multivariate group contrasts revealed that clusters that are defined and distinguished by parent ratings are for the most part differentiated by teacher ratings as well.

The nine-cluster solution derived from parent-ratings on the BASC-PRS (Kamphaus et al., 1999), showed many similarities to the solution obtained using teacher ratings (Huberty et al., 1997). There were also some important differences in the findings of each study. One similarity is that the large sampling of school-age children produced both well-adapted and maladapted clusters. In regard to

differences, the "Mildly Disruptive" cluster group obtained in the BASC-TRS study (Huberty et al., 1997) did not emerge in the parent study. Another important difference was that an internalizing cluster emerged in the BASC-PRS study that was not present when using the teacher data set. The clusters in the BASC-PRS study (Kamphaus et al., 1999) were labeled Adapted, Physical Complaints/Worry, Average, Well-Adapted, Minimal Problems, Attention Problems, Internalizing, General Psychopathology-Severe, and Disruptive Behavior Problems.

According to Kamphaus et al. (1997), further studies are required to gain a clearer understanding of the members of cluster groups obtained in typology studies. Knowledge regarding other variables such as intelligence, academic achievement, and other distinguishing variables and characteristics is limited. The findings for the yoked data set of parent ratings using the BASC-PRS suggested that members of the clusters will be distinguished by external variables however, additional evidence is required. Furthermore, improved measures of functional impairment will be sought through examination of external variables relationship to functional impairment.

Overall, the BASC-TRS typology appears to be a meaningful typology of classroom behavior for elementary school age children as it shows similarity to diagnostic syndromes previously identified in related child psychopathology research. Furthermore, the typology was developed using an instrument that possesses adequate to good evidence of reliability and validity and that has scales representing well-supported behavioral constructs as suggested by numerous independent reviews (Kline, 1994; Sandoval & Echandia, 1994; Flanagan, 1995). In

addition, a relatively large representative national sample based on U.S. Census statistics was used. These elements improve upon the conditions many of the previous typologies were developed under, and therefore, it is reasonable to choose this particular typology to research further.

Typology Validation

A typology may be validated against a variety of external criterion variables. The variables may include scores from intelligence and achievement tests, grades, discipline records, retention history, and special education placement.

Describing diagnostic criteria on a phenomenological basis, as is done in the DSM-IV and ICD-10 categorical systems, is not enough for the diagnostic categories to be valid and useful (Cantwell, 1996). Cantwell contends that diagnoses must differ in areas other than clinical phenomenology.

For a classification system to be useful for researchers, the diagnostic categories must have both internal and external validity (Cantwell, 1996). Cantwell (1996) proposed a model for the validation of psychiatric disorders in children, which is similar to Skinner's (1981) third and final stage of construct validation of psychiatric syndromes. The starting point for clinical research in Cantwell's model is clinical phenomenology. Cantwell pointed out that factor and cluster analysis of dimensional measures offer alternative and complimentary ways of describing the psychiatric disorders of childhood and adolescence compared to the categorical systems. The clearly defined and subtyped disorders can then be investigated for

evidence of external validity. The model includes the stages for studying demographic factors (e.g., age, gender, social class, ethnicity), psychosocial factors (e.g., acute and chronic life stressors, early childhood experiences), biological factors (e.g., physical handicaps, neurological disorders), family environmental factors (e.g., discipline styles, parent-child interactions), family genetic factors, natural history of the disorder, and response to therapeutic intervention. Cantwell (1996) cautions that these stages are not independent from one another, but that information from one stage often can inform the studies in another stage.

Cantwell (1996) summarized findings of external validation research, but he noted that no disorder can be fully validated. In terms of demographic factors, the early onset disorders, such as attention deficit disorder, developmental learning and language disorders, and pervasive developmental disorders tend to be more common in boys. Disorders such as Obsessive Compulsive Disorder and major depression have equal prevalence rates in males and females. Rates of both of these disorders increase with puberty, but the rates increase much more in females. Studies of psychosocial factors suggest that family dysfunction, discord between the parents and child, and family disruption due to death and divorce tend to be associated more with disruptive behavior disorders than with anxiety and mood disorders.

Another way cluster types are validated is to examine the differences in functional impairment among the various types. The field trials conducted by Lahey et al. (1994) presented evidence that

the two dimensions of ADHD are also associated with different forms of functional impairment as well as different external correlates.

Cantwell (1996) pointed out that subsyndromal conditions are associated with functional impairment.

Previous Validation Studies

McConaughy et al. (1988) conducted a study to determine whether profile patterns derived from parents' ratings of clinically referred boys aged 6 to 11 (Edelbrock & Achenbach, 1980) were significantly associated with differences in functioning identified by external correlates including teacher ratings, classroom observations, and cognitive tests. The typology tested was derived from cluster analysis of Child Behavior Profiles for 6- to 11-year-old boys. The Child Behavior Profile is scored from the CBCL on which parents report their children's competencies and behavioral-emotional problems in a standardized format. The problems are scored on nine scales constructed from factor analyses of parents' CBCL ratings of 450 clinically referred boys. The scales were normed by obtaining parents' CBCL ratings for 300 randomly selected nonreferred boys.

An initial centroid cluster analysis was performed (Edelbrock & Achenbach, 1980) on the nine problem scales of the Child Behavior Profiles of 250 clinically referred boys. The boys were grouped according to similarities between their profile patterns, as measured by one-way intraclass correlations (ICC) between profiles. Boys who showed the highest ICCs with each other were grouped together into clusters. To identify the most reliable profile types, a second sample of 250 clinically referred boys was cluster-analyzed. The centroids of

six profile types identified in the first sample had significant ICCs with centroids of profile types identified in the second sample. These six clusters or profile types were therefore considered reliable. The profile types were defined by the entire pattern of the profile and the magnitude of the scale scores and designated as follows: Schizoid-Social Withdrawal, Depressed-Social Withdrawal, Depressed-Social Withdrawal-Aggressive, Schizoid/Anxious, Somatic Complaints, Hyperactive, Delinquent. Hierarchical cluster analyses were performed in order to identify higher-order relations among the six profile types. Two broad-band groupings emerged from this analysis and were designated Internalizing and Externalizing as the profiles that formed each of the groups had relatively high scores on the scales previously designated as Internalizing or Externalizing.

The subjects were 185 6 to 11-year-old boys referred either to an outpatient psychiatric service or to a school psychologist, whose Child Behavior Checklist (CBCL) total problem score exceeded the 90th percentile clinical cutoff for their age and whose Child Behavior Profile showed an ICC greater than or equal to .35 with one of the six previously identified profile types.

Sample sizes for the six profile types were as follows: Schizoid-Social Withdrawal, $n = 11$; Depressed- Social Withdrawal- Aggressive, $n = 19$; Schizoid/ Anxious, $n = 25$; Somatic Complaints, $n = 38$; Hyperactive, $n = 35$; and Delinquent, $n = 37$. No significant differences in age and SES were found among profile types or between broad-band groups.

LaCombe et al. (1991) sought to enhance the clinical utility of a PIC profile typology constructed earlier and to expand the scope of previous validation research. Data from mental health case records about presenting problems and problem history, possible etiological factors, family characteristics, and treatment recommendations for children who received each PIC profile type. LaCombe et al. (1991) noted the difficulties that arise when using case records in research. The amount of clinical information, informants, and type of chart information varies from case to case, and some the information is based on retrospective interviews. The results indicated unique patterns of case historical data were associated with different PIC types.

The mental health records of 327 children and adolescents evaluated at a psychiatric facility was the database for the study. Case records of children who obtained one of ten different PIC profiles were selected from a larger psychiatric sample of 1,333. The random stratified sample (based on age, sex and race) was mostly boys (70%), the mean age was 10 years, and the total sample was about half white (51%) and half black (49%). There were about thirty cases for each profile type. The standard version of the PIC was administered to the mothers of all the children.

The PIC profiles were classified in this typology according to the number or pattern of elevated scores across the twelve clinical scales (Achievement, Intellectual Screening, Development, Somatic Concern, Depression, Family Relations, Delinquency, Withdrawal,

Anxiety, Psychosis, Hyperactivity, and Social Skills) according to classification rules.

The twelve profiles in the typology were grouped into broader band groups called cognitive dysfunction types (Types 3-6) and emotional/behavioral/learning types (Types 7-12). PIC profiles with no elevated scores were classified as Type 1 (within normal limits). Type 2 of the typology, in which there was an elevation only on one PIC scale, was not studied in the present investigation due to the small number of children who fit this profile.

To systematically collect case-record information for the study, LaCombe et al. (1991) constructed an original objective checklist that contained 196 true-false or multiple-choice items about presenting, primary, secondary, and other problems; possible etiological factors; occurrence of problems during infancy or preschool, grade school, or adolescent years; family characteristics; the child's feelings and views of significant others; and treatment recommendations.

Profile groups differed significantly in age but not sex or race. Children with elevated Psychosis scales (Types 5 and 8) were younger than the sample average of 10 years. Children with elevated Delinquency scales (Type 10), on the other hand, were older. Diagnoses of mental retardation, pervasive and specific developmental disorders, autism, and schizophrenia were assigned almost exclusively to the cognitive dysfunction types (Types 3-6). However, there was a weak correspondence of diagnoses and the PIC emotional/behavioral/learning types (Types 7-12).

To identify case-record correlates for each PIC profile type, 2 (profile type versus remainder of sample) \times I (I = number of item alternatives) chi-squared analyses for all coding form items were conducted. These analyses identified a total of 410 case record correlates among profile types: 198 significant at the .01-.05 level, 212 at the .01 level. The mean number of correlates per profile type was 37 (range 22-57). Only results at the .01 level were used to control for results obtained by chance. Using the .01 level, one would only expect 22 ($1\% \times 11 \times 196$) significant results by chance.

Significant findings were summarized as follows: Children with within-normal-limits PIC profiles (Type 1) were less likely than sample base rates to present with a variety of problems except those of mood disturbance (37%). Among the cognitive dysfunction profile types (Types 3-6), many (40%) of the children with Type 3 profiles (early onset of developmental problems and cognitive impairment) had secondary conduct problems such as temper tantrums or fighting with peers or siblings. Children with Type 4 profiles (conduct and scholastic problems) did not have significantly high rates of developmental problems, nor were their difficulties typically attributed to genetic or physiological factors, suggesting learning problems rather than general cognitive impairment. Most (57%) of these children were referred for learning disabilities programs in their schools as compared with the 21% sample base rate. The case records of children with Type 5 profiles (cognitive impairment and history of multiple, early-onset developmental problems) indicated that significant minorities presented with psychotic like features (e.g.,

bizarre/ritualistic motor behavior, unusual thought processes (23%), enuresis (30%), or encopresis (17%). They also tended not to have as many conduct problems (e.g., aggression) during the preschool and school years as did children with Type 3 profiles. A significant minority (38%) of children with Type 6 profiles (cognitive dysfunction attributed to genetic or physiological factors) were recommended for placement in classrooms for the mentally impaired.

Results for the emotional/behavioral/learning types were less distinct due to the very nature of the types and the correlates associated with them. Discipline of children with Type 7 profiles (concurrent externalization and internalization symptoms) was typically described as inconsistent or overly permissive. Seventy percent of this group were described as chronically angry because of poor family relations. Children with Type 8 profiles (behavioral disorganization and peculiarities) were described as difficult or fussy infants, and significant proportions showed a lack of self-control as preschoolers in the form of temper tantrums or hyperactivity. Thirty percent of them exhibited psychotic-like symptoms at the time of their mental health evaluation. The case records of children with Type 9 profiles (pure internalization) indicated high levels of family-related problems. Some form of family dissolution was indicated for 43% of the children, 67% were described as angry because of family interactions, and 37% feared abandonment. A significant minority (30%) of children with Type 10 profiles (pure externalization) had substance abuse problems. Family interactions were typically described as cold and distant and provoking child

anger. Relatively few case-record correlates were identified for Types 11 and 12 (problems of inattention, hyperactivity, impulsivity, and poor school achievement; learning problems without obvious cognitive impairment). Members of both groups often had poor school achievement. Children with Type 11 profiles were also inattentive and overactive. Forty-three percent of children with Type 12 profiles were recommended for regular classrooms with remedial instruction (resource classroom) as compared with the 21% base rate.

Changes in ADHD diagnosis and criteria from DSM-II to DSM-III to DSM-III-R sparked controversy as to what the underlying dimension(s) of ADHD is(are) (Lahey et al, 1994). The DSM-IV field trials conducted by Lahey et al. (1994) was conducted to obtain empirical information about the underlying dimensions.

Reviews of the existing literature on the factor analysis of symptoms and new factor analysis and diagnostic utility analyses of data from DSM-IV trials for the disruptive behavior disorders were conducted to resolve the issue concerning the underlying dimensions of ADHD. These sources consistently suggested that the symptoms of ADHD did not form a unitary dimension as implied by the DSM-III-R diagnostic criteria and description. The three-dimensional approach of the DSM-III also was not consistent with the data. The existing data suggested two separate dimensions of symptoms- one, inattention and two, excessive motor activity and impulsivity symptoms.

Three types of corollary evidence supported the distinction of the two dimensions- inattention and hyperactivity-impulsivity. First, evidence from longitudinal research indicated that the two dimensions

of ADHD follow different developmental courses. Inattention remains relatively constant while Hyperactivity-Impulsivity declines substantially with age. Secondly, they differ in terms of association with comorbid disorders. Hyperactivity-Impulsivity is more strongly correlated with oppositional and antisocial behaviors. Thirdly, they appear to differ in terms of sex ratios, comorbidity, and response to pharmacologic interventions.

Subjects in the Lahey et al. (1994) study were 380 cases from the sample used in the DSM-IV field trials for oppositional defiant disorder and conduct disorder in which at least the parent informant was interviewed.

Measures used in the analyses include a modified Diagnostic Interview Schedule for Children and several measures of impairment. Global ratings of impairment were obtained by having both the parent and the interviewer complete versions of the Children's Global Assessment Scale. Three measures of specific forms of impairment believed to be related to attention deficit disorder were also obtained. A rating scale adapted from the Homework Problem Checklist was completed by the parent informant to provide information about the youth's problems in completing homework. Similarly, teacher informants completed the Academic Performance Rating Scale to provide information about the accuracy and quantity of the youth's academic work completed in the classroom. Teachers estimated social impairment by using a scale that was validated against peer sociometrics.

The first set of analyses was conducted to identify the optimal diagnostic threshold for the DSM-IV hyperactivity-impulsivity symptom

list. Lower scores on the Children's Global Assessment Scale indicated greater perceived impairment in functioning.

Measures of impairment were chosen by using multiple regression analyses of the number of symptoms of inattention, hyperactivity-impulsivity, oppositional defiant disorder, conduct disorder, anxiety, and depression against each impairment measure to determine if each symptom list accounted for unique variance in the prediction of the various impairment measures after all other dimensions of psychopathology were controlled for. These regression analyses indicated that the number of hyperactivity-impulsivity symptoms was systematically and strongly related to scores on both the interviewer and parent versions of the Children's Global Assessment Scale, but the number of inattention symptoms was not.

The number for inattention symptoms accounted for unique variance in the prediction of both teacher-completed and parent-completed measures of impairment in academic functioning, but the number of hyperactivity-impulsivity symptoms did not.

The finding that the newly identified cases in the predominantly inattentive type are more likely to be girls is consistent with previous findings that girls tend to present with impairing levels of inattention but are less likely to be motorically hyperactive.

The two primary ways in which the independence of the two dimensions was demonstrated were as follows. The two dimensions were found to be associated with different types of impairment, with hyperactivity-impulsivity being associated with global ratings of impairment and inattention being associated with academic impairment.

Although there was a systematic relationship between the hyperactivity-impulsivity symptoms and the clinicians' valid diagnosis, clinicians gave the diagnosis of attention deficit disorder in a manner that was independent of the number of inattention symptoms.

It appears that the number of symptoms of inattention present did not affect impairment ratings as symptoms of hyperactivity-impulsivity did. Youths who met the criteria for predominantly hyperactive-impulsive type were not significantly more impaired on the measures of academic impairment. This is evidence against the impairment subtype.

It is expected that those with hyperactive behavior are more impaired than those with more internalizing problems. The hyperactive types should also show more impairment in terms of grades.

Rosenblatt and Rosenblatt (1999) recently conducted a study in which they sought to describe the demographic, educational, and clinical characteristics of youth served in educational and mental health programs and to gain a greater understanding of the relationship between the functional status and academic achievement of these youth. Using matched pairs, they also compared the children in the educational and mental health programs to children not receiving specialized care.

Subjects in the study were primarily Anglo-American boys participating in specialty programs in two California counties over seven- to eight-month time periods. The average child in the sample was in the sixth grade. The educational and clinical status of the sample was assessed with widely used instruments administered either

by the mental health clinician or education personnel. The measures included the Wide Range Achievement Test-3, the Woodcock-Johnson Revised Tests of Achievement, the Child Behavior Checklist, and the Child and Adolescent Functional Assessment Scale. The subjects were also diagnosed at intake into the program by a mental health clinician using the DSM-III-R.

Results of Rosenblatt and Rosenblatt's study indicated that youth served in the specialized programs were more functionally impaired than youth that were not served, however, their data indicated that functional status and academic achievement were not related.

Description of BASC-TRS-C Typology

The final seven-cluster solution derived from the BASC-TRS-C (Kamphaus et al., 1997) was described as follows.

Cluster 1 was the largest of the seven clusters, representing 34% of the national sample. It was labeled "Well Adapted" because of the significant elevations on the adaptive scales (all four of the adaptive scales were about 1 standard deviation above the mean) and the absence of behavior problems. The gender breakdown was 61% girls and 39% boys. The racial and ethnic breakdown of this group was similar to the 1986-1988 U.S. census population statistics, with most of the members being white (78%) and African-American (13%). Asian-American children were somewhat overrepresented at 2%, and the Hispanic children comprised 7% of the cluster.

Cluster 2 comprised 19% of the national sample. It was labeled "Average" because there were few deviations from a normative mean and

the gender composition of the cluster was balanced. Clusters 1 and 2 combined included over half the students sampled (53%).

Cluster 3 appeared to represent what is commonly referred to as "Disruptive Behavior Disorder" (Frick, Kamphaus, Lahey, Loeber, Christ, Hart, & Tannenbaum, 1991). The mean scores for the externalizing scales for this cluster met or surpassed those for the samples of children with conduct disorder, behavior disorder, and ADHD that were collected as part of the TRS validation process (Reynolds & Kamphaus, 1992, p. 125). This cluster was also marked by significant adaptive behavior deficits and elevations on internalizing scales including Depression. The "Disruptive Behavior Disorder" cluster comprised 8% of the sample, was male dominated (78%), and the majority of the children were white (57%). However, it should be noted that African-American (30.1%) and Hispanic (10.7%) children were overrepresented in this group.

Cluster 4 comprised 12% of the national sample and was tentatively labeled "Learning Disorder" as it was similar to the profile obtained for a large learning disability sample with one exception (Reynolds & Kamphaus, 1992). The Cluster 4 group members possessed significant deficits in adaptive skills. This group was also dominated by males (60%) and African-American children, were overrepresented (33%). Hispanic children were underrepresented at 2%.

Eleven percent of the national sample were grouped in Cluster 5 labeled "Physical Complaints/Worry." The cluster was marked by internalizing problems of a mild nature, with somatic complaints being

primary and symptoms of anxiety (chiefly worry and nervousness) secondary. This was a female dominated (60%) cluster.

Cluster 6 appeared to be the most severely impaired of all the clusters, comprising 4% of the national sample. The cluster was dominated by males 67% with a variety of problems including psychotic thought processes and impaired adaptive skills. This group was labeled "Severe Psychopathology" as it resembled the validation sample of children who were diagnosed by school personnel as emotionally disturbed (Reynolds & Kamphaus, 1992).

Cluster 7 was marked by mild scale elevations for only Aggression and Hyperactivity and its members had normal adaptive skills. The cluster was labeled "Mildly Disruptive" because the profile looked like a subclinical form of disruptive behavior problems. Most of the children in this cluster group were boys (70%) and African-American children were again overrepresented at 25%.

BASC-TRS-C Typology Replication and Validation

DiStefano, Kamphaus, Horne, and Winsor (2003) conducted a study to externally replicate the seven-cluster solution found in the BASC-TRS-C normative sample. External replication was conducted on two independent samples from two different counties in Georgia. BASC-TRS-C data was collected on 573 6 to 11 year-old students in Crawford County and 1076 6 to 11 year-old students in Athens-Clarke County. DiStefano et al. pointed out that the samples represented more at-risk characteristics than the BASC norm data set, but were useful in determining if the behavioral typology of children identified using the BASC norm sample can be reliably replicated. The same clustering

procedure used in this study was used in the Kamphaus et al. (1997) study. This was done to ensure that differences in the cluster solutions were not a result of different clustering algorithms or different similarity indices used to group the data. The potential cluster solutions were interpreted and through this process a seven-cluster solution was found. The cluster was determined to be similar to the interpretations from the norm data set (Kamphaus et al. 1997).

The first cluster, comprising 21% of the sample, was named Well Adapted because of its significant elevations on the adaptive scales and the absence of behavioral problems. Approximately 70% of the Well Adapted children were female.

The second cluster, labeled Average, was the largest of all the clusters (30% of the sample). Scores on most of the 14 BASC-TRS-C scales were within on half of a standard deviation from the expected mean values of 50. As with the norm sample (Kamphaus et al., 1997), the Average and Well Adapted clusters together accounted for approximately 50% of the data set.

The third cluster was identified as Disruptive Behavior Problems as there were significant adaptive behavior deficits and elevation on the externalizing scales. Males dominated (91%) this cluster.

The fourth cluster was named Academic Problems as these children displayed scores close to average values for all variables except for significantly high scores on the Learning Problems and Attention Problems scales and significantly low scores on the Study Skills scale.

Students in the fifth cluster, Physical Complaints/Worry, exhibited high levels of anxiety and somatic complaints. Sixty-three percent of the students in this cluster were girls.

The General Problems -Severe cluster is predominantly male (63%) with diverse problems including psychotic thought processes (indicated by significant Atypicality scores) and impaired adaptive skills. Additionally, the children in this cluster exhibited high levels of externalizing behaviors.

Finally, the Mildly Disruptive cluster is differentiated from the Disruptive Behavior Problems cluster by comparatively mild elevations on the Aggression, Hyperactivity, and Adaptability scales.

The independent clustering of the Athens-Clarke County sample resulted in an eight-cluster solution. Seven of the clusters were determined to be similar to the previous seven-cluster solutions obtained in the Kamphaus et al. (1997) study and the current study (DiStefano et al., 2003).

The first cluster was named Well Adapted Because of its profile of high mean values for the adaptive scales, and the absence of behavioral problems. There were also more female members than male.

The second cluster was labeled Average as there were few deviations of the variables from the normative mean. There were fewer children identified as Well Adaptive or Adaptive in the Athens-Clarke county sample.

The Disruptive Behavior Problems cluster showed a pattern of significant adaptive behavior deficits and higher mean values on

externalizing scales. Males (75%) were more prevalent members of this cluster.

The fourth cluster matched the Academic Problems cluster. High scores on the Learning Problems and Attention Problems scales and low score on the Study Skills scale marked this cluster.

The Physical Complaints/Worry cluster was defined by higher patterns of somatic complaints and anxiety. There were a higher number of females in this cluster.

The General Problems -Severe cluster was easily identified due to its pattern of extreme values across many of the BASC-TRS-C scales. However, unlike the other two samples, the children in the Athens-Clarke county sample showed extremely high elevations for Conduct Problems, Anxiety, Depression, and externalizing behaviors. The children in this cluster comprised a very small percentage in both samples (4% norm, 2% Athens-Clarke County).

The seventh cluster identified was Mildly Disruptive. Like the norm group, it was characterized by mild elevations on the Aggression, Hyperactivity, and Adaptability scales.

The additional eighth cluster identified in the Athens-Clarke County data set comprised 21% of the sample and was not present in either the norm sample or the Crawford County sample. The children in the Mildly Adaptive cluster showed adaptive skills scores that ranged from one-third to one-half of a standard deviation above the mean as opposed to the typical full standard deviation found in prior solutions. DiStefano et al. (2003) believed that the Mildly Adaptive cluster may be a subset of the Well Adaptive and Average clusters

previously observed as they are all characterized by few behavior problems in school. They noted that combining the prevalence of the three clusters in the current solution results in 54%, which is close to the prevalence of the Well Adapted and Average clusters in the norm group.

Summary and Conclusions

Research on the relationship of child behavior problem types to impairment or severity has provided information about how these types are differentiated. Edelbrock and Achenbach (1980) found that social competence was inversely related to the severity of behavior problems in children. Similarly, Thompson et al., (1989) and Frankel et al. (1992), found that the magnitude of the dimensions differed between profiles, suggesting that profile groups can be differentiated in terms of severity. Related variables such as cognitive ability, academic achievement and others also have been found to differentiate child behavior types. For instance, Lahey et al. (1994) found that cognitive ability and academic achievement were negatively related to externalizing behavior problems. LaCombe et al. (1991) found that low achievement was associated with hyperactivity and attention problems cluster as well as the learning problems cluster.

In regard to demographic variables, race generally has not emerged as a significant factor in determining group membership (e.g., Frankel et al., 1992; LaCombe et al., 1991). However, some studies did observe race differences among the obtained profiles (e.g., Edelbrock & Achenbach, 1980; Kamphaus et al. 1997). Similarly, variation with regard to age was not observed in studies by Edelbrock & Achenbach

(1980), Curry & Thompson (1985), Frankel et al. (1992), and McConaughy, Achenbach et al. (1988), but LaCombe et al. (1991) found that cluster membership was related to age in their study. Most studies found that sex was not related to group membership (e.g., Edelbrock & Achenbach, 1980; Frankel et al., 1992; LaCombe et al., 1991), but Curry and Thompson (1985) observed that low social skills were related to sex.

Although there has been much research into the classification of childhood behavior problems, many interesting questions remain. These taxonomic systems have been developed, but they have not been tested with a referred population. Many questions remain about the nature of the low prevalence groups due to the relatively small sample sizes in the general population. It is not known whether subgroups exist, that is, whether the low incidence types can be further differentiated into subgroups. Again, it is difficult to see these groups emerge when they have such low prevalence in the general population.

CHAPTER 3

METHOD

First, the groups of subjects are described, instrumentation is specified, and procedures for data collection are given. Then the research questions are delineated. Finally, procedures for data analysis are discussed.

Subjects

The participants for this study are 206 children, aged 6 through 11. Subjects in the study are a referred subsample of students from a public school district with the demographics outlined in Table 2. Each child was referred for psychoeducational evaluation during consecutive school years due to classroom problems (behavioral, emotional, or learning). The file for each evaluation conducted during this time period was examined to determine if a BASC-TRS-C was administered as part of the evaluation. The cases that used a BASC-TRS-C in the evaluation were included in the sample. Approximately 2500 case files examined. Using a referred population should aid in obtaining larger numbers for each potential grouping of behavior problem areas (Frankel et al., 1992).

The ability of the sample was assessed with the Cognitive Ability Test (CogAT; Thorndike & Hagen, 1993). The CogAT is a group ability test that is administered in small groups. The CogAT assesses the pattern and level of students' cognitive development. All levels of the test contain three batteries that provide separate scores for

TABLE 2

School District Demographics (K-12)

TOTAL ENROLLMENT: 93,543

GENDER

Male..... 51.0% Female 49.0%

RACE / ETHNICITY

Black..... 76.7% Asian 3.9%

White..... 11.3% American Indian 0.1%

Hispanic..... 5.8% Multi-Racial 2.1%

ENROLLMENT IN COMPENSATORY PROGRAMS

Special Education (K-12)..... 8.4%

ESOL (K-12)..... 4.2%

Remedial Education (4-5, 9-12)..... 11.7%

Early Intervention Program (EIP) (K-3)..... 28.3%

SOCIO-ECONOMIC STATUS / SES

Students Eligible to Receive Free/Reduced Lunch..... 54.9%

verbal, quantitative, and nonverbal reasoning abilities. The CogAT IQ Composite was used in this study. The academic achievement of the sample was assessed with the group administered Iowa Tests of Basic Skills (ITBS; Hoover, Hieronymus, Dunbar, & Frisbie, 1996). The ITBS measures skills and achievement in several areas. Overall test scores from the reading and math areas were used in this study. Percentile ranks were used in reporting academic achievement scores. Each participant's evaluation information includes a completed BASC-TRS-C, a cognitive measure (CogAT), an academic achievement measure (ITBS), and a case file including information attendance records, disciplinary actions, etc.

Instrument

The Behavior Assessment System for Children - Teacher Rating Scales - Child (BASC-TRS-C) for children aged 6 to 11 was utilized. The scales and items on the BASC-TRS cover a wide range of both maladaptive and adaptive behavior in the classroom setting. The BASC is a collection of instruments developed in order to evaluate the behavior of children across raters and methods. In addition to the form selected for use in this study, it includes a Structured Developmental History form for parent interviews, Parent Rating Scales for three age groups, 4-5, 6-11, and 12-18, and Self-Report of Personality for children aged 8-11, and 12-18. There are also Teacher Rating Scales for children aged 4-5 and 12-18.

Description of the BASC Teacher Rating Scale (TRS)

The BASC Teacher Rating Scale for children aged 6 to 11 consists of 148 questions about children's behavior to which the teacher

responds "never," "sometimes," or "often," or "almost always." The teacher is asked to answer the questions with reference to the child's behavior over the past six months. The TRS separates various behavioral and emotional characteristics that may not be included on other rating scales or which are listed in combined subscales on other measures. Five composite scores are generated based on the 14 scales of the BASC-TRS. The composite scores are: Externalizing Problems Composite, Internalizing Problems Composite, School Problems Composite, Behavioral Symptoms Index, and Adaptive Skills Composite. The Externalizing Problems Composite is based on scores from the Hyperactivity, Aggression, and Conduct Problems subscales. The Internalizing Problems Composite is based on the Anxiety, Depression, and Somatization subscales. The School Problems Composite is made up of the Attention Problems and Learning Problems subscales. The Withdrawal subscale does not fall under any of the composite scores. Atypicality, Attention Problems, Depression, Anxiety, Aggression, and Hyperactivity comprise the Behavioral Symptoms Index. Finally, the Adaptive Skills Composite is made up of Adaptability, Social Skills, Leadership, and Study Skills.

Each item on the BASC-TRS contributes only to one scale. The manual states that when items are allowed to contribute to more than one scale, there is a risk of inflated relationships between scales making interpretation problematic.

The standardization sample of the TRS for ages 6-11 consisted of 1,259 children from 25 states and Canada. Forty-nine percent of the sample was female, and 51% male. Fifteen percent of the sample was

African American, 11% Hispanic, and 71% White (Reynolds & Kamphaus, 1992).

Technical Information on the BASC-TRS

Reliability

Internal consistency reliabilities for the TRS range from .62 for Conduct Problems for ages 6-7 to .95 on Aggression for ages 8-11 (Sandoval & Echandia, 1994; Kline, 1994; Flanagan, 1995; Merenda, 1996). The median internal consistency reliability coefficient for the scales at ages 6-7 is .84. The median for the 8-11 age group is .88. Reliabilities are higher for externalizing scales (.93 for Hyperactivity and .95 for Aggression) and lower for internalizing scales (.79 for Anxiety and .87 for Depression).

Test-retest reliability was assessed over a two to eight week period. The median value for the TRS 6-11 age group was .91. Test-retest reliabilities ranges from .59 for Somatization and .79 for Withdrawal to .95 for Leadership. Interrater reliabilities range from .44 for Depression to .93 for Learning Problems. The median interrater reliability was .72 (Reynolds & Kamphaus, 1992).

Long-term stability was assessed over a seven-month period for a clinical sample of 55 children. These children were classified as emotionally disturbed or behaviorally disordered. The median scale correlation was .71. Stability ranged from .27 for Conduct Problems to .90 for Study Skills (Reynolds & Kamphaus, 1992).

Validity

Three types of validity evidence are reported in the BASC manual (Reynolds & Kamphaus, 1992): factor structure of the scales and

composite scores, concurrent validity, and profiles of clinical groups. To investigate validity based on factor structure, covariance structure analysis (CSA) as well as principal axis factor analysis were used. The CSA and principal factoring provide evidence for four factors: Internalizing Problems, Externalizing Problems, School Problems, and Adaptive Skills (Reynolds & Kamphaus).

Description of the CGAS

The Children's Global Assessment Scale (CGAS) is an adaptation (Rothman, Sorrell, & Heldman, 1976; Schaffer, Gould, Brasic, Ambrosini, Fisher, Bird, & Aluwahlia, 1983) of the Global Assessment Scale developed by Endicott, Spitzer, Fleiss, & Cohen (1976) and is designed to reflect the lowest level of functioning for a child or adolescent (4 to 16 years of age) during a specified time period. Its values range from 1 representing the most impaired child to 100 representing the healthiest. Scores above 70 on the CGAS are designated as indicating normal functioning. Schaffer et al. (1983) performed tests of reliability and validity on the CGAS. An intraclass correlation coefficient of .84 was found as evidence of interrater reliability. A second intraclass correlation of .85 was found following a 6-month period, suggesting test-retest stability. Further, when discriminating between inpatients and outpatients, the difference between the means of the two groups was significant at the .001 level, suggesting Discriminant validity of the measure.

External Correlates and Other Variables

The variables (see Table 3) tested included demographic- age, gender, race/ethnicity; cognitive- IQ as measured by the CogAT;

academic achievement- reading and math as measured by the ITBS;
behavioral/school factors- attendance, suspensions, disciplinary
reports, report card grades; information from alternate informants-
BASC-PRS, BASC-SRP.

Demographic data, cognitive and academic data, and behavioral and
school data were gathered from school records for each subject. The
data for each area was collected from the school year in which the
subject was referred.

Age is measured in months, as is required for scoring of the
BASC-TRS. Gender will be coded male or female for each student. Race
or ethnicity will be coded according to what is recorded in the
subject's student's registration information with the school district.

Cognitive functioning is measured by scores obtained on the
district-wide administered CogAT. Academic achievement in reading and
math is measured by scores on the district-wide administered ITBS.
Report card grades were rated failing, below average, average, above
average in the areas of language arts and mathematics.

Attendance was recorded as the number of school days the subject
was absent during a 180-day school year. The discipline variable was
the number of individual discipline incident reports each subject had
during one school year. Suspensions were recorded as the number of
days suspended during a school year.

Many of the subjects have a BASC-PRS-C and/or a BASC-SRP-C in
addition to the BASC-TRS-C required for entry into the sample for this
study. When the information was available, the data for these measures
was entered.

Social-emotional functioning was assessed using raters (school psychologists) on the CGAS. Scores on this measure range from 1 to 100. Scores above 70 indicate normal functioning.

Research Questions

There are two overarching research questions to be answered in this study. The second question has multiple parts.

1. Is the BASC-TRS-C typology replicable in a referred sample?
2. Does the obtained typology have demonstrated evidence of external validity? Are the TRS-C behavior problem types discriminated by demographic variables? Do children classified into the TRS-C types demonstrate different levels of impairment in indicators of behavioral adjustment? Do children classified into the TRS-C types demonstrate different levels of impairment in adaptive behavior? Are the TRS-C behavior problem types discriminated by indicators of educational status at a level greater than chance? Are different levels of impairment associated with the TRS-C behavior types?

Analyses

The preliminary analysis required that the subjects be grouped into cluster groups in the same manner the normative sample was clustered. Cluster analysis refers to a set of classification procedures used to uncover homogeneous groups underlying a data set (Aldenderfer & Blashfield, 1984). The goal of cluster analysis is to create smaller subgroups of children that are similar to members within a cluster while distinctly different from members of other clusters. Many different procedures exist for clustering data,

TABLE 3

EXTERNAL CORRELATES AND OTHER VARIABLES**Demographic**

Age

Gender

Race/ethnicity- African-American, White, Hispanic, Asian, Multi-Racial

Educational

Cognitive

IQ- Mean of overall score on CogAT

Academic Achievement

ITBS scores

-ITBS Reading score

-ITBS Math score

Report Card Grades- rated Failing, Below Average, Average, Above Average (rated 1-4 respectively)

-Language Arts

-Mathematics

Behavioral/ School

Attendance- number of days in attendance

Disciplinary Reports- number of incidents

Suspensions- number of times suspended

Retention- coded yes or no

Impairment

By teacher (BASC-TRS 14 scales)- BSI (Behavioral Symptoms Index)

Alternate raters

By parent (BASC-PRS 12 scales)- BSI (Behavioral Symptoms Index)

By student (BASC-SRP 12 scales)- ESI (Emotional Symptoms Index)

By school psychologists on Children's Global Assessment Scale (CGAS)-

Scores range from 1 to 100; above 70 indicates normal functioning

however, Ward's hierarchical analysis is the most popular used in the social sciences. Ward's hierarchical analysis creates groups that have the minimum variance within a cluster (Ward, 1963). The Ward procedure is then followed by a K-means iterative clustering procedure. A drawback of the Ward method is that once a case is assigned as a member of a particular cluster, it cannot be reassigned as the clustering procedure continues. The K-means iterative procedure allows for cases to switch from their initial cluster assignment to a different cluster when they become more closely represented as a typical member of a new cluster (MacQueen, 1967). The iterative process continues making "passes" through the data set until cases do not change clusters. The benefits from both clustering procedures are gained by using the final Ward's solution as the starting point for the K-means procedure (Huberty et al. 1997).

Analysis of variance (ANOVA) and chi-square analyses were performed to determine if the groups differed significantly from each other on the basis of the external variables.

To determine if children classified into the TRS-C types demonstrate different levels of impairment in academic achievement, behavioral adjustment in school, and adaptive behavior, ANOVAs were performed.

To determine if the BASC-TRS-C typology differentiates children based on indicators of demographic variables and impairment, chi-squared analyses were conducted for the demographic variables, and discriminant functional analyses were used for the functional impairment indicators.

It was hypothesized that the original BASC TRS-C cluster solution would be replicated in the independent, clinical sample of children. However, it was expected that clusters or types characterized by increased risk (Academic Problems, General Psychopathology- Severe, et al.) would have greater proportions in the clinical sample in comparison to the normative sample. Further, it was hypothesized that the clusters would be supported by variables external to the clustering procedures, and that the index of functional impairment would coincide with increased risk factors.

More specifically, it was expected that the Well Adapted cluster, if present, would be characterized by a high index of functional impairment, average to above average scores on tests of cognitive ability and achievement, as well as little to no history of poor grades, grade retention, special education placement, and disciplinary actions. Children in the Average cluster, if present, are expected to have a high index of functional impairment, average scores on tests of cognitive ability and achievement, as well as little to no history of poor grades, grade retention, or disciplinary actions. Children in the Academic Problems cluster were expected to be distinguished by a borderline index of functional impairment, low average scores on tests of cognitive ability and achievement, as well as higher rates of poor grades, and grade retention. Children belonging to the Disruptive Behavior Problems cluster were expected to be characterized by a low index of functional impairment, low average scores on tests of cognitive ability and achievement, as well as higher rates of poor grades, and disciplinary actions. The Physical Complaints/Worry

cluster members were expected to be characterized by a borderline index of functional impairment, and average scores on tests of cognitive ability and achievement. Children in the Mildly Disruptive cluster were expected to have a borderline index of functional impairment, average scores on tests of cognitive ability and achievement, as well as to have higher rates of disciplinary actions. Finally, children in the General Problems -Severe cluster were expected to be distinguished by the lowest index of functional impairment, low average to below average scores on tests of cognitive ability and achievement, as well as a history of poor grades, and disciplinary actions.

Overall, it was anticipated that this study would yield a possible basis for classification derived through dimensional, person-oriented methods that can sort children by risk and functional impairment for diagnostic purposes. Thus, the study was expected promote additional advances in the study of child behavior in that more meaning could be inferred from the current line of BASC typology research and that treatment needs of children could be readily identified.

CHAPTER 4

RESULTS

The analyses for the clustering of the sample and the external variables are presented in this chapter. Although there was some support for the hypotheses, the majority of the hypotheses were not supported. Despite the lack of overall support, these findings have significant implications to be presented in the next chapter.

Characteristics of the Referred Sample

The referred sample was drawn from students referred for psychoeducational evaluation during consecutive school years. To be included in the sample, the student had to have been between 6 and 11 years old at the time of the referral and his or her teacher had to have completed a BASC-TRS-C rating scale for the evaluation. Two hundred and six students were selected. Sample characteristics of this sample are shown in Table 4. The demographic characteristics of the sample closely resembled that of the entire school district in terms of racial and ethnic makeup. The sample did include more boys (74.8%) than girls. Subjects in the first and third grades accounted for nearly half of the sample (approximately 46%).

Each subject was rated on the Children's Global Assessment Scale (CGAS). Two raters rated a subsample (15.5%) of the whole sample in order to determine interrater reliability. The Pearson's R calculated (0.91) was significant at the .0001 level and thus a single rater was used for all subsequent analyses.

TABLE 4

Demographics of the Sample

TOTAL N: 206

GENDER

Male.....	154 (74.8%)	Female	52 (25.2%)
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RACE / ETHNICITY

Black.....	163 (80.1%)	Asian	1 (0.5%)
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White.....	27 (13.1%)	American Indian	1 (0.5%)
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Hispanic.....	6 (2.9%)	Multi-Racial	4 (1.5%)
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GRADE

Kindergarten.....	22 (10.7%)	Fourth	25 (12.1%)
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First.....	50 (24.3%)	Fifth	23 (11.2%)
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Second.....	36 (17.5%)	Sixth	4 (1.9%)
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Third.....	45 (21.8%)		
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Independent Clustering of the Sample

The referred sample was clustered, ignoring prior knowledge of cluster solution information from the BASC-TRS norm sample. The Pseudo F was plotted by the number of possible clusters to judge the number of clusters in the data set (Aldenderfer & Blashfield, 1984). Based on the plot information, a 5-cluster solution was run and interpreted.

Interpreting a cluster analysis solution involves two main components. First the centroid information for each of the clusters in the solution was examined. For each cluster, the centroid states the arithmetic mean values across the set of variables used in the clustering process. From evaluating the centroids, one can determine if a cluster's pattern of mean values identifies a subgroup of children. Second, supporting information about each cluster's characteristics, such as gender distributions, racial characteristics, and cluster size relative to the total sample, is examined. A cluster is "named" by comparing the centroid information and cluster characteristics to existing information about child developmental and behavioral theories, childhood disorders, and psychological problems.

Through this cluster interpretation process, a five-cluster solution was found. Two of the 206 subjects entered into the cluster analysis were not classified, as their BASC-TRS-C profiles did not resemble any of the final cluster groups. The clusters identified differed somewhat from those obtained in the norm sample. There was support for the hypothesis that the Well Adapted and Average clusters would be very small or not represented in a referred sample. None of the clusters obtained resembled those two groups, nor was the group,

Mildly Adaptive (DiStefano, 2003) represented. The clusters obtained were named: Learning Problems, Disruptive Behavior Problems - Severe, Disruptive Behavior Problems - Moderate, Internalizing/Withdrawn, and General Problems - Severe. The Internalizing/Withdrawn cluster has been observed in previous clustering of BASC-TRS data, but was referred to by a different name. The other four clusters or clusters similar in name have been observed previously.

Of the 204 students, 70 were identified on Cluster 1, which was named Learning Problems. The cluster was named because of its significant elevations on Attention Problems and Learning Problems scales on the School Problems Composite. Scores on the other scales were in the average range. This cluster most closely resembles the Learning Disorder cluster in the Kamphaus et al. (1997) study and the Academic Problems cluster obtained in the DiStefano et al. (2003) study.

Fifty-eight students were identified on Cluster 2, which was named Disruptive Behavior - Severe. This cluster was marked by very high scores on the Externalizing Problems scales (Aggression, Hyperactivity, and Conduct Problems) in addition to a very high score on the Depression scale. Elevated scores were also observed on the School Problems scales (Attention Problems and Learning Problems), the Adaptive Skills scales (Adaptability, Social Skills, and Study Skills), and the Atypicality and Withdrawal scales. This cluster appears to be a more intense version of the Disruptive Behavior Disorder cluster obtained in Kamphaus et al. (1997) and the Disruptive Behavior Problems cluster obtained on the Crawford County students in

DiStefano et al. (2003), as the scores obtained on the Externalizing Problems Composite and the Depression scale differ in severity by one-half standard deviation than what was observed in those studies.

The third cluster was named Disruptive Behavior -Moderate as it had the same elevations of the Disruptive Behavior -Severe cluster but less significant scores. This cluster was more in line with what was observed on the Disruptive Behavior Disorder in Kamphaus et al. (1997) and the Athens-Clarke County Disruptive Behavior Problems cluster obtained in DiStefano et al. (2003).

Cluster 4 was named Internalizing/Atypicality, as it was characterized by elevated scores on the Anxiety, Depression, and Withdrawal clinical scales and a very high score on the Atypicality scale. Furthermore, the cluster was marked by significant problems on the School Problems composite (Attention Problems and Learning Problems), a significant score on the Hyperactivity scale, and significant scores on the Adaptive Skills scales. The Internalizing/Atypicality cluster obtained in the current study most closely resembles the General Problems -Severe cluster obtained in the Crawford County sample in DiStefano et al. (2003).

The fifth and final cluster was named General Problems -Severe. Very high and elevated scores were observed on almost all the BASC-TRS-C scales with the exception of the Somatization scale. This cluster resembled the Severe Psychopathology cluster obtained in Kamphaus et al. (1997) and the Athens-Clarke County General Problems -Severe cluster obtained in DiStefano et al. (2003).

TABLE 5

MEAN T SCORES BY SCALE FOR THE FIVE-CLUSTER SOLUTION (N=204)

	LP	DB-S	DB-M	INT/ATYP	GP-S
Externalizing					
Aggression	50.53	*84.17	68.77	55.58	*87.27
Hyperactivity	53.69	*74.41	62.27	61.21	*78.41
Conduct Problems	50.53	*77.69	62.20	59.67	*90.09
Internalizing					
Anxiety	52.09	57.98	48.00	61.29	69.32
Depression	51.00	*71.14	60.03	62.37	*85.55
Somatization	49.61	55.50	44.37	57.54	53.50
School Problems					
Attention Problems	62.83	67.43	57.77	69.92	*73.00
Learning Problems	65.17	65.14	50.97	69.54	*74.55
Other Scales					
Atypicality	55.77	68.12	59.30	*74.17	*91.14
Withdrawal	56.07	60.95	51.63	68.83	*72.95
Adaptive Skills					
Adaptability	44.69	*29.16	34.23	36.08	*25.00
Leadership	41.51	41.09	40.27	38.71	37.41
Social Skills	43.41	37.55	38.97	37.54	35.64
Study Skills	40.77	36.00	39.80	37.04	32.77
Cluster N	70	58	30	24	22
Sample percent	34	28	15	12	11

LP = Learning Problems; DB-S = Disruptive Behavior -Severe; DB-M = Disruptive Behavior -Moderate; INT/ATYP = Internalizing/Atypicality; GP-S = General Problems -Severe.

T Scores 1 SD or more from the mean are in **boldface** print.

T Scores 2 SDs or more from the mean are preceded by an asterisk (*).

External Correlates

To determine the extent of differences among cluster groups on several external variables, one-way ANOVAs and chi-square analyses were performed. Since the cluster groups do not contain the same number of subjects, the assumption of equal variances was tested using Levene's test. Post-hoc tests were not performed, as none of the results were significant at the .05 level or lower. There were no significant differences between the cluster groups on the demographic variables age ($F(4, 199) = 2.71, p = .409$), gender ($F(4, 199) = 1.277, p = .280$), and race ($F(4, 196) = 1.405, p = .234$). There were no significant differences between the cluster groups on the behavioral or school correlates: number of days absent, number of discipline referrals, number of days suspended, and grade retention. There were no significant differences between the cluster groups on the educational variables: CogAT Composite IQ score, ITBS Reading percentile rank, ITBS Math percentile rank, Language Arts grades, and Math grades. Finally, there were no significant differences between the cluster groups on the impairment correlates: CGAS rating, Teacher Behavior Symptoms Index (T-BSI), Parent Behavior Symptoms Index (P-BSI) and Student Emotional Symptoms Index (S-ESI). Table 6 summarizes my findings on the external correlates. Table 7 provides the means and standard deviations for each of the external correlate variables.

TABLE 6

ANALYSES OF EXTERNAL CORRELATESAnalyses of Behavioral/ School variables

Attendance	$F(4, 178) = .485, p = .747$	NS
Discipline Incidents	$F(4, 194) = 2.71, p = .897$	NS
Suspension	$F(4, 193) = 1.416, p = .230$	NS
Retention	$\chi^2(4, N = 170) = 5.657, p = .226$	NS

Analyses of Educational variables

CogAT Composite IQ	$F(4, 148) = .589, p = .671$	NS
ITBS Reading	$F(4, 181) = .585, p = .674$	NS
ITBS Math	$F(4, 176) = .717, p = .581$	NS
Language Arts grades	$\chi^2(4, N = 185) = .606, p = .962$	NS
Math grades	$\chi^2(4, N = 185) = 3.028, p = .553$	NS

Analyses of Impairment variables

CGAS rating	$F(4, 192) = 1.980, p = .099$	NS
Teacher BSI	$F(4, 198) = .975, p = .422$	NS
Parent BSI	$F(4, 145) = 1.295, p = .275$	NS
Student ESI	$F(4, 58) = .549, p = .701$	NS

TABLE 7

MEANS OF EXTERNAL CORRELATES FOR THE FIVE-CLUSTER SOLUTION (N=204)

	LP	DB-S	DB-M	INT/ATYP	GP-S
Attendance	8.48	7.12	9.00	9.55	8.43
SD	8.64	6.48	8.02	8.06	6.88
Discipline Incidents	2.23	1.69	2.17	2.42	1.55
SD	5.30	3.30	3.241	4.20	2.13
Retention	.37	.28	.20	.18	.09
SD	.49	.46	.41	.41	.30
Suspension	.77	.50	1.29	1.17	.77
SD	1.53	1.16	2.61	1.58	1.11
CogAT IQ	85.27	89.54	86.09	88.60	84.76
SD	14.52	17.09	15.81	14.74	14.14
ITBS Reading	26.45	30.08	35.29	29.68	27.43
SD	25.02	28.77	24.70	27.86	23.41
ITBS Math	24.05	32.13	32.89	25.38	28.42
SD	23.36	31.55	26.34	29.32	26.64
Language Arts grades	2.95	2.94	2.78	2.81	2.91
SD	.97	1.01	1.09	1.12	.87
Math grades	2.92	3.10	2.93	2.71	2.91
SD	.97	.96	.78	1.06	.81
CGAS rating	52.88	53.48	55.39	50.08	58.05
SD	9.60	10.54	10.88	8.74	11.53
Teacher BSI	66.81	68.25	66.07	69.08	62.64
SD	11.53	12.67	13.95	13.42	14.60
Parent BSI	60.88	57.93	58.35	57.38	51.80
SD	13.71	14.48	12.01	16.74	10.56
Student ESI	52.55	55.06	50.86	56.60	55.33
SD	10.57	8.40	9.05	16.73	10.09
Cluster N	70	58	30	24	22
Sample percent	34	28	15	12	11

LP = Learning Problems; DB-S = Disruptive Behavior -Severe; DB-M = Disruptive Behavior -Moderate; INT/ATYP = Internalizing/Atypicality; GP-S = General Problems -Severe.

BSI = Behavioral Symptoms Index

ESI = Emotional Symptoms Index

CHAPTER 5

DISCUSSION

Interpretation and Implications

This study suggests that the problem behavior clusters in the BASC-TRS-C can be substantially replicated in a referred sample. A five-cluster solution was identified in the independent referred sample used in this study. The cluster groups identified were very close to those identified in previous studies using the BASC-TRS. As hypothesized, the clusters or types characterized by increased risk had greater proportions in the referred or clinical sample used in the current study in comparison to the normative sample (Kamphaus et al., 1997). In addition, the cluster groups obtained resembled those found in other studies replicating the BASC-TRS-C typology (e.g. DiStefano et al., 2003; Reynolds & Kamphaus, 2004). The Well-Adapted and the Average clusters were not represented at all in the current study as hypothesized. They were likely not present because the sample was composed of children referred due to problems they were experiencing in the school setting. Children with either the Well-Adapted or Average profile would probably not be referred.

Three of the obtained cluster groups, Disruptive Behavior - Moderate, Disruptive Behavior -Severe, and General Problems -Severe, were variations on a theme in that they were similar profiles with varying levels of severity. This suggests homogeneity of the sample. Each of these clusters was characterized by significant scores on the

Externalizing scales, Depression, School Problems scales, Adaptive scales, and the Atypicality and Withdrawal scales. Disruptive Behavior -Moderate was the least severe and General Problems -Severe was the most severe of these similar clusters.

The obtained cluster groups were also similar when considering adaptive skills and learning problems. All but one of the cluster groups, Learning Problems, was characterized by significantly low adaptive skills. Although the scores on the Adaptive Skills scales for the subjects in the Learning Problems cluster were not significant, they were borderline scores and did not indicate strong adaptive skills. The Disruptive Behavior -Moderate cluster was the only cluster group not characterized by significant scores on the Learning Problems scale.

The homogeneity of the sample was also suggested by the lack of differences observed on the external correlates. The cluster groups did not differ significantly from each other in areas of behavioral or school problems, educational variables, and measures of impairment. When comparing the mean scores on the external correlates in Table 7, one notes that the cluster groups do not differ significantly from each other. One should also note that the standard deviations for each of the variables are relatively high, indicating a large range for each variable for each cluster group.

Similar profiles on the behavior/school, and educational correlates were observed for the five clusters obtained. The means on the behavior/school correlates indicated that the subjects had been absent for about seven to ten days, had about two discipline

incidents, less than half of them had been retained, and they had had an average of one suspension. It should be noted that the behavior/school variables are affected by typical school practices. When a student is absent for ten days or more, they are typically referred for truancy concerns. The recording of discipline incidents is not consistent across students, school personnel, or schools. Furthermore, alternative strategies are often used with students identified with a disability or suspected to have a disability. Similarly, students with a disability or suspected to have a disability are often not retained. The suspension correlate means indicate the number of times the student was suspended, not the number of days they were suspended, thus one suspension could refer to one day for one student and ten days for another. Also, students with a disability or suspected of having a disability are limited to a maximum of ten days of suspension without a manifestation hearing. The means on the educational correlates indicated low average cognitive ability, low average achievement in reading and math, and below average to average grades in language arts and math. The grades the students receive are also affected by school practices. Students that are referred for learning problems are typically under an accommodation plan through a student support team, which may involve modified curriculum, assignments, or grades.

The means on the impairment variables were also similar across cluster groups. The CGAS ratings ranged from 50.08 to 58.05 for the five obtained cluster groups. According to the CGAS rating system, a CGAS rating from 60-51 indicates, "variable functioning with sporadic

difficulties or symptoms in several but not all social areas" (Schaffer et al., 1983). Similarly, the mean scores obtained on the BASC-TRS BSI were in the at-risk range for all the obtained cluster groups (range 62.62 - 69.08). (The Parent BSI and Student ESI scores (mostly not significant) indicated that the raters did not perceive the same level of severity of problems as the teachers perceived.)

The results suggest that when significant impairment is indicated, there are no significant differences between the cluster groups on these external correlates. Once a certain level of impairment is reached, regardless of area or cluster group membership, certain implications may be expected, such as discipline problems, retention, poor grades, and lower test scores.

Limitations

When developing a typology there are problems inherent in clustering itself (Frankel et al. 1992). As pointed out previously, cluster solutions usually do not detect rarely occurring disorders because cluster groups containing only a small number of subjects are typically discarded. In the current study, two subjects' profiles were not included in the final cluster solution because they did not fit within the obtained cluster groups. In addition, clustering algorithm differences may cause problems with replication and cluster analytic methods can be used to classify subjects even when there is no theoretical basis for such classification (Frankel et al., 1992).

There may have been bias in the sample used. Students referred for evaluation were used if their evaluation included a BASC-TRS-C. Whether their evaluation included a BASC-TRS-C may have been affected

by the reason for referral and the psychologist completing the evaluation. First, if the student was referred for only an academic problem (not behavioral), a behavior rating scale may have not been administered. Second, the psychologist conducting the evaluation may have preferred another behavior rating scale to the BASC-TRS-C. The fact that all of the subjects included in the study were referred may also indicate bias in the sample. Students who are referred likely are experiencing some academic problems. There are students who have behavioral problems who are not referred because they do not have concurrent academic problems.

This study was also limited by the number of subjects that fell into each cluster group. Two of the groups were relatively large- Learning Problems and Disruptive Behavior -Severe, accounting for 62% of the entire sample- and the other three cluster groups were small. Another problem with the sample was its homogeneity. By design, all the subjects were referred. All had been identified as having problems in the school setting. There were no subjects falling into the Well-adapted or average clusters. In other words, there were no subjects classified that had average or high adaptive behavior. According to Meehl (1995), large samples that include subjects that vary on adaptive skills are needed in the development of typologies. As previously pointed out, the sample did not vary on the impairment variables either. This lack of variation on the adaptive scales and in functional impairment may account for the lack of differences found on the external correlates.

How the correlates were defined could have affected the apparent relation between them and the cluster groups. For instance, the external correlate Suspensions was defined as the number of times a student was suspended, however, this does not account for the number of days the student was suspended, just the number of instances. Similarly, the external correlate Discipline, was simply defined as the number of discipline referrals or incidents a student had on his or her school record. DiStefano et al. (2003) broke disciplinary actions received by students into five categories. Such a breakdown may have differentiated between the cluster groups in terms of what types of infractions they had committed.

The data coded for the behavior/school correlates were only taken for the school year in which the referral was made. The information for each subject represented only a "snapshot" of the student's status at the time of the evaluation. This may have affected the presence of observed differences between the cluster groups as the members of each group may have followed a different course (etiology) up to the point of referral and may have different outcomes.

Future Research Needs

This may be a weak test of clusters due to the nature of cluster analysis and the lack of expected differences in cognition, problems with the school data, and the homogeneity of the sample due to overall functional impairment. Future research should address the limitations of the current study.

A different clustering algorithm using latent profile analysis may be useful to address the problems encountered with cluster

discrimination in this study. Latent variables may produce fewer clusters and better differentiation than the clustering of the observed variables. There were four latent variables underlying the data set.

The study of the etiology and outcomes of the subjects could also make a stronger test of clusters. Data collected from the times before and after the school year in which the referral was made may have revealed differences between the cluster groups. A student with a learning problem may have had a history of poor grades, poor test scores, etc. prior to his or her referral and the implementation of accommodations through the student support team, but this history would not have been reflected in the current year's data. Similarly, the outcomes of the evaluation would not be reflected in the year the referral was made. Perhaps the members of the cluster groups differ in terms of prognosis.

Studies using more students with varying levels of impairment should produce a clearer understanding of the members of the clusters. Research should also be conducted with larger sample sizes for all cluster groups, both adapted and problem groups. Larger numbers are required to answer remaining questions about the nature of low prevalence groups. Future research may involve determining the location of the "impairment threshold" that seemed to present in the current study. Completion of continued research in this area may help determine if the outcome or results for children with similar overall impairment is indeed similar.

Summary

The current study serves as one of the steps towards examining external validity for the BASC-TRS-C typology and the development of a useful classification system of child behavior that includes both adaptive and maladaptive behavior. It was demonstrated that the problem behavior clusters are clearly replicable in a referred sample. However, the referred cluster group members were found to be more similar than different on behavioral/school variables, educational variables, and impairment variables. As more research is done using this typology, more distinct differences between the various cluster groups are likely to emerge.

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