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Research in Brief

Latent Classes of Externalizing Behaviors in Youth With Early Maltreatment Histories

Miguel T. Villodas¹, Alan J. Litrownik², and Scott C. Roesch²

Abstract

Latent class analyses were used to identify subsets of 217 12-year-old youth with early maltreatment histories based on youth and caregiver reports of externalizing behavior problems. The identified classes were validated using symptom counts and diagnoses for disruptive behavior disorders collected from youth and caregiver reports 2 years later.

Keywords

Achenbach system of empirically based assessment, construct validity, behavioral assessment, clinical assessment

Efforts to identify and intervene in the lives of potentially delinquent youth have generally focused on externalizing behavior problems that include activities that are both illegal and not illegal (Dishion & Patterson, 2006). Previous clinicians and researchers suggested that these externalizing behavior problems may be manifestations of underlying psychiatric disorders (Cicchetti, 2006; Dishion & Patterson, 2006). In fact, many specific externalizing behavior problems examined correspond to symptoms of attention deficit hyperactivity disorder (ADHD), oppositional defiant disorder (ODD), and conduct disorder (CD; Achenbach, Dumenci, & Rescorla, 2003; American Psychiatric Association, 2000). Moreover, researchers reported high rates of comorbidity with symptoms of these three disorders (Loeber & Keenan, 1994; Maughan, Rowe, Messer, Goodman, & Meltzer, 2004).

In an effort to address the relationship between externalizing behavior problems and symptoms of disruptive behavior disorders, Achenbach, Dumenci, and Rescorla (2003) developed Diagnostic and Statistical Manual of Mental Disorder (DSM)–oriented scales (i.e., ADHD, ODD, and CD) using previously well-established measures of externalizing behavior problems (e.g., Child Behavior Checklist [CBCL], Youth Self-Report [YSR], and Teacher Report Form [TRF]; Achenbach & Rescorla, 2001). These scales were developed using clinical experts to rate and sort items and evidence of validity from confirmatory factor analyses. The new scales demonstrated adequate psychometric properties and represent a step toward bridging the gap between research or dimensional models of externalizing behavior problems and clinical diagnoses of disruptive behavior disorders.

¹University of California, San Francisco, San Francisco, CA, USA
²San Diego State University, San Diego, CA, USA

Corresponding Author:
Miguel Villodas, Langley Porter Psychiatric Institute, 401 Parnassus Avenue, LP-220, San Francisco, CA 94143, USA
Email: Miguel.villodas@ucsf.edu
Further advances were accomplished by using the DSM-oriented scales of the CBCL and YSR and applying sophisticated analytic approaches (e.g., latent class analysis [LCA]; Lanza, Flaherty, & Collins, 2003) that identify groups of individuals with similar traits or characteristics (Sondeijker et al., 2005; Storr, Accornero, & Crum, 2007; van Lier, Verhulst, van der Ende, & Crijnen, 2003). Specifically, van Lier et al. (2003) used LCA to determine whether distinct groups of first- and second-grade children from the general population in the Netherlands could be identified using items from the ADHD, ODD, and CD DSM-oriented scales of the CBCL. This analysis identified three classes of children: (a) those with low or no probabilities of behaviors on all three scales; (b) those with moderate probabilities of ADHD and ODD behaviors, but low or no probabilities of CD behaviors; and (c) those with high probabilities of ADHD and ODD behaviors and moderate probabilities of CD behaviors.

Storr, Accornero, and Crum (2007) found nearly identical results using LCAs of items from the YSR with a group of adolescents aged 12 years and older from the general population in the United States, as did Sondeijker et al. (2005) using items from both the YSR and CBCL for 10- to 12-year-old youth from the general population in the Netherlands. In contrast to the previous study by van Lier et al. (2003), these researchers found high rather than moderate probabilities of CD, in addition to high probabilities of ADHD and ODD in their third group (Sondeijker et al., 2005; Storr et al., 2007). This finding is not surprising, as it is common for CD-related behaviors to increase in frequency and severity among preadolescents and adolescents (Dishion & Patterson, 2006; Mottitt, 2006). Nevertheless, none of these studies managed to identify any pure disorder groups of youth without comorbid symptoms.

The present study attempted to build on the findings of the previous studies by extending their methodologies in several ways. First, previous studies, with the exception of Sondeijker et al. (2005), relied solely on a single informant (i.e., either caregiver or youth) for reported youth problem behaviors (Storr et al., 2007; van Lier et al., 2003). Low to moderate levels of agreement between the externalizing behavior scales of the CBCL and YSR previously were found across a number of populations, which highlights the importance of considering information from multiple informants (Lau et al., 2004; Vierhaus & Lohaus, 2008; Youngstrom, Loeber, & Stouthamer-Loeber, 2008). The present study examined both youth and caregiver reports from the YSR and CBCL, respectively, using separate LCAs to identify presentations of externalizing behavior problems that are specific to particular reporters. In addition, all the previous studies used general population samples. Though identifying the same pattern of externalizing behavior presentations across childhood, preadolescence, and adolescence is informative, there is no evidence that the same patterns would emerge in a sample of youth who were at an increased risk for mental health problems (particularly externalizing behavior problems) because of early exposure to maltreatment (Cicchetti & Valentino, 2006; Dishion & Patterson, 2006). Using such a sample may not only increase the potential to discriminate between individuals with higher levels of problems and potentially clinically significant psychopathology but also would provide evidence for the cross-validity of groups identified within general populations. Finally, although Storr et al. (2007) provided evidence of convergent validity for their latent class solution by relating the resulting externalizing behavior problem profiles to self-reported substance use behaviors, we attempted to validate the identified groups by predicting their ADHD, ODD, and CD symptom counts and diagnoses assessed using a structured diagnostic interview administered 2 years later.

**Method**

**Sample and Procedures**

LONGSCAN (LONGitudinal Studies of Child Abuse and Neglect) is a multisite consortium
of ongoing prospective studies examining the antecedents and consequences of child maltreatment. The local institutional review boards approved all procedures of the studies. Beginning at age 4, biannual interviews are conducted face to face using audio-computer assisted self-interviews (ACASI), pencil-and-paper tasks, and observational assessments with both children and their primary caregivers. Informed consent was obtained from all caregivers and assent from all youth. Data collected from each informant were obtained using developmentally appropriate measures that assess the characteristics of the children, caregivers, and families and their neighborhoods and schools.

Participants in the present study were drawn from the Southwestern site of LONGSCAN, which consists of an ethnically diverse cohort of 330 children who, prior to 3.5 years of age, were removed from their homes due to substantiated maltreatment and were placed in out-of-home care for at least 5 months. Youth and caregivers each used laptop computers to complete ACASI versions of the YSR and CBCL, respectively, at the age 12 interview and the NIMH Computerized Diagnostic Interview Schedule for Children, Version IV (C-DISC), at the age 14 interview (Shaffer, Fisher, & Lucas, 2004).

The present study used archival data, and the criteria for inclusion were the completion of youth and caregiver interviews at age 12, including completed data for both the YSR and CBCL. Of the 330 children initially recruited, 231 were interviewed at age 12, 217 of whom had completed data for both youth and their caregivers and were included in the present study. Analyses revealed that the 217 youth included in the present study did not differ from the 113 youth who did not have completed data at age 12 with regard to gender, ethnicity, or total problems as measured by the CBCL at baseline (i.e., age 4 interview).

**Measures**

**Child Behavior Checklist and Youth Self-Report.**

The CBCL and YSR ask caregivers and youth to report on the frequency of 113 child and adolescent problem behaviors that the youth have engaged in over the preceding 6-month period on a 3-point scale (0 = never true, 1 = sometimes true, and 2 = often true; Achenbach, 1991). The present study focused on 26 and 24 items for the CBCL and YSR, respectively, from the ADHD, ODD, and CD DSM-oriented scales identified by Achenbach et al. (2003). More specifically, the same 5 indicators of ADHD behaviors (e.g., “Can’t concentrate, Can’t pay attention long”), 5 indicators of ODD behaviors (e.g., “Argues a lot”), and 14 indicators of CD behaviors were included in the present study (e.g., “Physically attacks people”) from the CBCL and YSR. Two additional CD items were included on the CBCL that were not included on the YSR—how often the youth was cruel to animals and committed acts of vandalism. As a result of low frequencies of endorsement for several items, all CBCL items were dichotomized in the present study (i.e., 0 = never true, 1 = sometimes/often true).

**NIMH Computerized Diagnostic Interview Schedule for Children IV.** The C-DISC was administered at age 14 to assess more than 30...
psychiatric diagnoses as well as symptoms for each disorder in the youth based on the DSM-IV-TR (Shaffer et al., 2004). This instrument measures symptoms of mental disorders that have occurred over the preceding year using both child and caregiver reports. These symptoms are later derived into symptom counts for each disorder as well as diagnoses when all relevant criteria are met. The present study included the combined youth and caregiver report of ADHD, ODD, and CD diagnoses and symptom counts. These variables were included to provide evidence of the predictive validity of the LCA solutions in the identification of externalizing behavior presentations that are of particular clinical concern.

**Data Analysis**

Data were analyzed using LCA in Mplus version 3.0 (Muthén & Muthén, 2006). LCA is a data analytic procedure that is used to identify relatively homogeneous and unobserved (latent) groups or classes of individuals with similar response patterns to a set of indicators. The probabilities that an individual in a particular class is represented by each of the indicators are used to interpret the conceptual characteristics of that class. The object of LCA is to find the smallest number of latent classes that can describe the associations among a set of observed categorical variables. This is accomplished by adding classes in a stepwise fashion until the model fits the data adequately (Lanza, Flaherty, & Collins, 2003). Roesch, Villodas, and Villodas (2010) provide a more detailed review of suggested practices for identifying and selecting the best-fitting model using LCA.

Roesch et al. (2010) recommended that researchers examine multiple indicators of model fit to select the consensus, best-fitting model. Typically in exploratory studies, models with increasing numbers of classes/profiles are fit sequentially and their fit indices are compared with one another. The Lo–Mendell–Ruben adjusted likelihood ratio test (LMRT; Lo, Mendell, & Ruben, 2001) provides an inferential statistical test to sequentially assess the fit superiority of a model with \( k \) latent classes as compared with a model with \( k - 1 \) latent classes based on the difference between two log likelihood values (rather than using a \( \chi^2 \) distribution). Thus, a significant LMRT test indicates that a more complex model (e.g., three class) provides superior fit to a less complex model (e.g., two class). The Akaike information criterion (AIC; Akaike, 1974), Bayesian information criterion (BIC; Schwarz, 1978), and sample-size-adjusted BIC (Sclove, 1987) are also useful for model selection. Each of these information criteria is based on the log likelihood function for individual models and, thus, do not compare models statistically but can be compared across models to determine the best-fitting model (i.e., lower values indicated superior fit). All three statistical indicators penalize models for estimating too many parameters and both versions of the BIC further penalize models by sample size. Finally, entropy provides an index of how well classes can be distinguished based on posterior probabilities assigned to individuals for each class, with values closer to 1 indicating better fit and values above .80 indicating good fit. These posterior probabilities are a function of each individual’s response pattern, the number of latent classes, and the proportion of individuals estimated to be in each class. Roesch et al. (2010) suggested consulting as many fit indices as possible when selecting the best-fitting model. Thus, we considered the AIC, sample-size-adjusted BIC, LMRT, and entropy in the identification of the best-fitting model.

Roesch et al. (2010) suggested that the examination of statistical fit indices is important in model selection only if the selected models can be meaningfully interpreted. In this way, interpretation of model parameters is an important, and often overlooked, step in the model selection process. The LCA model includes two important parameters, conditional response probabilities (CRPs) and latent class probabilities (LCPs). CRPs are estimated for each indicator of the latent variable for each class and represent the probability that a particular indicator was fulfilled by individuals in
each class. These parameters are analogous to factor loadings in factor analysis as they indicate to what degree an indicator represents the latent variable it is specified to represent. Thus, CRPs can be examined within and between classes to substantively differentiate between the classes identified by the solutions. In addition to CRPs, LCPs indicate the probability that each case will be assigned to each class of the resulting solution. Thus, LCPs indicate the prevalence of each class among the sample such that a class with an LCP of .75 indicates that any one case would have a 75% chance of being assigned to that class.

LCAs were performed in the present study to identify latent classes of youth based on youth and caregiver responses to the items from the ADHD, ODD, and CD DSM-oriented subscales of the YSR and the CBCL, respectively, at age 12. The resulting latent class solutions were then used to predict clinical diagnoses of ADHD, ODD, and CD using the DISC at age 14 in logistic regression analyses. Finally, mean differences in symptom counts for each disorder between each of the classes were examined using univariate analyses of variance (ANOVAs).

**Results**

**Latent Class Analyses**

LCA was used to examine one-, two-, three-, and four-class solutions for youth and caregiver reports of the ADHD, ODD, and CD indicators from the CBCL and YSR, respectively (AIC, sample-size-adjusted BIC, LMRT, and entropy for both the CBCL and YSR can be found in Table 1).

**Caregiver-reported model and interpretation.** A significant LMRT indicated that the two-class solution provided superior fit to the one-class solution. In addition, the three-class solution yielded lower AIC and BIC values (nearly 200 point drops for each, respectively), as well as a significant LMRT indicating that the three-class solution provided superior fit as compared with the two-class solution. Although the entropy values were slightly lower for the three-class solution, they remained above the .80 threshold and indicated good model fit. The four-class solution resulted in somewhat smaller decreases in both AIC and BIC values relative to the three-class solution, but the LMRT was not significant and the entropy value did not change. Thus, the more parsimonious three-class solution was determined to have the best overall fit. This was further supported by the interpretability of the class solutions.

Class 1 consisted of 67 youth (31%), Class 2 consisted of 94 youth (43%), and Class 3 consisted of 56 youth (26%). To interpret the criteria that were used to discriminate between each class, the CRPs were examined as well as the prevalence ratios or proportions of youth who endorsed each indicator in the overall sample. Figure 1 displays the patterns of CRPs for each class. Class 3 was characterized by low CRPs (ranging from 0 to .25) for most items with the exception of indicators of difficulty concentrating and argumentativeness.

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**Table 1. Model Fit Indexes for the Two-, Three-, and Four-Class Solutions**

<table>
<thead>
<tr>
<th>Fit Index</th>
<th>Youth-Reported Two-Class</th>
<th>Youth-Reported Three-Class</th>
<th>Youth-Reported Four-Class</th>
<th>Caregiver-Reported Two-Class</th>
<th>Caregiver-Reported Three-Class</th>
<th>Caregiver-Reported Four-Class</th>
</tr>
</thead>
<tbody>
<tr>
<td>AIC</td>
<td>4970.67</td>
<td>4885.93</td>
<td>4853.21</td>
<td>4950.45</td>
<td>4764.03</td>
<td>4682.90</td>
</tr>
<tr>
<td>BIC</td>
<td>4981.01</td>
<td>4901.54</td>
<td>4874.10</td>
<td>4961.64</td>
<td>4780.92</td>
<td>4705.48</td>
</tr>
<tr>
<td>LMRT</td>
<td>606.26, p &lt; .001</td>
<td>133.74, p = .04</td>
<td>89.64, p = .88</td>
<td>993.62, p &lt; .001</td>
<td>238.78, p = .02</td>
<td>131.95, p = .10</td>
</tr>
<tr>
<td>Entropy</td>
<td>.89</td>
<td>.89</td>
<td>.84</td>
<td>.93</td>
<td>.90</td>
<td>.90</td>
</tr>
</tbody>
</table>

Note: AIC = Akaike information criterion; BIC = sample-size-adjusted Bayesian information criterion; LMRT = Lo–Mendell–Rubin test.
Thus, given the low probability of endorsement for most externalizing behavior problems, this class was labeled the Well-Adjusted class. In general, Class 2 was characterized by moderate to high CRPs (ranging from .50 to .94) for the ADHD and ODD items and low CRPs (ranging from 0 to .23) for the CD items. However, two CD items had moderate CRPs (i.e., lack of guilt after misbehaving and lying or cheating; CRPs = .54 and .53, respectively). Moreover, individuals in Class 2 were characterized by high CRPs (ranging from .72 to .94) on indicators of difficulty concentrating, disobedience toward parents, argumentativeness, and stubbornness as well as relatively moderate CRPs (ranging from .50 to .65) on indicators of difficulty sitting still, acting impulsively, talking too much, being loud, disobeying parents, and having temper tantrums. Thus, this group was labeled the Inattentive/Oppositional class. The CRPs for Class 3 were high (ranging from .75 to 1) and above the prevalence ratio on all the ADHD and ODD items. Class 3 was also characterized by moderate to high CRPs (ranging from .51 to .96) for most of the CD items, with the exception of behaviors such as cruelty to animals, running away from home, fire-setting, truancy, and vandalism, which had very low response rates throughout the sample (prevalence rates ranging from .03 to .06). The indicators that distinguished this class most clearly from the Inattentive/Oppositional class, however, were the high probabilities for CD-related externalizing behavior problems including bullying or being mean to peers, destroying others’ property, lying, swearing, and lacking guilt and the moderate to high probabilities of other aggressive behaviors (e.g., fighting, attacking, and threatening), stealing, and associating with deviant peers. Thus, this class was labeled the Aggressive/Rule-breaking class.

Figure 1. Externalizing behavior conditional response probabilities for caregiver-reported classes

(CRPs of .41 and .47, respectively). Thus, given the low probability of endorsement for most externalizing behavior problems, this class was labeled the Well-Adjusted class. In general, Class 2 was characterized by moderate to high CRPs (ranging from .50 to .94) for the ADHD and ODD items and low CRPs (ranging from 0 to .23) for the CD items. However, two CD items had moderate CRPs (i.e., lack of guilt after misbehaving and lying or cheating; CRPs = .54 and .53, respectively). Moreover, individuals in Class 2 were characterized by high CRPs (ranging from .72 to .94) on indicators of difficulty concentrating, disobedience toward parents, argumentativeness, and stubbornness as well as relatively moderate CRPs (ranging from .50 to .65) on indicators of difficulty sitting still, acting impulsively, talking too much, being loud, disobeying parents, and having temper tantrums. Thus, this group was labeled the Inattentive/Oppositional class. The CRPs for Class 3 were high (ranging from .75 to 1) and above the prevalence ratio on all the ADHD and ODD items. Class 3 was also characterized by moderate to high CRPs (ranging from .51 to .96) for most of the CD items, with the exception of behaviors such as cruelty to animals, running away from home, fire-setting, truancy, and vandalism, which had very low response rates throughout the sample (prevalence rates ranging from .03 to .06). The indicators that distinguished this class most clearly from the Inattentive/Oppositional class, however, were the high probabilities for CD-related externalizing behavior problems including bullying or being mean to peers, destroying others’ property, lying, swearing, and lacking guilt and the moderate to high probabilities of other aggressive behaviors (e.g., fighting, attacking, and threatening), stealing, and associating with deviant peers. Thus, this class was labeled the Aggressive/Rule-breaking class.
Youth-reported model and interpretation. Similar to the caregiver-reported model, a significant LMRT indicated that the two-class solution provided superior fit to the one-class solution. The three-class solution yielded lower AIC and BIC values (nearly 100 point drops for each respectively) as well as a significant LMRT. Although the entropy value did not change, it remained well above the .80 threshold indicating that the three-class solution provided good overall fit, whereas the other fit indices indicated superior fit as compared with the two-class solution. Though the four-class solution resulted in a very minimal decrease in both AIC and BIC values relative to the three-class solution the LMRT was not significant indicating that the four-class solution did not provide superior fit to the three-class solution. Moreover, the entropy value decreased indicating that the four-class solution provided poorer classification of youth. Roesch et al. (2010) recommend selecting the most parsimonious model unless a more complex model provides superior fit. Therefore, the more parsimonious three-class solution was selected as the best overall fit. As with the caregiver-reported model, this was further supported by the interpretability of the class solutions. Class 1 consisted of 100 youth (46%), Class 2 consisted of 106 youth (49%), and Class 3 consisted of 11 youth (5%).

As with the caregiver-reported model, the CRPs were examined as well as the prevalence ratios to interpret the criteria that were used to discriminate between each class. Figure 2 displays the patterns of CRPs for each class. Class 1 was characterized by low to moderate CRPs (ranging from .14 to .56) for the ADHD and ODD items and low CRPs (ranging from 0 to .29) for the CD items. Thus, similar to the first class identified in the CBCL model, this class was labeled the Well-Adjusted class. Individuals in Class 2 were characterized by moderate to high CRPs (ranging from .54 to .98) for the ADHD and ODD items and generally low to moderate CRPs (ranging from .05 to .30) for the CD items.
CRPs (ranging from .05 to .67) for the CD items. The CD items with moderate CRPs (ranging from .51 to .67) were indicators of bullying or being mean to others, hanging out with troublemakers, lying or cheating, and swearing or using dirty language. However, this class was most prominently characterized by having trouble concentrating, sitting still, acting impulsively, talking too much, being argumentative, and disobeying their parents and were labeled the Inattentive/Oppositional class.

Finally, Class 3 was characterized by consistently high CRPs (ranging from .91 to 1) for all the ADHD and ODD items and high CRPs (ranging from .72 to 1) for many of the CD items. The exceptions were indicators representing a lack of guilt after misbehaving, destroying other people’s belongings, running away from home, fire-setting, stealing from places outside of the home, and truancy, which were found to have lower, more moderate CRPs (ranging from .36 to .63). However, relative to the extremely low prevalence ratios in the sample (ranging from .06 to .10) for most of these items, these CRPs can be considered relatively high for this particular sample. This class was labeled the Violent/Antisocial class because of their high probabilities of many physically aggressive and rule-breaking behaviors.

Approximately 64% of individuals in the youth-reported Violent/Antisocial class were also in the caregiver-reported Aggressive/Rule-Breaking class. In addition, 49% of individuals in the youth-reported Inattentive/Oppositional class were also in the caregiver-reported Inattentive/Oppositional class. Finally, 45% of individuals in the youth-reported Well-Adjusted class were also in the caregiver-reported Well-Adjusted class. Meanwhile, only nine individuals in the youth-reported Well-Adjusted class were in the caregiver-reported Aggressive/Rule-Breaking class and one individual in the caregiver-reported Well-Adjusted class was in the youth-reported Violent/Antisocial class.

### Logistic Regressions

Logistic regression analyses were conducted with ADHD, ODD, and CD diagnoses as criterion variables and the caregiver- and youth-reported classes as predictor variables entered simultaneously (see Table 2 for $\chi^2$ values and odds ratios). The overall models that included youth- and caregiver-reported classes were significant for each of the outcome variables. For the caregiver-reported classes, no differences were found between youth in any of the classes for ADHD diagnosis. The odds that youth in the Aggressive/Rule-Breaking and Inattentive/Oppositional classes would have an ODD diagnosis were approximately 25 and 11 times greater than youth in the Well-Adjusted class. Also, the odds that youth in the Aggressive/Rule-Breaking class would have a CD diagnosis were approximately 4 and 20 times than youth in the Inattentive/Oppositional and Well-Adjusted classes, respectively.

For the youth-reported classes, the odds that youth in the Violent/Antisocial class would have an ADHD diagnosis were approximately 4.5 and 7 times greater than youth in the Inattentive/Oppositional and Well-Adjusted classes, respectively. However, it should be noted that the difference between the Violent/Antisocial and Inattentive/Oppositional classes was only marginally significant ($p = .05$). Also, the odds that youth in the Violent/Antisocial and Inattentive/Oppositional classes would have a diagnosis of ODD were, respectively, 7 and 5 times greater than youth in the Well-Adjusted class. Finally, the odds that youth in the Violent/Antisocial and Inattentive/Oppositional classes would have a CD diagnoses were almost 8 and 3 times greater than youth in the Well-Adjusted class, although it should be noted that differences between the Inattentive/Oppositional and Well-Adjusted classes were marginally significant ($p = .05$).
Table 2. Logistic Regression Analyses for YSR and CBCL Classes Predicting Diagnoses at Age 14

<table>
<thead>
<tr>
<th></th>
<th>ADHD Diagnosis</th>
<th>ODD Diagnosis</th>
<th>CD Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\chi^2(df = 4) = 12.978$</td>
<td>$\chi^2(df = 4) = 39.062$</td>
<td>$\chi^2(df = 4) = 31.741$</td>
</tr>
<tr>
<td></td>
<td>Nagelkerke $R^2 = .14^{**}$, OR (95% CI)</td>
<td>Nagelkerke $R^2 = .33^{***}$, OR (95% CI)</td>
<td>Nagelkerke $R^2 = .31^{***}$, OR (95% CI)</td>
</tr>
<tr>
<td><strong>Caregiver-reported classes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inattentive/Oppositional vs. Well-Adjusted</td>
<td>2.71 (0.70, 10.49)</td>
<td>11.34 (1.42, 90.34)$^{**}$</td>
<td>4.88 (0.58, 41.16)</td>
</tr>
<tr>
<td>Aggressive/Rule-breaking vs. Inattentive/Oppositional</td>
<td>1.20 (0.42, 3.41)</td>
<td>2.25 (0.91, 5.59)</td>
<td>4.18 (1.49, 11.76)$^{***}$</td>
</tr>
<tr>
<td>Aggressive/Rule-breaking vs. Well-Adjusted</td>
<td>3.26 (0.75, 14.26)</td>
<td>25.55 (3.07, 212.45)$^{***}$</td>
<td>20.42 (2.44, 171.02)$^{***}$</td>
</tr>
<tr>
<td><strong>Youth-reported classes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inattentive/Oppositional vs. Well-Adjusted</td>
<td>1.61 (0.58, 4.42)</td>
<td>4.86 (1.67, 14.15)$^{***}$</td>
<td>3.36 (1.00, 11.27)$^*$</td>
</tr>
<tr>
<td>Violent/Antisocial vs. Inattentive/Oppositional</td>
<td>4.57 (1.00, 20.83)$^*$</td>
<td>1.47 (0.33, 6.33)</td>
<td>2.35 (0.50, 10.87)</td>
</tr>
<tr>
<td>Violent/Antisocial vs. Well-Adjusted</td>
<td>7.32 (1.43, 37.57)$^{**}$</td>
<td>7.04 (1.33, 37.23)$^{**}$</td>
<td>7.88 (1.36, 45.59)$^{**}$</td>
</tr>
</tbody>
</table>

Note: OR = odds ratio; CI = confidence interval; YSR = Youth Self-report; CBCL = Child Behavior Checklist; ADHD = attention deficit hyperactivity disorder; ODD = oppositional defiant disorder; CD = conduct disorder.

* $p < .05$. ** $p < .01$. *** $p < .001$.

Univariate ANOVAs

To examine mean differences in symptoms counts for ADHD, ODD, and CD, univariate 3 (CBCL classes) by 3 (YSR classes) ANOVAs were conducted on each individual dependent variable. Statistically significant effects were examined using the Tukey honestly significant difference (Tukey HSD) post hoc analysis. For ADHD symptom counts, the omnibus test revealed a significant main effect for CBCL classes, $F(2, 147) = 11.562$, $p < .05$, partial $\eta^2 = .136$. Post hoc analyses revealed that youth in the Inattentive/Oppositional class ($M = 6.78$, $SD = 4.00$) and the Aggressive/Rule-breaking class ($M = 8.33$, $SD = 4.52$) had statistically significantly higher mean numbers of symptoms than youth in the Well-Adjusted class ($M = 3.46$, $SD = 2.88$), and the effect sizes of these comparisons were large (Cohen’s $d = 0.95$ and 1.28, respectively). There were no statistically significant differences in mean numbers of ADHD symptoms between the youth in the Inattentive/Oppositional class and the Aggressive/Rule-breaking class. The omnibus test for YSR Classes revealed a significant main effect, $F(2, 147) = 11.792$, $p < .05$, partial $\eta^2 = .138$. Post hoc analyses revealed that youth in the Violent/Antisocial class ($M = 13.17$, $SD = 4.13$) had a statistically significantly higher mean number of symptoms than youth in the Inattentive/Oppositional class ($M = 6.81$, $SD = 4.01$) or youth in the Well-Adjusted class ($M = 4.51$, $SD = 3.37$), and the effect sizes for these...
comparisons were large (Cohen’s $d = 2.30$ and 1.56, respectively). Moreover, youth in the Inattentive/Oppositional class had a statistically significantly higher mean number of symptoms than youth in the Well-Adjusted class, and the effect size was moderate (Cohen’s $d = 0.62$). The interaction between CBCL classes and YSR classes was not statistically significant, $F(3, 147) = .842, p > .05$, partial $\eta^2 = .017$.

For ODD symptom counts, the omnibus test did reveal a significant main effect for CBCL classes, $F(2, 158) = 3.796, p < .05$, partial $\eta^2 = .046$. Post hoc analyses revealed that youth in the Inattentive/Oppositional class ($M = 4.29, SD = 2.62$) and the Aggressive/Rule-breaking class ($M = 5.18, SD = 2.80$) had statistically significantly higher mean numbers of symptoms than youth in the Well-Adjusted class ($M = 3.03, SD = 2.08$), and the effect sizes of these comparisons were moderate and large, respectively (Cohen’s $d = 0.53$ and 0.87, respectively). There were no statistically significant differences in mean numbers of ADHD symptoms between the youth in the Inattentive/Oppositional class and the Aggressive/Rule-breaking class. The omnibus test for YSR classes also revealed a significant main effect, $F(2, 147) = 8.141, p < .05$, partial $\eta^2 = .093$. Post hoc analyses revealed that youth in the Violent/Antisocial class ($M = 7.67, SD = 3.04$) had a statistically significantly higher mean number of symptoms than youth in the Inattentive/Oppositional class ($M = 4.70, SD = 2.42$) or youth in the Well-Adjusted class ($M = 3.06, SD = 2.19$), and the effect sizes of these differences were large (Cohen’s $d = 1.08$ and 1.74, respectively). Moreover, youth in the Inattentive/Oppositional class had a statistically significantly higher mean number of symptoms than youth in the Well-Adjusted class and the effect size was moderate to large (Cohen’s $d = 0.71$). The interaction between CBCL classes and YSR classes was not statistically significant, $F(3, 158) = .437, p > .05$, partial $\eta^2 = .008$.

For CD symptom counts, the omnibus test revealed a significant main effect for CBCL classes, $F(2, 158) = 16.054, p < .05$, partial $\eta^2 = .169$. Post hoc analyses revealed that youth in the Aggressive/Rule-breaking class ($M = 6.97, SD = 3.82$) had a statistically significantly higher mean number of symptoms than youth in the Inattentive/Oppositional class ($M = 3.52, SD = 2.80$) or the Well-Adjusted class ($M = 2.24, SD = 1.96$), and the effect sizes of these comparisons were large (Cohen’s $d = 1.03$ and 1.56, respectively). Moreover, youth in the Inattentive/Oppositional class had a statistically significantly higher mean number of symptoms than youth in the Well-Adjusted class, and the effect size was moderate (Cohen’s $d = .53$). The omnibus test for YSR classes revealed a significant main effect, $F(2, 158) = 9.578, p < .05$, partial $\eta^2 = .108$. Post hoc analyses revealed that youth in the Violent/Antisocial class ($M = 9.39, SD = 3.98$) had a statistically significantly higher mean number of symptoms than youth in the Inattentive/Oppositional class ($M = 4.60, SD = 3.28$) or youth in the Well-Adjusted class ($M = 2.44, SD = 2.46$), and the effect sizes of these differences were large (Cohen’s $d = 1.31$ and 210, respectively). Moreover, youth in the Inattentive/Oppositional class had a statistically significantly higher mean number of symptoms than youth in the Well-Adjusted class, and the effect size was moderate to large (Cohen’s $d = 0.75$). The interaction between CBCL classes and YSR classes was not statistically significant, $F(3, 158) = .761, p > .05$, partial $\eta^2 = .014$.

Discussion

The present study used LCA to identify unobserved groups of youth with similar presentations of externalizing behavior problems based on both youth and caregiver reports at age 12. Three classes were identified for youth and caregiver reports and consisted of (a) youth with generally low probabilities for behavior problems, (b) youth with moderate to high probabilities for ADHD- and ODD-related behaviors and low to moderate probabilities for most CD-related behaviors, and (c) youth with high probabilities for ADHD- and ODD-related behaviors and moderate to high
probabilities for most CD-related behaviors. Although classes of youth identified using youth and caregiver reports generally agreed, they did appear to identify different proportions of youth in each class. In addition, the present study provided evidence for the predictive validity of these classes using a combined youth and caregiver report of diagnoses and symptom counts for ADHD, ODD, and CD at age 14.

The three latent classes of youth that were identified were consistent with classes identified in samples of youth from the general population in the United States and the Netherlands among children 6 to 18 years and using youth and caregiver reports (Sondeijker et al., 2005; Storr et al., 2007; van Lier et al., 2003). Thus, the three classes identified appear to be robust representations of an unobserved classification structure that can be identified across samples of youth at varying developmental periods, cultural contexts, and levels of risk. Although a pure class of youth without comorbid disruptive behavior problems was not identified, it is possible that these youth do exist, but occur less frequently. Nevertheless, these findings have important implications for diagnosis and treatment planning as they provide important information about the comorbidity of disruptive behavior disorder (DBD) symptoms.

The largest class of youth identified by each reporter consisted of youth with generally high probabilities for ADHD- and ODD-related behaviors and lower to moderate probabilities for CD-related behaviors. This finding is consistent with the class solutions identified by previous researchers (Sondeijker et al., 2005; Storr et al., 2007; van Lier et al., 2003), which suggests that some degree of ADHD- (e.g., inattentiveness, not sitting still) and ODD-related (e.g., argumentativeness, disobedience) behaviors may be normative among youth. Although this class appears to be consistently identified as the most common class, longitudinal analyses are required to identify whether the same youth are consistently assigned to this class across developmental periods or if youth in this class transition to classes with more or less severe behavior problems. Investigating these transitions would substantially improve the accuracy with which high-risk youth are identified for intervention. Moreover, identifying other factors that are related to these transitions could provide crucial information about potential targets for treatment.

The most pronounced discrepancy in class sizes was the relatively smaller group of youth identified by self-report as having high probabilities of ADHD and ODD behaviors as well as moderate to high probabilities of CD behaviors. One explanation for this finding could be that youth were less likely to report severe disruptive behaviors as a result of social desirability or fear of punishment. However, this conclusion would be contrary to previous research that suggests that youth often report a greater number of problems than their caregivers (Lau et al., 2004; Vierhaus & Lohaus, 2008; Youngstrom et al., 2008). Also, previous studies that have used youth reports have found proportions of youth in this class comparable to or higher than those provided by caregiver reports (Sondeijker et al., 2005; Storr et al., 2007). After examining the relatively higher probabilities for each behavior from youth reports as well as the pattern of evidence of predictive validity, it appears that a smaller subset of youth that are characterized by more consistently severe aggressive and rule-breaking behaviors was identified by youth reports. Based on the pattern of LCPs identified, this youth-reported group appears to have a qualitatively different set of characteristics than the groups that were previously identified. Specifically, although the probabilities for many of the externalizing behaviors were comparable to those of the caregiver-reported Aggressive/Rule-breaking group, youth in this group had particularly high probabilities of engaging in a number of physically aggressive and violent behaviors as well as moderate, yet substantially higher, probabilities of engaging in the most infrequently occurring behaviors such as setting fires, running away from home, and truancy. Although these youth may not be easily identified in general population samples because
of generally low frequencies of severe externalizing behavior problems, it appears that the examination of this high-risk sample of youth facilitated the differentiation of the smaller proportion of youth with more severe externalizing behavior problems. It is crucial that researchers focus on this group, as they are the most likely to develop more severe and persistent antisocial behaviors in the future (Dishion & Patterson, 2006). Longitudinal research designs examining factors related to the development of these behaviors could provide useful information about which individuals and factors should be targeted for earlier intervention.

The validation of the class solutions in the present study is an important extension of the previous research, as it indicates the utility of a brief report form for the early identification of future symptoms and diagnoses of disorders. These findings provide support for the use of similar screening methods in future research studies as well as in clinical settings as a method of identifying youth at risk for the development of disruptive behavior problems. Specifically, current assessment packages offer computerized software for diagnosis of disorders based on factor analytic solutions (Achenbach et al., 2003). Similarly, it may be possible to establish normative data for these models and to program software that would identify unobserved group membership based on the same brief screening measures (Templin & Henson, 2006). Software packages such as these could facilitate the application of research findings to assessment and diagnosis efforts in clinical settings and, in turn, identify youth for treatment planning and intervention.

**Implications for Counseling**

In addition to implications for the assessment and identification of youth at risk for developing DBDs, the present study yields important implications for counseling practice and the development of interventions. Specifically, given the common comorbidities among different externalizing behavior problems, it appears that the most optimal treatment approaches would be those that target multiple DBDs simultaneously rather than individually. For example, the present study demonstrated the tendency for youth with either self- or caregiver-reported attention problems to also have problems following rules and obeying authority figures. Based on these results, it appears that the development of a combined treatment model to address problems with inattention and oppositional behavior would be optimal. These findings are consistent with the findings of a review by Farmer, Compton, Burns, and Robertson (2002), which determined that, although pharmacological treatments resulted in the most improvement in ADHD symptoms for youth with ADHD, combined pharmacological and psychosocial treatment also resulted in improvement in comorbid symptoms, such as oppositionality and defiance.

However, although particular psychosocial treatments such as social skills training, cognitive behavioral therapy, and parent training have resulted in improvement of symptoms of both ADHD and ODD, the strongest evidence for the improvement of symptoms of these disorders appears to be for multifaceted treatments that are able to integrate a variety of approaches and include multiple people in a number of contexts. This appears to be particularly true for youth with the most severe presentations of externalizing behavior problems. This assertion is supported by previous studies that have identified multifaceted treatments that include community, family, parent, and/or youth components such as Functional Family Therapy, Multisystemic Therapy, and Multidimensional Treatment Foster Care to be optimal for the improvement of DBD symptoms (see review by Henggeler & Schoenwald, 2011). These treatments more comprehensively target youths’ externalizing problem presentations by providing treatment and support from multiple sources in a number of contexts and integrating multiple treatment approaches rather than only treating specific CD-related behavior problems (e.g., anger management). In this way, replication of the findings from the present study with youth...
from additional age groups and high-risk populations will be important to determine whether or not intervention programs should be developed to address these specific combinations of externalizing behavior problem presentations.

**Limitations**

Although the findings of the present study offer important implications for researchers and mental health providers, there are limitations to the interpretation of the present study that should be noted. For example, although the sample used in the present study offers unique advantages, these advantages may also limit the generalizability of the results. Specifically, maltreated youth represent a particular example of a high-risk group. Thus, future research should examine these externalizing behavior presentations in other high-risk youth populations.

In addition, the youth in the present study were approximately 12 years old at the time of data collection, which is often considered a transitional age after which externalizing behaviors tend to increase (Dishion & Patterson, 2006; Moffitt, 2006). Thus, to fully understand the development of these behaviors, it is important that future research apply longitudinal data analytic models to understand the changes in these presentations over time (i.e., transitions as youth develop from childhood to adolescence). Moreover, dishonesty is often considered a characteristic of more severe forms of externalizing behaviors, thus the most severe youth may not accurately report their behaviors to avoid detection or punishment. Although this is likely less problematic in research settings in which anonymity is guaranteed, it may be particularly problematic in treatment settings in which assessment results cannot be kept confidential from youths’ caregivers. Thus, researchers and counselors should consider information provided by multiple informants when possible to most accurately identify, diagnose, and treat youth.

Although the identified class solutions were generally validated by diagnoses and symptom counts at age 14, the less consistent prediction of ADHD diagnoses, particularly by the caregiver-reported class solutions, could have resulted from poor representation of ADHD symptoms on the CBCL. More specifically, the *DSM-IV-TR* specifies 18 possible symptoms of ADHD, whereas only 5 items from the CBCL and YSR *DSM*-oriented scales address ADHD symptoms. The *DSM*-oriented scales of the TRF include several additional items that address specific symptoms of ADHD and would likely improve the identification of youth ADHD symptoms. This limitation has important implications for the utility of these findings with respect to ADHD in clinical settings; thus, future researchers should also examine teacher reports of externalizing behavior problems.

Despite these limitations, the present findings have implications for the development of screening instruments, assessment procedures, diagnostic criteria, differential diagnosis, identification and targeting of candidates for intervention, and the development of intervention efforts to comprehensively address youth externalizing behavior problems. Specifically, using individuals’ data to identify unobserved groups of youth using a person-centered approach facilitates the consideration of a number of variables simultaneously that can be used to characterize that group. Furthermore, understanding the diversity in the presentations of externalizing behavior problems will facilitate the accurate diagnosis of and treatment planning for related disorders. Finally, understanding the differences in behavioral presentations and related factors will help identify additional targets to be addressed by intervention efforts. Longitudinal extensions of these findings could potentially inform researchers and mental health practitioners about specific developmental periods during which identification and/or intervention may be particularly beneficial in addition to identifying factors related to the development/desistance of externalizing behavior problems across developmental periods.
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References


Bios

Miguel T. Villodas, PhD, is a postdoctoral fellow at the University of California, San Francisco Langley Porter Psychiatric Institute. His current research focuses on the development and evaluation of clinic and school-based psychosocial interventions for children. He also has primary research interests in the etiology, development, and treatment of disruptive behavior disorders in children and adolescents.

Alan J. Litrownik, PhD, is professor of psychology at San Diego State University, faculty member of the SDSU/UCSD Joint Doctoral Program in Clinical Psychology, and Senior Associate Editor of Child Abuse & Neglect. His primary research interests focus on at-risk children and factors that determine adaptive and maladaptive outcomes.

Scott C. Roesch is an Associate Professor in the Department of Psychology at San Diego State University, where he teaches graduate courses in advanced and multivariate statistics. His primary research interests focus on the application of latent variable methodology in mental and physical health research in ethnic minority groups.