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A Comparison of Classification Methods for Use in Predicting School-Based Outcomes

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There is growing evidence that current classification methods are not consistent with current empirical knowledge of childhood psychopathology and the optimal way to classify school-age children remains controversial. The current study investigated three classification methods (categorical, dimensional, person-oriented) for use in predicting school-based outcomes. Children (grades 1-5; N=558) were administered the Behavior Assessment System for Children – Teacher Rating Scale and results were used to form three classification systems. Educational outcome variables were collected seven months later and the predictive validity of the three classification systems was compared using regression analyses. Findings indicated that all three methods for predicting educational outcomes were modest and were best able to predict later grade point averages. Results indicate the relative superiority of person-oriented and dimensional methods of classification; however these classification methods warrant further investigation.

Keywords: classification, diagnosis, person-oriented, psychopathology

The fields of psychiatry and psychology have been grappling with the issue of classification for decades (Achenbach, 1998; 2001). Practitioners, researchers, and educators agree about the importance of classification for a variety of reasons including enhanced communication among professionals, ease of description, and the ability to differentiate individuals (Scotti & Morris, 2000; Blashfield, 1998; Cantwell, 1996). Accurate classification for school-age children is particularly critical considering the fact that the developmental courses or pathways of children are likely to influence subsequent outcomes (Jimerson, Coffino, & Sroufe, 2007; Sroufe, Egeland, Carlson, & Collins, 2005). Insight into children's adjustment and risk status (Kagan, 1997), tracking developmental pathways (Richters, 1997), differentiating individuals by etiology (Cantwell, 1996), and predicting effective treatment approaches (Scotti & Morris, 2000) are among the most salient reasons that accurate classification in school-age children is important. However, children are often classified into groups that receive services only after they exhibit significant impairment. This "wait-to-fail" treatment approach could result from current classification systems that fail to identify subsyndromal psychopathology or current risk status. Classification systems that more accurately identify children for services are thus needed as these systems could effectively aid daily decisions regarding prevention, early intervention, and treatment for children.

There is growing consensus that current diagnostic systems have lagged behind the increase in knowledge about psychopathology and classification (Beutler & Malik, 2002; Houts, 2002). Currently, most school-age children are primarily classified and diagnosed using categorical methods. This approach uses variables to form "all-or-nothing" categories based on the assumption that disorders form discrete categories (Millon, 1991). Specifically, students are placed into categories specified by the DSM (DSM-IV; American Psychiatric Association) or the Individuals with Disabilities Education Act (IDEA). There are several limitations to these methods of classification including that only qualitative differences are

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noted. However, throughout the scientific literature evidence exists suggesting that symptoms of hyperactivity/impulsivity, inattention, conduct problems, depression, and anxiety occur along a continuum, or show evidence of quantitative differences (Deater-Deckard, et al., 1997; Fergusson & Horwood, 1995; Hudziak, Wadsworth, Heath, & Achenbach, 1999; Nease, Volk, & Cass, 1999). Other limitations of categorical classification methods include the failure to account for comorbidity (van Lier, Verhulst, van der Ende, & Crijnen, 2003), normally or marginally functional behavioral systems (Jensen, et al., 1996), or subsyndromal psychopathology (Cantwell, 1996). A study by Scahill, et al. (1999) found that children beneath the diagnostic threshold for ADHD still possessed evidence of functional impairment in school, which was nearly identical to the impairment experienced by children above the diagnostic threshold. This study suggests that under a purely categorical model, such as the DSM-IV or IDEA, students who experience functional impairment might not be classified, and thus fail to receive services. Furthermore, there is no differentiation among individuals with lower levels of risk, yielding no useful information for planning prevention or early intervention services.

Considering limitations of categorical methods, dimensional and person-oriented methods have been proposed as alternative approaches to classification. Dimensional approaches to classification assume that behavior does not occur dichotomously, but rather along a continuum. Descriptive variables are collected and combined with other correlated variables to form a dimension, which summarizes information about the descriptive variables into an abstract, higher-order variable (Blashfield, 1998). Dimensional methods of classification improve on categorical methods by accounting for quantitative differences in symptomatology. Namely, this method includes a wider variety of information and has the ability to identify and classify all children, not just the ones with the most severe psychopathology. However, dimensional methods often focus on variables of interest and produce a system that is arguably less parsimonious than a categorical system (Helzer & Hudziak, 2000).

Person-oriented, or multivariate, methods of classification attempt to blend categorical and dimensional methods by producing a categorical classification system through the use of dimensional scales. The resulting typology is a different type of categorical classification system that encompasses a full range of dimensionally scaled variables. Person-oriented approaches have been proposed due to their strength in emphasizing the individual as a whole, not just a linear combination of variables (Bergman & Magnusson, 1997), being conducive to a fuller understanding of the complexity and range of child behaviors (Meehl, 1995; Speece & Cooper, 1991), and providing consistency with psychological theoretical models of psychological systems development (Gottlieb, 2000; Waddington, 1971). Multivariate behavior typologies, derived through cluster analytic techniques, are also gaining wider acceptance as a model of classification due to the evidence supporting the relative superiority of multivariate methods in explaining the complex interactions, correlates, and comorbidities in children (van Lier, et al., 2003; Greenberg, Speltz, DeKlyen, & Jones, 2001).

However, before behavioral typologies are proposed as an alternative classification method, a direct comparison of methods is needed. Few systematic comparisons of classification methods have been conducted. Fergusson and Horwood (1995) examined the relationship between categorical, dimensional, and a series of outcome measures and found dimensional methods to result in stronger predictions of outcomes. However, findings by Jensen et al. (1996) suggest that categorical and dimensional approaches to classification might produce similar results when similar methods are used, even though highly specific diagnostic categories show fewer relationships with external validators. Furthermore, Mattison and Spitznagel (1999) found prior studies comparing DSM categories to Child Behavior Checklist dimensional scales that suggest that neither system is superior when compared to external validators.

Theoretically, person-oriented methods of classification are superior to categorical and dimensional methods due to their ability to account for the interactional and additive nature among variables (Kamphaus, DiStefano, & Lease, 2003; Dowdy, Hendry, & Kamphaus, 2006). However, it is not known whether person-oriented clusters, derived from such diagnostic tools as teacher rating scales, demonstrate an increased ability to predict future outcomes. The ability of a classification system to predict future outcomes should guide thinking about its utility (Bergman & Magnusson, 1997). Before cluster-analytically derived typologies can be introduced as alternatives, research must examine their ability to predict and generalize based on the attributes of the individual (Lessing, 1982). For example, it is unknown if the additional dimensional scales used to create a person-oriented classification system are more predictive than the single dimensional scale used in a dimensional system.

Initial research by Flanagan, Bierman, and Kam (2003) found cluster membership to be predictive of later outcomes for first grade children, and Toshiaki, et al. (1995) found cluster membership to be predictive of outcomes in adults. Additionally, Fergusson and Horwood (1995) found dimensionally scored measures to show better evidence of predictive validity than categorical methods. A study by Greenberg, Speltz, DeKlyen, and Jones (2001) found person-oriented methods to be superior to individual variable approaches in significantly predicting risk factors of conduct problems. However, Haapasalo, Tremblay, Boulerice, and Vitaro (2000) found prediction of problem behavior in kindergartners to be equally accurate using either cluster or variable approaches. Blanchard, Morgenstern, Morgan, Labouvie, and Bux (2003) concluded that the utility of clusters to inform clinicians about the future behavior of individuals is unknown.

These discrepant findings suggest that additional research should be conducted on classification methods in an attempt to determine the optimal way to classify school-age children. A direct comparison of methods and information regarding their ability to predict later outcomes is needed. The current study sought to: (1) classify children into categories according to categorical, dimensional, and person-oriented methods and (2) provide a comparison of classification methods for predicting school-based outcomes.

METHOD

Subjects

Data for this study were collected as part of Project ACT Early, funded by Field-Initiated Studies grants (R306F60158, R305T990330) from the Institute for At-Risk Children of the Office of Educational Research and Improvement, United States Department of Education. (Grant principal investigators: Jean A. Baker, Randy W. Kamphaus, and Arthur M. Horne). Project ACT Early was a research grant designed to study the ecological context of risk in elementary schools and was aimed at teacher professional development designed to improve classroom management. The sample consisted of 558 children (grades 1-5; N=558) and is approximately one half female (N= 298; 53.4%). Approximately 52% of the children were African American (N=295), 30% Caucasian (N=169), 7% Hispanic (N=38), 2% Asian American (N=10), and 2% multiracial (N=13).

Instruments

Children's behavior problems and adaptive competencies were assessed with the Behavior Assessment System for Children - Teacher Rating Scale - Child (BASC-TRS-C; Reynolds & Kamphaus, 1992), designed for students ages 6-11. The BASC-TRS-C is a 148-item, nationally standardized measure that yields ten problem behavior scales and four adaptive behavior scales (Reynolds & Kamphaus, 1992).

The BASC manual provides reliability and validity psychometric information and descriptions of the TRS-C scales. The 148 behavioral items are rated on a 4-point Likert scale (1=never, 2=sometimes, 3=often, 4=almost always).

Procedure

BASC-Teacher Rating Scales were collected in the fall of the academic school year for each participating child. Results from the BASC-TRS were used to form three classification models: a categorical classification model examining symptoms based on DSM-IV criteria (categorical), a dimensional system based on dimensional scales (dimensional), and a categorical system formed by examining the multiple dimensions of symptoms exhibited by individuals (person-oriented, cluster). Each child was concurrently placed into these three separate classification systems.

Approximately seven months later, educational outcome variables were collected for each child. The predictive validity of the three classification systems was compared using regression techniques.

Categorical Classification Model

To construct a model consistent with DSM-IV criteria (American Psychiatric Association, 1994), the BASC-TRS-C was inspected for items with content similar to diagnostic criteria following the procedure of van Lier, et al., (2003). Based on this analysis, it was determined that a sufficient amount of items existed to account for symptoms of inattention, hyperactivity, impulsivity, oppositional defiance, conduct, and anxiety. However, due to sample sizes needed for regression techniques, diagnostic groups were formed only if 25 individuals from the sample met diagnostic criteria.

The following diagnostic groups were formed based on items consistent with a DSM-IV diagnosis: (1) Attention-Deficit/Hyperactivity Disorder, Predominantly Inattentive Type; (ADHDI; DSM-IV 314.00) and (2) Oppositional Defiant Disorder (ODD; DSM-IV 313.81). To account for the considerable comorbidity that empirical research has found to occur between behavior disorders (Barkley, 1996), a 3rd diagnostic group was formed that consisted of children with ADHD plus another behavior disorder, specifically (3) ADHD + CD or ODD.

A 4th diagnostic group was formed to account for the comorbidity between Generalized Anxiety Disorder (GAD; DSM-IV 300.02) and ADHDI: (4) GAD and GAD + ADHD, Predominantly Inattentive Type. A 5th group, (5) Other, was also formed to capture individuals that met diagnostic criteria for a disorder with symptoms of inattention, hyperactivity, impulsivity, oppositional defiance, conduct, and anxiety but could not be analyzed separately due to small sample sizes. In summary, five psychiatric diagnostic groups were formed: (1) ADHDI, (2) ODD, (3) ADHD + CD or ODD, (4) GAD and GAD + ADHDI, and (5) Other.

To form these diagnostic groups, items that were consistent with diagnostic criteria were dichotomized where 0 = never or sometimes, and 1= often or almost always true. Individuals who scored above the diagnostic threshold for one disorder, determined by receiving ratings of often or almost always true on a sufficient number of items consistent with a particular diagnosis, were placed in that particular diagnostic category.

Dimensional Classification Model

Scales from the BASC-TRS were combined to form a dimensional classification model. The BASC-TRS yields 10 problem behavior scales: Aggression, Hyperactivity, Conduct Problems, Anxiety, Depres-

sion, Somatization, Attention Problems, Learning Problems, Atypicality, and Withdrawal. Two overarching clinical composite dimensions, which are supported by factorial validity evidence, are formed using these scales: Externalizing and Internalizing Problems. The Externalizing Problems dimension is formed by combining the Hyperactivity, Aggression, and Conduct Problems scales. The Internalizing Problems dimension consists of the Anxiety, Depression, and Somatization scales (Reynolds & Kamphaus, 1992). Individuals were assigned T scores on both the Externalizing and Internalizing dimensions. These dimensional scores were used as the basis for comparison to the other two classification systems.

Person-oriented Classification Model

Teacher ratings of children, using the BASC-TRS, have been utilized in multivariate, or person-oriented, methods to develop a classification system for child behavior in school. Kamphaus, et al., (1997) used a two-step cluster analytic technique involving a Ward hierarchical analysis followed by an iterative cluster partitioning via a K-means analysis. A seven-cluster solution was proposed to classify the behavioral adjustment of children in elementary school. The proposed clusters that were found to be adequate for classification were (1) Well Adapted, (2) Average, (3) Disruptive Behavior Problems, (4) Academic Problems, (5) Physical Complaints/Worry, (6) General Problems-Severe, and (7) Mildly Disruptive. This seven-cluster solution was substantially replicated across: samples in the U.S. population (Kamphaus et al., 1997), a U.S. urban sample (DiStefano, et al., 2003), a U.S. rural sample (DiStefano, et al., 2003), and a sample in Medellin, Colombia (Kamphaus & DiStefano, 2001). For the current study children were assigned to one of these seven previously constructed behavioral clusters based on their teachers' ratings.

Comparison of Classification Models

Once individuals were classified according to categorical, dimensional, and person-oriented methods, the relationship between the classification models and the ability to predict educational outcome variables was assessed. The following educational outcomes were collected for each child: (1) Grade Point Average (GPA), (2) Iowa Test of Basic Skills Reading Composite (ITBS Reading; standardized achievement test), (3) Iowa Test of Basic Skills Mathematics Composite (ITBS Math; standardized achievement test), (4) Number of days absent, (5) Number of days tardy, (6) Number of visits to the Opportunity Room (OR, indicative of a discipline problem), and (7) Number of Suspensions. These educational outcomes were collected through examination of school records.

The predictive validity of the classification systems was examined through regression analyses. Separate regression analyses were computed for each outcome variable. Through regression, unstandardized predicted values of each outcome variable using each classification method were obtained and used for comparison. Bivariate correlations were computed for each outcome, correlating the outcome with the unstandardized predicted values obtained using each classification method. Cases were excluded listwise. Then, T tests were used to compare the differential predictive validity of the three classification systems to determine if the differences were statistically significant. Specifically, the correlations of classification systems with outcomes were compared with each method (Glass & Stanley, 1970).

RESULTS

Of the 558 students participating in the cross-sectional study, 166 students met diagnostic criteria and were placed into one of the following categories: (1) ADHDI, N=30 (2) ODD, N=32; (3) ADHD + CD or ODD, N=41; (4) GAD and GAD + ADHDI, N=25; and (5) Other, N= 38. T scores on the externalizing and internalizing dimensions were calculated for all 558 students. Scores ranged from 40 to 95 and 39 to 101 respectively. Additionally, each student was placed into one of the person-oriented clusters: (1) Well Adapted, N= 147 (2) Average, N=87 (3) Disruptive Behavior, N=82 Problems, (4) Academic Problems, N=66, (5) Physical Complaints/Worry, N=60 (6) General Problems-Severe, N=26 and (7) Mildly Disruptive, N=90.

Overall Strength of Prediction

Multiple regression techniques were used to predict GPA, ITBS reading and math scores, and number of days absent, days tardy, opportunity room visits, and suspensions using categorical (DSM), dimensional (externalizing, internalizing), and person-oriented (cluster) classification methods. Table 1 lists the overall R squared values for this study.

TABLE 1. *Classification Methods Predicting Educational Outcomes*

	R squared values		
Outcomes	Categorical	Dimensional	Cluster
GPA	.197	.200	.366
ITBS Read	.047	.082	.110
ITBS Math	.074	.086	.100
# of Days Absent	.030	.048	.060
# of Days Tardy	.006	.013	.017
# of OR visits	.320	.416	.294
# of Suspensions	.107	.138	.079

Note: GPA = Grade Point Average; ITBS Read = Iowa Test of Basic Skills Reading composite; ITBS Math = Iowa Test of Basic Skills Mathematics composite; OR = Opportunity Room

Predicting Academic Outcomes

GPA. The ability of the three classification methods to predict GPA and standardized achievement scores was analyzed. Correlations between three academic outcomes (GPA, Iowa Test of Basic Skills Reading and Mathematics composites) and the unstandardized predicted values using the three classification methods (categorical, dimensional, person-oriented or cluster) were analyzed separately. In order to make inferences about the equality of the population correlation coefficient values that used the same sample, T tests were employed. Overall, results suggest that person-oriented methods predicted GPA significantly better than either dimensional or categorical methods, while there was no significant difference in the prediction of GPA using dimensional or categorical methods. (See Table 2.)

TABLE 2. *Correlations between GPA and Predicted Values of GPA*

	GPA	PGPAC	PGPACL	PGPAD
GPA	1			
PGPAC	.443			
PGPACL	.605	.650		
PGPAD	.447	.735	.694	

Note: GPA = Grade Point Average; PGPAC = Predicted GPA using Categorical method; PGPACL = Predicted GPA using CLuster, person-oriented method; PGPAD = Predicted GPA using Dimensional method

Reading and Math Achievement. The Iowa Test of Basic Skills, Reading (ITBSRead) and Mathematics (ITBSMath) Composites were used as indicators of reading and math achievement. T-tests among correlations between ITBSMath and the predicted values using the three classification methods did not yield any significant differences, suggesting that the superiority of any method cannot be established for use in predicting mathematics achievement scores. However, results from T-tests among correlations with ITBSRead, suggest that the person-oriented method and the dimensional method predicted reading scores significantly better than the categorical method. (See Table 3.)

TABLE 3. *Correlations between ITBS Reading and Predicted Values*

	ITBSRead	PITBSReadC	PITBSReadCL	PITBSReadD
ITBSRead	1			
PITBSReadC	.217			
PITBSReadCL	.232	.583		
PITBSReadD	.287	.653	.747	

Note: ITBSRead = Iowa Test of Basic Skills Reading composite; PITBSReadC = Predicted ITBSRead using Categorical method; PITBSReadCL = Predicted ITBSRead using CLuster, person-oriented method; PITBSReadD = Predicted ITBSRead using Dimensional method

Predicting Attendance and Behavioral Outcomes

The ability of these three classification methods to predict the following outcomes throughout the school year was examined: number of days absent, number of days tardy, number of times a student visited the opportunity room (OR, an indicator of discipline problems), and number of suspensions. Correlations between the outcomes and the predicted values of the outcomes using the three different classification methods were examined separately.

Days Absent/Tardy. Results from T tests indicated that the person-oriented method predicted the number of days absent significantly better than the categorical method. However, no other significant differences were noted for days absent. (See Table 4.) No significant differences were noted between the three possible methods of predicting the number of days a student was tardy.

Opportunity Room Visits. When examining the ability of the classification methods to predict Opportunity Room visits, findings suggest that the dimensional method is superior to the categorical and person-oriented method for predicting the number of OR visits. No significant differences were noted between person-oriented and categorical methods. (See Table 5.)

TABLE 4. *Correlations between Days Absent (Absent) and Predicted Values*

	Absent	PAbsentC	PAbsentCL	PAbsentD
Absent	1			
PAbsentC	.174			
PAbsentCL	.246	.467		
PAbsentD	.219	.429	.734	

Note: Absent = Number of school days Absent; PAbsentC = Predicted Absent using Categorical method; PAbsentCL = Predicted Absent using CLuster, person-oriented method; PAbsentD = Predicted Absent using Dimensional method

TABLE 5. *Correlations between Number of Visits to OR and Predicted Value*

	#OR	P#ORC	P#ORCL	P#ORD
#OR	1			
P#ORC	.565			
P#ORCL	.542	.723		
P#ORD	.645	.812	.797	

Note: #OR = Number of visits to the Opportunity Room; P#ORP = Predicted #OR using Categorical method; P#ORCL = Predicted #OR using CLuster, person-oriented method; P#ORD = Predicted #OR using Dimensional method

Suspensions. T tests examining the significant differences using the three classification methods indicated that the dimensional method of classification was superior to the person-oriented method when predicting suspensions. No other significant differences were noted. (See Table 6.)

TABLE 6. *Correlations between Number of Suspensions and Predicted Values*

	#Suspend	P#SuspendC	P#SuspendCL	P#SuspendD
#Suspend	1			
P#SuspendC	.327			
P#SuspendCL	.281	.628		
P#SuspendD	.371	.663	.796	

Note: Absent = Number of school days Absent; PAbsentC = Predicted Absent using Categorical method; PAbsentCL = Predicted Absent using CLuster, person-oriented method; PAbsentD = Predicted Absent using Dimensional method

DISCUSSION

The aim of this study was to compare categorical, dimensional, and person-oriented methods of classification for use in predicting school-based outcomes. Through examination of overall R squared values, the value of the categorical, dimensional, and person-oriented methods for predicting educational outcomes was modest. All three classification approaches yielded results suggesting that they were best able to predict later grade point averages (GPA) and number of visits to the opportunity room when compared with other outcome variables. However, the overall ability of these classification models for use in predicting days absent, days tardy, and reading and math achievement is questionable.

Despite somewhat unfavorable results suggesting that these classification methods were not optimal for predicting educational outcomes, differences among the classification methods were revealed. When examining GPA, person-oriented methods were clearly superior to both dimensional and categorical methods. In schools, GPA is often a global indicator of functioning in the classroom suggesting that person-oriented methods might allow for the prediction of global functioning. Similarly, person-oriented methods were found to be superior to categorical methods for predicting reading achievement scores and days absent.

Dimensional methods of classification were found to be superior to categorical methods for predicting reading achievement scores and number of visits to the opportunity room. Dimensional methods were also found to be better able to predict number of visits to the opportunity room and number of suspensions than person-oriented methods of classification. This finding suggests that, for behavioral outcomes, knowledge about a student's externalizing and internalizing functioning might be sufficient. In other words, the additional dimensional scales used to create a person-oriented classification system were not more predictive than the two dimensional scales used in the dimensional system.

In the current study, categorical classification methods using DSM criteria were not found to be superior for predicting any of the educational outcomes. This knowledge is significant when considering that students in educational systems are currently being classified according to categorical methods (DSM or IDEA). Person-oriented or dimensional methods of classification were found to better predict grade point average, standardized reading achievement measures, number of days absent, number of visits to the opportunity room, and number of suspensions than categorical classification methods.

Similar to results found by Fergusson and Horwood (1995), the current study found the dimensional classification system to show better evidence of predictive validity than a purely categorical system. However, this study did not replicate the findings by Greenberg and colleagues (2001) that indicated the relative superiority of person-oriented methods over individual variable approaches in predicting risk factors of conduct problems. Specifically, the dimensional method utilized in the current study appeared to be superior to person-oriented methods when predicting behavioral outcomes. When predicting many of the educational outcomes, results of the current study were more consistent with findings by Haapasalo et al. (2000), suggesting few differences between the cluster and dimensional approaches. While the ability of person-oriented, dimensional, and categorical classification methods to predict educational outcomes warrants further investigation, the results of this study reveal the relative superiority of person-oriented and dimensional methods of classification over the frequently used categorical methods. However, it remains unclear if person-oriented methods are superior to dimensional methods when predicting behavioral outcomes.

There are a number of limitations in this study that should be highlighted. This study was limited in the availability of behavioral outcomes, which would be hypothesized to be more highly correlated with classification systems utilizing teacher ratings of emotional and behavioral functioning. Additionally, the validity of some of the outcome measures, particularly number of suspensions, is questionable due to the fact that they are based on complex teacher and school processes beyond the child's problems. Another limitation of this study is that the three classification methods were formed based on results of one instrument, the BASC-TRS. Information regarding a student's categorical classification, such as a current DSM diagnosis, was unavailable. However, it would have been desirable to obtain diagnostic information through a diagnostic semi-structured interview, such as the Diagnostic Interview Schedule for Children (DISC-IV), or another comprehensive measure to assist in forming the categorical classification model.

Despite limitations, these results are consistent with previous research suggesting the inadequacies of current categorical classification methods. As school psychologists are often called upon to place students into categories, such as determining their eligibility for special education, they should be aware of the limitations of current classification methods used in the schools. The ability of current classification models to predict later school outcomes is questionable. Additionally, previous research suggests that students, while they might not meet criteria for special education placement, could be experiencing functional impairment or lower levels of risk. This points to the need for prevention and early intervention services for students experiencing significant functional impairment or risk, regardless of classification or placement in special education. Furthermore, school psychologists would benefit from gathering comprehensive information regarding students' functioning, an approach more consistent with dimensional and person-oriented methodologies. Relying solely on information regarding placement eligibility, such as that obtained for categorical classification, might prove insufficient and further the "wait to fail" treatment approach. It should also be emphasized that the present findings point to the need for future research into classification methods for use with school-age children. Particularly, methods utilizing a person-oriented or dimensional approach to classification should be further investigated.

REFERENCES

Achenbach, T. (1998). Diagnosis, assessment, taxonomy, and case formulations. In T. Ollendick and M. Hersen (Eds.). *Handbook of Child Psychopathology (3rd ed.)* (pp. 63-87). New York: Plenum Press.

Achenbach, T. (2001). Challenges and benefits of assessment, diagnosis, and taxonomy for clinical practice and research. *Australian and New Zealand Journal of Psychiatry, 35* (3), 263–271.

American Psychiatric Association (1994). *Diagnostic and statistical manual of mental disorders* (4th ed). Washington, DC: Author.

Barkley, R. A. (1996). Attention-deficit/hyperactivity disorder. In E.J. Mash & R.A.

Barkley (Eds.), *Child Psychopathology*. New York: Guilford Press.

Bergman, L. R., & Magnusson, D. (1997). A person-oriented approach in research on developmental psychopathology. *Development & Psychopathology, 9(2)* 291-319.

Beutler, L. E. & Malik, M. L. (2002). *Rethinking the DSM: A psychological perspective*. Washington, DC: American Psychological Association.

Blanchard, K. A., Morgenstern, J., Morgan, T. J., Labouvie, E. & Bux, D. A. (2003).

Motivational subtypes and continuous measures of readiness for change: concurrent and predictive validity. *Psychology of Addictive Behaviors, 17, 1*, 56-65.

Blashfield, R. K. (1998). Diagnostic models and systems. In A. S. Bellack, M. Hersen, & C. R. Reynolds (Eds.), *Comprehensive clinical psychology: (Vol.4) Assessment.* New York: Elsevier Science.

Cantwell, D. P. (1996). Classification of child and adolescent psychopathology. *Journal of Child Psychology and Psychiatry, 37*, 3-12.

Deater-Deckard, K., Reiss, D., Hetherington, E. M., & Plomin, R. (1997). Dimensions and disorders of adolescent adjustment: A quantitative genetic analysis of unselected samples and selected extremes. *Journal of Child Psychology and Psychiatry, 38(5)*, 515-525.

DiStefano, C., Kamphaus, R. W., Horne, A. M., & Winsor, A. P. (2003). Behavioral Adjustment in the U.S. Elementary School: Cross-validation of a Person-oriented Typology of Risk. *Journal of Psychoeducational Assessment*, *21*, 338-357.

Dowdy, E., Hendry, C., & Kamphaus, R. W. (2006). Clusters of child adjustment. In R.W. Kamphaus & J. M. Campbell, (Eds.), *Psychodiagnostic Assessment of Children* (pp. 437-464). Hoboken, NJ: John Wiley & Sons, Inc.

Fergusson, D. M., & Horwood, J. (1995). Predictive validity of categorically and dimensionally scored measures of disruptive childhood behaviors. *Journal of the American Academy of Child and Adolescent Psychiatry, 34*, 477-487.

Flanagan, K. S., Bierman, K. L., & Kam, C. M. (2003). Identifying at-risk children at school entry: the usefulness of multibehavioral problem profiles. *Journal of Clinical Child and Adolescent Psychology*, *32*, 396-407).

Glass, G., & Stanley, J. (1970). *Statistical methods in education and psychology.* Oxford, England: Prentice-Hall.

Gottlieb, G. (2000). Understanding genetic activity within a holistic framework. In L. R. Bergman, R. B. Cairns, L. G. Nilsson, & L. Nested, (Eds.), *Developmental Science and the Holistic Approach* (pp. 180-201). Mahwah, NJ: Lawrence Erlbaum Associates, Inc.

Greenberg, M. T., Speltz, M. L., DeKlyen, M. & Jones, K. (2001). Correlates of clinic referral for early conduct problems: variable- and person-oriented approaches. *Development and Psychopathology, 13*, 255-276.

Haapasalo, J., Tremblay, R. E., Boulerice, B., & Vitaro, F. (2000). Relative advantages of person–and variable-based approaches for predicting problem behaviors from kindergarten assessments. *Journal of Quantitative Criminology, 16, 2*, 145-168.

Helzer, J. E. & Hudziak, J. J. (2000). *Defining psychopathology in the 21st century: DSM-V and beyond*. Washington, DC: American Psychiatric Association.

Houts, A. C. (2002). Discovery, invention, and the expansion of the modern diagnostic and statistical manuals of mental disorders. In *Defining psychopathology in the*

21st century: DSM-V and beyond. Washington, DC: American Psychiatric Association. Hudziak, J. J., Wadsworth, B. A., Heath, A. C., & Achenbach, T. M. (1999).

Latent class analysis of child behavior checklist attention problems. *Journal of the American Academy of Child and Adolescent Psychiatry, 38*, 985–991.

Jensen, P. S., Watanabe, H. K., Richters, J. E., Roper, M., Hibbs, E., Salzberg, A., & Liu, S. (1996). Scales, diagnosis, and child psychopathology: II. Comparing the CBCL and the DISC against external validators. *Journal of Abnormal Child Psychology, 24(2)*, 151-168.

Jimerson, S. R., Coffino, B., & Sroufe, L. A. (2007). Building school-based Interventions on attachment theory and research. *Journal of Early Childhood and Infant Psychology, 3,* 79-94.

Kagan, J. (1997). Conceptualizing psychopathology: the importance of developmental profiles. *Development and Psychopathology, 9*, 321-334.

Kamphaus, R. W. & DiStefano, C. (2001). Evaluación multidimensional de la psicopatología infantíl. *Revista de Neuropsicología, Neuropsyqiatría y Neurociencias. 3(1)*, 85-98.

Kamphaus, R. W., DiStefano, C., & Lease, A. M. (2003). A self-report typology of behavioral adjustment for young children. *Psychological Assessment, 15(1), 17-28.*

Kamphaus, R. W., Huberty, C. J., DiStefano, C., & Petoskey, M. D. (1997). A typology of teacher rated child behavior for a national U. S. sample. *Journal of Abnormal Child Psychology, 25*, 453-463.

Lessing, E. E., Williams, V., & Gil, E. (1982). A cluster-analytically derived typology: feasible alternative to clinical diagnostic classification of children? *Journal of Abnormal Child Psychology*, *10*, 451-482.

Mattison, R. E. & Spitznagel, E. L. (1999). Long-term stability of child behavior checklist profile types in a child psychiatric clinic population. *Journal of the American Academy of Child and Adolescent Psychiatry,* 38, 700-707.

Meehl, P. E. (1995). Bootstraps taxometrics: Solving the classification problem in psychopathology. *American Psychologist, 50*, 266-275.

Millon, T. (1991). Classification in psychopathology: rationale, alternatives, and standards. *Journal of Abnormal Psychology, 100,* 245-261.

Nease, D. E., Volk, R. J., & Cass, A. R. (1999). Investigation of a severity-based classification of mood and anxiety symptoms in primary care patients. *Journal of the American Board of Family Practice, 12(1),* 21-31.

Reynolds, C. R., & Kamphaus, R. W. (1992). *Behavior Assessment System for Children.* Circle Pines, MN: American Guidance Service, Inc.

Richters, J. E. (1997). The Hubble hypothesis and the developmentalists' dilemma. *Development and Psychopathology, 9(2)*, 193-229.

Scahill, L., Schwab-Stone, M., Merikangas, K. R., Leckman, J. F., Zhang, H., & Kasl, S. (1999). Psychosocial and clinical correlates of ADHD in a community sample of school-age children. *Journal of the American Academy of Child and Adolescent Psychiatry, 38*, 976–984.

Scotti, J. R., & Morris, T. L. (2000). Diagnosis and classification. In M. Hersen & R. T. Ammerman (Eds.) *Advanced abnormal child psychology*. Mahwah, NJ: Erlbaum.

Speece, D. L., & Cooper, D. H. (1991). Retreat, regroup, or advance? An agenda for empirical classification research in learning disabilities. In L.V. Feagans, E.J. Short, & L.J. Meltzer (Eds.), *Subtypes of learning disabilities*. Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Sroufe, L. A., Egeland, B., Carlson, E. A., & Collins, W. A. (2005a). *The development of the person: The Minnesota study of risk and adaptation from birth to adulthood*. New York: Guilford Press.

Toshiaki, F., Awaji, R., Nakazato, H., & Sumita, Y. (1995). Predictive validity of subtypes of chronic affective disorders derived by cluster analysis. *Acta Psychiatrica Scandinavica*, *91*, 379-385

Van Lier, P.A.C., Verhulst, F.C., van der Ende, J., & Crijnen, A.A.M. (2003). Classes of disruptive behaviour in a sample of young elementary school children. *Journal of Child Psychology and Psychiatry and Applied Disciplines,* 44, 377-387.

Waddington, C.H. (1971). Concepts of Development. In L.R. Aronson, E. Shaw, & E Tobach, (Eds.), *Biopsychology of Development* (pp. 17-23). New York: Academic Press.