

Symptom Patterns among Youth Exposed to Intimate Partner Violence

Jason M. Lang · Carla Smith Stover

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Abstract Children and adolescents exposed to intimate partner violence display a broad range of symptoms. We sought to differentiate symptom patterns and predictors of these patterns using a person-oriented approach. Previous cluster analysis research of exposed youth was extended to include youth PTSD symptoms and trauma history. Participants were 74 mothers who had received a police call for domestic violence, and who had a child between 2 and 17 years old. Cluster analysis was used to identify four symptom patterns among exposed youth: Typical, Asymptomatic, General Distress, and Acute PTSD. These patterns were replicated in separate cluster analyses with younger and older participants. Symptom patterns were differentiated by maternal distress, maternal aggression, and youth trauma history, but not by male partner aggression. Implications for assessment and treatment of youth exposed to intimate partner violence, and suggestions for further research, are discussed.

Keywords Trauma · Domestic violence · Youth · PTSD · Child

Each year, approximately 5.3 million adult women in the United States are victims of intimate partner violence (IPV; Center for Disease Control and Prevention 2003). Prevalence rates for children exposed to IPV vary widely, with most

recent estimates ranging from 10 million to 18 million children and adolescents (henceforth collectively referred to as children) witnessing physical or verbal spousal abuse annually (McDonald et al. 2006; Silvern et al. 1995; Straus 1992). Several meta-analytic studies of children exposed to IPV have documented impairments in multiple domains, including internalizing behaviors, externalizing behaviors, academic functioning, and socialization (Buehler et al. 1997; Kitzmann et al. 2003; Wolfe et al. 2003). These meta-analyses yielded overall small to moderate effect sizes of $d=0.28$, $d=0.32$, and $d=0.40$ for exposure to IPV across a broad range of child outcomes. Thus, a large body of research has shown that children exposed to IPV are at-risk for a variety of problems.

However, little is known about the patterns of behavioral and emotional responses, and predictors of these patterns, among children exposed to IPV. For example, do equivalent effect sizes across different domains of functioning (Kitzmann et al. 2003) mean that most children display a range of problems, or that equal numbers of children develop relatively specific symptoms? Using a person-oriented approach to identify unique symptom patterns among children exposed to IPV, and factors related to these patterns, allows interventions to be better tailored to families' specific needs. To our knowledge, only two studies have used cluster analysis to identify symptom patterns among children exposed to IPV. Using internalizing problems, externalizing problems, and self-esteem as outcome variables, Grych et al. (2000) found five patterns among 8- to 14-year-old children residing in battered women's shelters: multiproblem-externalizing, multiproblem-internalizing, externalizing, mild distress, and no problems reported. These clusters were distinguished by fathers' perpetration of violence towards mothers and aggression from either parent towards the child, with higher levels of each occurring among the two multi-

J. M. Lang · C. S. Stover
National Center for Children Exposed to Violence,
Yale University Child Study Center,
New Haven, CT, USA

J. M. Lang (✉)
Connecticut Center for Effective Practice,
270 Farmington Avenue, Suite 367,
Farmington, CT 06032, USA
e-mail: jalang@uchc.edu

problem groups. In a similar sample of 6- to 12-year-olds residing in a battered women's shelter, Hughes and Luke (1998) also identified five patterns: moderate levels of internalizing and externalizing, high externalizing and internalizing, externalizing only, internalizing only, and few problems reported. Factors that differentiated these patterns included child's age, mother's age, mother's distress, duration of abuse, and mother's verbal aggression. While providing initial evidence of distinct child responses to IPV, these studies leave several unanswered questions. Specifically, it is not known whether symptom patterns, and predictors of patterns, are replicable in community samples with a wider range of IPV severity and without the disruption of moving to a shelter. In addition, two important variables that have not been examined in cluster analyses are children's posttraumatic stress symptoms (PTSS) and trauma history.

In comparison to other outcome measures, there is less research on PTSS among child witnesses of IPV. For example, only 3 of 41 studies in the Wolfe et al. (2003) meta-analysis included measures of PTSS. This gap is notable for several reasons. First, IPV, especially if it is severe, has the potential to be highly traumatic because children are often in close proximity to the violence, which is related to the severity of posttraumatic stress disorder (PTSD; Pynoos et al. 1987). Second, initial research suggests that PTSS have larger effect sizes than other internalizing behavior problems among child witnesses of IPV (Kitzmann et al. 2003). Third, a significant proportion (31% to 84%) of victimized women have PTSS (Jones et al. 2001), and maternal PTSD is associated with PTSD reactions in one's children, from infancy through adolescence (Bogat et al. 2006; Laor et al. 2001; Levendosky et al. 2002; Lieberman et al. 2005). Fourth, IPV usually takes place in what should be the child's safe haven, occurs between adults responsible for protecting the child, thus diminishing trust and security, and is often chronic. Finally, the relationship between child PTSS and other emotional and behavioral outcomes (Saigh et al. 1999) is unclear. For example, PTSS may represent a pathway from IPV that is distinct from other internalizing behaviors, may co-occur with other problems and simply represent more impaired functioning, or may mediate or moderate the relationship between IPV and other problems.

In concluding their meta-analysis, Wolfe et al. (2003) suggest that future research on the effects of IPV exposure consider unique predictors of various child responses, including exposure to community violence and other traumatic events. Examining child responses to IPV without consideration of previous or co-occurring exposure to other traumatic events may not provide the full picture of the unique and additive effects of IPV exposure. Children living in families with high IPV often live in neighborhoods

with more community violence (Lynch and Cicchetti 1998), which is linked to an increased risk of internalizing and externalizing problems among children (e.g., Luthar and Goldstein 2004). Similarly, the number of traumatic or stressful events a child has witnessed is predictive of increased psychological distress, and lower school grades, two years later (DuBois et al. 1992).

The current study was designed to further research on the effects of child exposure to IPV with a two-step process. First, a cluster analysis was used to identify distinct patterns of children's emotional and behavioral responses to IPV among a community sample in an attempt to expand on cluster groupings previously identified in children residing in battered women shelters (Grych et al. 2000; Hughes and Luke 1998). Unlike the two prior studies utilizing cluster analyses, we included PTSS as one of the outcome measures, along with internalizing and externalizing behaviors. We did this because of the mounting evidence that for children exposed to IPV, PTSS frequently co-occur with other behavioral and emotional problems. Although there is some shared variance between PTSS and internalizing problems because of symptoms common to PTSD and other disorders (e.g., difficulty sleeping, excessive worry), most measures of broadband behavior, such as the Child Behavior Checklist (CBCL; Achenbach and Rescorla 2001) do not directly assess for PTSS. Given that cluster analysis is an exploratory approach and we do not know of any other studies that have included PTSS in such an analysis, we could not make a priori predictions for this step, although we hypothesized that we would obtain similar clusters to those found by Grych et al. (2000) and Hughes and Luke (1998).

Next, we hypothesized that several factors would differentiate the clusters. We did not have strong a priori predictions about cluster groupings, so we could only speculate on variables that would distinguish the clusters. First, we hypothesized that both mothers' and male partners' aggression would differentiate patterns of child functioning. In shelter samples, the severity of father's, but not mother's, aggression predicts child maladjustment (Grych et al. 2000). However, in this community sample with more variable male partner aggression and more bi-directional IPV, we predicted that both partners' aggression would differentiate the clusters. Second, we predicted that mothers' distress and PTSS would differentiate clusters of more distressed children, consistent with evidence that maternal symptomatology is related to child adjustment following IPV (Lieberman et al. 2005). Third, we predicted that severity of the referred IPV incident would differentiate the clusters such that a more severe event would predict more PTSS-related clusters. Finally, we predicted that children's trauma history would be related to symptom patterns, such that those with more extensive trauma histories would have more impairment and PTSS symptoms.

Method

Participants

Participant data from an evaluation study of the Domestic Violence Home Visit Intervention (DVHVI) were used for the current analyses. The recruitment pool consisted of 430 women who were eligible to participate in the DVHVI evaluation based on screening of police reports generated between November 2004 and October 2005 in the city of New Haven, CT. Female victims aged 18 and older were invited to participate if the police report identified an altercation between a man and woman resulting in an arrest. Women were excluded if the incident was non-IPV (e.g., sibling or parent-child altercations), if the woman was arrested, or if the victim did not speak English or Spanish fluently.

Of the 430 eligible women, 24% declined participation, 42% either were not reached due to no phone number or their lack of response to phone messages/mailings requesting their participation in research, and 9% agreed to participate, scheduled an interview and then did not show up despite multiple attempts to contact them. There were 109 women who participated in the DVHVI program (25% of the subject pool). These cases were reviewed, and participants were selected if they had at least one child between the ages of 2 and 17 and complete baseline data was reported. This resulted in 74 cases selected for inclusion in these analyses. If a woman had more than one child between the ages of 2 and 17, she was asked to complete questions about her eldest child. The mean age for mothers was 31.11 years ($SD=7.06$), and the mean age of the identified child was 8.70 years ($SD=4.57$). Based upon mothers' reports of these 74 children, 36 (49%) were present at the index IPV, 35 (47%) were not present, and information was not available for 3 (4%). Additional demographic data for the sample is shown in Table 1.

There were significant differences between women who agreed to participate and those who did not. Research participants were less likely to be married or living with the perpetrator at the time of the domestic incident, and they had cases with less severe police charges (Stover et al. [under review](#)).

Procedure

Women who met inclusion criteria were called by a research assistant between 10 days and three weeks following the IPV incident to ask if they would like to participate in a research study examining women's and children's experiences of IPV. Baseline interviews were scheduled within 6 weeks of the domestic incident to allow some time for acute symptoms to potentially abate, but to also assess children reasonably soon

Table 1 Sample demographic characteristics

Ethnicity	Percent
African-American	57
Latino	28
Caucasian	11
Other/Mixed	4
Partner Status	
Ex-partners	46
Dating/Living together	38
Married	16
Unemployed	62
Education	
Less than High School	27
High School Diploma	32
Some College/Associate's degree	39
Family Income	
<\$10,000	65
\$10,000–\$20,000	23
> \$20,000	8
Child's Age	
2–5 years old	30
6–10 years old	34
11–14 years old	20
15–17 years old	16

after the incidents. Interviews, consisting of a series of questionnaires, were scheduled at the research study offices or in the women's homes, and took approximately 1–2 hours to complete. Women were paid \$50 for their participation in the interview.

Measures

Participating mothers were asked to respond to a series of demographic questions as well as to the following standardized questionnaires:

Child Internalizing and Externalizing Problems were assessed with the respective broadband t-scores from the Child Behavior Checklist (CBCL; Achenbach and Rescorla 2001). The CBCL is a widely used, well-validated, 113-item measure of child emotional and behavioral problems. The CBCL has parent-report versions for children from 1 1/2 to 18 years of age, and the appropriate version was used for each child in this study.

Child PTSS were assessed with the severity scale of the UCLA Posttraumatic Stress Disorder Reaction Index-Parent Report Version (PTSD-RI; Rodriguez et al. 1998). The PTSD-RI is a parent-reported measure of posttraumatic stress reactions that assesses children's subjective distress, re-experiencing, arousal, and avoidance symptoms. The PTSD-RI also provides a total severity score. The PTSD-RI has good internal consistency ($\alpha=0.90$) and a test-retest reliability coefficient of 0.84 (Roussos et al. 2005).

Child Trauma History was assessed with the Traumatic Events Screening Inventory-Parent Report Revised (TESI-PRR; Ghosh-Ippen et al. 2002). The TESI-PRR is a revision of the original TESI-PR, which has adequate test–retest reliability with kappas between 0.50 and 0.79 (Ford et al. 2000). The new version was developed to include traumatic events for children under 6 years. The TESI-PRR is a parent report measure designed to screen for a wide range of potentially traumatic events for children including accidents, abuse, witnessing community and domestic violence, and terrorism. The number of previous traumatic events endorsed were summed to create a trauma history summary score.

IPV Perpetration was assessed with the Conflict Tactics Scale, Revised (CTS2; Straus et al. 1996). The CTS2 is a widely used measure of IPV that assesses psychological and physical abuse between partners, as well as negotiation skills, over the past year. Separate ratings are obtained for the woman and her partner on five subscales: Reasoning, Verbal Aggression, Physical Aggression, Sexual Coercion, and Injury. Total IPV scores were obtained for each partner by summing the latter four scales. Psychometric data for the CTS2 have shown good internal consistency, with coefficient alphas ranging from 0.79 for psychological abuse to 0.95 for the injury variable.

Dangerousness was assessed with the Danger Assessment Scale (DAS; Campbell 1995). The DAS is a 15-item scale that is used to assess the potential danger posed by a male partner. It has also been shown to be a strong predictor of IPV recidivism. Test–retest reliability has ranged from 0.89 to 0.94, and Cronbach's alpha has ranged from 0.60 to 0.86; however, internal consistency reliability may not be an appropriate psychometric descriptor for an instrument composed of a set of independent risk factors (Campbell 1995).

Maternal Distress was assessed with the Brief Symptom Inventory (Derogatis 1993). The BSI is a widely used, 53-item measure of adolescent and adult psychiatric symptoms with a 5-point Likert response scale for each item. This study used the hostility subscale and the Global Severity Index (GSI), a measure of overall psychological distress that is drawn from the following subscales: somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism. Coefficient alphas range from 0.71 on the psychoticism scale to 0.83 on the obsessive compulsive scale, and test–retest reliability ranges from 0.68 to 0.91 on the subscales.

Maternal PTSS were assessed with the Posttraumatic Stress Disorder Checklist, Civilian (PCL; Weathers et al. 1991). The PCL is a 17-item measure of PTSD symptoms with responses on a 5-point Likert scale. The PCL has excellent psychometric properties, with a coefficient alpha for the total score of 0.94 and test–retest reliability of 0.96.

Criminal History was assessed using a review of police records for the previous five years. Separate counts were

computed for the mother and her male partner. Criminal history was defined as the number of police reports where the identified person was noted as the perpetrator in a crime. Police charges is a proxy for criminal history, but likely indicates a greater degree of criminal history than convictions, as many charges are later reduced, dismissed, or do not result in convictions.

Severity of Charges was assessed by coding police reported criminal charges at the time of the incident into four distinct categories based on type of crime: Property Crimes, Personal Crimes, Child-Related Crimes, and Police Interference. Each of these variables was coded according to the severity of the crime based on the crime definitions and penalty scale contained in the Connecticut criminal statutes. In order to provide a continuous variable to describe the severity of charges, the scores for each of the four charges categories were summed to create a total incident severity composite score. The numerical values were assigned based on the severity of charges in each category, as detailed in Table 2, and then summed. For example, if the perpetrator was charged with criminal mischief 1st degree, breach of peace, and interference with an officer, the total severity score for that case would equal 4, on a scale of 1 to 12 (12 being the most severe). Furthermore, if the perpetrator had more than one charge under any category, only the highest level of crime was coded. No case had more than one charge under the same level of severity (e.g., burglary 1st degree and arson 1st degree).

Results

Analysis Plan

Results are presented in two sections based upon the identified study goals. First, a cluster analysis was conducted to determine whether children exposed to IPV exhibited variable patterns of internalizing problems, externalizing problems, and PTSS. Next, factors that were hypothesized to differentiate between these clusters were examined, including demographic variables, maternal aggression, male partner aggression, maternal symptomatology, and child trauma history.

Cluster Analyses

The following cluster analyses were conducted based upon the methods suggested by Grych et al. (2000) and Henry et al. (2005). Although 74 participants is a small sample size on which to conduct cluster analyses, the lack of any similar published data warranted exploration even with a less than ideal sample size. Additionally, we limited the clustered

Table 2 Scoring criteria for criminal charges

Score	Property Crimes	Personal Crimes	Child Related Crimes	Police Interference
0	No Charges	No Charges	No Charges	No Charges
1	Crim. Mischief 2/3; Trespassing	Disorderly Conduct; Breach of Peace; Harassment 2	Custodial Interference 2	Interference with 911 call or police officer
2	Crim. Mischief 1; Burglary 2/3; Arson	Threatening 2; Stalking 2/3	Custodial Interference 1; Risk of Injury to a Minor	Violation of Protective or Restraining Order
3	Burglary 1; Arson 1	Reckless Endangerment; Unlawful Restraint 2; Assault 3; Unlawful Restraint 1; Stalking 1; or Threatening 1	NA	NA
4	NA	Assault 3, Unlawful Restraint 1; Stalking 1; or Threatening 1	NA	NA
5	NA	Assault 1/2; Sexual Assault; Rape; Kidnapping	NA	NA

Charge severity was categorized with reference to the definitions contained in the Connecticut criminal code (Conn. Gen. Stats., Title 53a). Connecticut statutes list some crimes that may occur in several degrees, e.g., assault. For these crimes, the lowest degree refers to the most severe crime (e.g. Assault 1). Charges coded in the current study were those initially charged by police at the time of the incident and not as subsequently modified by prosecutor or court

variables to three to improve reliability of the solution and replicated the analyses on two halves of the sample to assess validity of the solution. We used the common approach to cluster analysis utilizing both hierarchical and nonhierarchical methods in order to capitalize on the strengths of each. The cluster analysis was performed on three variables: CBCL Internalizing *t*-score, CBCL Externalizing *t*-score, and UCLA PTSD-RI severity score. Prior to analysis, each variable was divided by its range, a method that was found to be superior to other standardization procedures (Milligan and Cooper 1988). Next, a hierarchical agglomerative method using Ward’s (1963) minimum variance technique was used to provide a range of solutions from three to seven clusters in order to identify the number of clusters that best fit the data.

Cluster analysis is an exploratory procedure, and there are no standard criteria for selecting the best solution (Henry et al. 2005). Thus, in order to identify the optimal solution, we compared these five solutions using a variety of criteria, including examining the dendrogram, the cluster memberships at each stage, and the agglomeration schedule, which is presented in Table 3. A four-cluster solution was determined to best fit the data by providing the most interpretable clusters, minimizing differences within clusters, and maximizing differences between clusters. The three cluster solution also provided acceptable and similar results, but combined cases that appeared to have average levels of symptoms (e.g. no distress) with those that had mildly elevated levels of each of the three symptoms (e.g. some general distress), a distinction which we felt was clinically important. The five-factor solution was difficult to interpret and clusters varied less on the three clustering variables, while the four-factor solution had more distinct clusters and was easily interpretable.

We then used this four-factor solution and the cluster centers obtained from the hierarchical analysis as a starting

point for a *k*-means analysis. The *k*-means four-cluster solution was nearly identical to the hierarchical solution, with 73 of 74 participants falling into the same cluster on both. Because of the wide age range in our sample, we also performed separate *k*-means cluster analyses, specifying four clusters, on the younger (age 2–8) and older (age 9–18) halves of the sample to confirm whether the overall cluster solution fit both younger and older children. The decision to split the sample in this way was made to create approximately equal group sizes for the two replication cluster analyses. Although the small sample sizes of these analyses are less reliable than the whole sample, these analyses each resulted in four clusters that were similar to those obtained from the entire sample. Additionally, 73 of 74 participants were classified into the same cluster as they were in the whole sample *k*-means analysis. Thus, the *k*-means four-cluster solution was selected as the best solution for this sample.

Table 3 Agglomeration schedule of hierarchical cluster analysis

Stage	Error Coefficient
62	1.28
63	1.44
64	1.60
65	1.79
66	1.99
67	2.37
68	2.76
69	3.25
70	3.89
71	4.62
72	6.75
73	12.17

In order to examine cluster differences, a multivariate analysis of variance (MANOVA), univariate ANOVAs, and follow-up *t*-tests were conducted on the three child behavior variables, with cluster identified as the factor. These results were conducted on the unstandardized data in order to facilitate interpretation, and are shown in Table 4. Results showed a significant multivariate effect of cluster, Wilks' $\Lambda=0.08$, $F(9, 166)=33.41$, $p<0.001$. $\eta_p^2 = 0.57$, indicating that 57% of the variability in child symptoms was accounted for by cluster differences. In addition, the clusters accounted for 74% of the variance in internalizing behavior, 54% of the variability in externalizing behavior, and 75% of the variability in PTSD symptoms. As shown in Table 4, univariate ANOVAs indicate that internalizing behaviors, externalizing behaviors, and PTSS were each significantly different across the four clusters. These results are, of course, expected from a cluster analysis, which is designed to maximize differences between clusters on each of the variables being analyzed.

The clusters represent four distinct categories of child behavior and emotional functioning: Typical, Asymptomatic, Acute PTSD, and General Distress. Children in the Typical cluster had average levels of internalizing and externalizing behaviors and relatively low levels of PTSS symptoms. Children in the Asymptomatic cluster had below average levels of internalizing and externalizing behaviors, and virtually no PTSS symptoms. Children in the Acute PTSD cluster had very high levels of PTSS, internalizing behaviors just under the CBCL borderline clinical cutoff ($t \geq 60$), and borderline clinical levels of externalizing behaviors. Children in the General Distress cluster had internalizing problems in the borderline clinical range, externalizing problems just under the borderline clinical cutoff, and mild to moderate levels of PTSS.

Exploration of Cluster Differences

We sought to determine whether clusters could be distinguished by demographic factors, maternal aggression, male partner aggression, maternal symptomatology, or child trauma history. A series of MANOVAs with subsequent ANOVAs and pairwise comparisons were performed for continuous variables, and the pattern matrix of the discriminant function was examined to assess the relative importance of each factor. Chi-square analyses were conducted for categorical demographic variables.

Demographic Variables

There were no significant differences between clusters on child's age $F(3, 70)=0.34$, $p=0.80$, child's gender, $X^2(3, N=74)=2.26$, $p=0.52$, mother's age, $F(3, 70)=0.85$, $p=0.47$, mother's ethnicity, $X^2(9, N=74)=3.62$, $p=0.94$, family income, $F(3, 67)=1.62$, $p=0.19$, whether the perpetrator was the child's biological father, $X^2(3, N=74)=1.92$, $p=0.59$, or whether the child was present at the index IPV, $X^2(3, N=71)=3.09$, $p=0.38$. There was a significant difference in mother's employment status, $X^2(3, N=74)=9.56$, $p=0.02$. More mothers of children in the Asymptomatic cluster (59%) reported that they were either employed or a student than mothers of children in the Typical (30%), Acute PTSD (14%), or General Distress (18%) clusters. Independent *t*-tests conducted for employment status across each of the predictor variables showed that employment status was only related to children's trauma history, such that unemployed mothers had children with greater trauma histories, $t(74)=2.42$, $p=0.02$. Thus, employment status was covaried in the subsequent trauma history analysis.

Table 4 Cluster descriptives and differences

Measure	Typical (N=27)	Asymptomatic (N=29)	Acute PTSD (N=7)	General Distress (N=11)	Total Sample (N=74)	<i>F</i> (3, 70)
Internalizing						
<i>M</i>	49.11 ^{ab}	36.66 ^{ab}	58.57 ^a	61.36 ^b	46.95	66.05***
(SD)	(4.74)	(4.65)	(11.01)	(5.95)	(10.92)	
Externalizing						
<i>M</i>	51.26 ^{cde}	41.14 ^{cfg}	62.29 ^{df}	58.09 ^{eg}	49.35	27.38***
(SD)	(7.10)	(7.40)	(8.28)	(4.59)	(10.16)	
PTSS						
<i>M</i>	9.41 ^h	2.17 ^{hi}	31.86 ^{hj}	12.64 ^{ij}	8.99	70.86***
(SD)	(6.05)	(3.57)	(5.52)	(4.57)	(9.64)	

^{abcfg hij} Indicates significant difference at $p<0.001$ on pairwise *t*-test with Tukey HSD correction

^d Indicates significant difference at $p<0.01$ on pairwise *t*-test with Tukey HSD correction

^e Indicates significant difference at $p<0.05$ on pairwise *t*-test with Tukey HSD correction

*** $p<0.001$

Variables Associated with Cluster Membership

Correlations between measures of maternal aggression, male partner aggression, maternal symptomatology, and trauma history, which were examined as potentially differentiating the clusters, are shown in Table 5. Means and standard deviations of these variables, along with ANOVAs, are shown in Table 6.

Maternal Aggression A MANOVA conducted across mothers' IPV perpetration, mothers' hostility, and mothers' criminal history showed that the clusters were differentiated by mothers' aggression, Wilks' $\Lambda=0.69$, $F(9, 166)=3.04$, $p=0.002$, $\eta_p^2 = 0.12$. Follow-up ANOVAs indicated that mothers' hostility, $F(3, 70)=7.51$, $p<0.001$, and marginally, mothers' IPV perpetration, $F(3, 70)=2.40$, $p=0.08$, differentiated the clusters. Pairwise comparisons, using Tukey's HSD correction, indicated that mothers of children in the Asymptomatic cluster had significantly lower levels of hostility than mothers of those in the Typical, Acute PTSD, and General Distress clusters. There were not significant differences between the clusters on mothers' IPV perpetration or criminal history. The pattern matrix of coefficients of the discriminant function was examined to determine the unique contribution of each variable to predict cluster classification, adjusting for the covariance of these three measures of maternal aggression. Cluster membership was predicted best by mother's hostility (0.89), followed by mother's IPV perpetration (0.38), and mother's criminal history (0.19).

Male Partner Aggression A MANOVA conducted across male partners' IPV perpetration, dangerousness, severity of criminal charges, and history of criminal charges, showed that the clusters were not differentiated by male partners' aggression, Wilks' $\Lambda=0.85$, $F(12, 178)=0.91$, $p=0.54$, $\eta_p^2 = 0.05$.

Follow-up ANOVAs indicated that there were no differences between the clusters on male partners' IPV perpetration, $F(3, 70)=0.40$, $p=0.76$, dangerousness, $F(3,70)=0.98$, $p=0.41$, severity of criminal charges, $F(3, 70)=1.32$, $p=0.27$, or criminal history, $F(3, 70)=0.36$, $p=0.78$.

Maternal Symptomatology A MANOVA conducted across mothers' PTSS and global distress showed that the clusters were differentiated by mothers' symptomatology, Wilks' $\Lambda=0.57$, $F(6, 138)=7.48$, $p<0.001$, $\eta_p^2 = 0.25$. Follow-up ANOVAs indicated that PTSS, $F(3, 70)=9.35$, $p<0.001$, and global distress, $F(3, 70)=14.27$, $p=0.001$, differentiated the clusters. Pairwise comparisons, using Tukey's HSD correction, indicated that mothers of children in the Asymptomatic cluster reported significantly lower levels of PTSS and global distress than mothers of children in each of the other clusters. Mothers of children in the Acute PTSD cluster reported higher levels of PTSS, but not global distress, than those in the Typical cluster. Mothers of children in the General Distress cluster reported higher levels of global distress, but not PTSS, than those in the Typical cluster. There were not significant differences in PTSS or global distress between mothers of children in the Acute PTSD and General Distress clusters. The pattern matrix of coefficients of the discriminant function was examined to determine the unique contribution of each variable to predict cluster classification, adjusting for the covariance of these two measures of maternal symptomatology. Cluster membership was more strongly predicted by global distress (0.93) than by PTSS (0.10).

Trauma History An ANOVA controlling for mothers' employment status showed that the clusters were differentiated by trauma history, $F(3, 70)=7.71$, $p<0.001$. Pairwise comparisons, using Tukey's HSD correction, indicated that children in the Asymptomatic cluster had a less extensive

Table 5 Correlations among measures of aggression, symptomatology, and trauma history

Measure	1	2	3	4	5	6	7	8	9
1. CTS2 Mother	–								
2. BSI Hostility	0.29**	–							
3. Mother's CH	0.20	0.17	–						
4. CTS2 Partner	0.35**	–0.02	0.08	–					
5. DAS	0.08	0.03	–0.01	0.53***	–				
6. Partner's SOC	–0.11	–0.03	0.27*	0.02	0.18	–			
7. Partner's CH	0.00	0.09	0.15	0.09	–0.07	0.25*	–		
8. BSI Distress	0.22	0.80***	0.18	0.06	0.22	0.16	0.09	–	
9. PCL Total	0.28*	0.64***	0.31**	0.37**	0.34**	0.35*	0.09	0.79***	–
10. TESI	0.26*	0.30**	0.23*	0.14	0.19	–0.10	–0.1	0.43***	0.47***

CTS2 Conflict Tactics Scale, Revised, DAS Danger Assessment Scale, SOC Severity of Charges, BSI Brief Symptom Inventory, CH Criminal History, PCL Posttraumatic Stress Disorder Checklist, Civilian, TESI Traumatic Events Screening Inventory
 * $p<0.05$; ** $p<0.01$; *** $p<0.001$

Table 6 Cluster differences on measures of aggression, symptomatology, and trauma history

Measure	Typical <i>M (SD)</i>	Asymptomatic <i>M (SD)</i>	Acute PTSD <i>M (SD)</i>	General Distress <i>M (SD)</i>	Total Sample <i>M (SD)</i>	<i>F</i> (3, 70)
CTS2 Mother	0.36 (.22)	0.27 (0.17)	0.46 (0.16)	0.42 (0.29)	0.34 (0.22)	2.40 [^]
BSI Hostility	55.89 ^a (11.74)	46.59 ^{abc} (9.39)	59.43 ^b (11.79)	61.64 ^c (9.64)	53.43 (11.89)	7.51 ^{***}
Mother's CH	1.52 (2.47)	1.17 (1.61)	2.29 (2.98)	0.63 (0.81)	1.32 (2.04)	1.07
CTS2 Partner	0.51 (0.48)	0.58 (0.57)	0.73 (0.35)	0.60 (0.35)	0.57 (0.49)	0.40
DAS	4.19 (2.57)	3.59 (2.63)	5.43 (2.99)	4.00 (2.45)	4.04 (2.61)	0.98
Partner's SOC	3.70 (2.05)	3.90 (2.43)	3.43 (1.51)	2.45 (1.37)	3.57 (2.11)	1.32
Partner's CH	3.59 (3.07)	4.28 (3.79)	4.29 (2.93)	4.81 (4.29)	4.11 (3.50)	0.36
BSI Distress	57.96 ^{de} (12.18)	46.79 ^{dfg} (9.89)	65.57 ^f (11.25)	68.55 ^{eg} (8.44)	55.88 (13.35)	14.27 ^{***}
PCL Total	35.48 ^{hi} (16.73)	25.31 ^{hjk} (10.34)	51.57 ^{ij} (18.21)	43.45 ^k (10.94)	34.20 (16.07)	9.35 ^{***}
TESI	3.70 ^l (2.35)	2.31 ^{mn} (1.80)	6.29 ^{lm} (2.75)	5.45 ⁿ (2.25)	3.66 (2.53)	7.71 ^{***}

CTS2 Conflict Tactics Scale, Revised, DAS Danger Assessment Scale, SOC Severity of Charges, BSI Brief Symptom Inventory; CH Criminal History, PCL Posttraumatic Stress Disorder Checklist, Civilian, TESI Traumatic Events Screening Inventory

^{cdfigjmn} Indicates significant difference at $p < 0.001$ on pairwise *t*-test with Tukey HSD correction

^{ak} Indicates significant difference at $p < 0.01$ on pairwise *t*-test with Tukey HSD correction

^{behil} Indicates significant difference at $p < 0.05$ on pairwise *t*-test with Tukey HSD correction

^{***} $p < 0.001$. [^] $p < 0.08$

trauma history than children in the Acute PTSD and General Distress clusters. Children in the Acute PTSD cluster had a more extensive trauma history than those in the Typical cluster. There were no significant differences in trauma history between children in the Acute PTSD and General Distress clusters.

A binary logistic regression was conducted to test the cumulative effects of exposure to multiple traumatic events. The number of traumatic events to which a child was exposed was used to predict whether the child was or was not in either the Acute PTSD or General Distress cluster. This regression was significant, $B = 0.52$, $SE B = 0.15$, $\chi^2(1, N = 74) = 12.37$, $p < 0.001$, and indicates that for each additional exposure to a traumatic event, the odds of a child being in either the General Distress or Acute PTSD cluster increased by 1.7 times.

Discussion

This study was the first to use cluster analysis to identify symptom patterns, and predictors of these patterns, among a community sample of children exposed to IPV. Building on the two prior cluster analyses of children residing in

battered women's shelters, this study was also the first to include measures of PTSS for classification and to include objective measures of IPV and criminal history based on police reports.

Cluster analysis revealed four distinct patterns of child functioning that were replicated in younger and older halves of the sample: Typical (36%), Asymptomatic (39%), Acute PTSD (10%), and General Distress (15%). Thus, one quarter of children living in homes where police were called due to an incident of IPV demonstrated patterns of behavioral and emotional problems. In contrast to the findings of Grych et al. (2000) and Hughes and Luke (1998), we did not find clusters of children displaying either internalizing or externalizing behaviors only. However, this was the first study to use a PTSS measure, so a different cluster solution is not unexpected. In addition, the two prior studies both used shelter samples, while we used community based sample in which specific symptom patterns may be less defined.

There is some question about interpretation of children in the Asymptomatic cluster. Mothers of these children reported below average levels of child behavior problems and trauma history as well as lower levels of their own hostility, distress, and PTSS compared to children in other clusters. Hughes and Luke (1998) found a similar cluster of

apparently high-functioning children with low levels of behavior problems and anxiety, and high self-esteem, in their cluster analysis of children residing in battered women's shelters. However, in our sample, mothers of these children did not report less aggressive male partners and there were no differences on any of the objective police report data between this and other clusters. One benefit of using a person-oriented approach like cluster analysis is that these ambiguous response patterns are more easily identified than they would be in a variable-oriented analysis. Some might question whether 39% of an urban, low-income sample of children exposed to domestic violence, and their mothers, were functioning virtually symptom free. Thus, an alternative explanation is that these mothers underreported their own and their children's symptoms. Clarifying which of these contradictory interpretations (e.g., highly resilient families versus mothers who deny clinical problems) is more accurate will have important implications for intervention. Future research that includes child self-report and/or teacher report measures would address this question by providing multiple informants of children's and mothers' functioning.

Some of the hypothesized predictors of cluster classification were confirmed. Cluster membership was distinguished by measures of maternal aggression, maternal symptomatology, and child trauma history, but not by male partner aggression. Child trauma history and maternal hostility, global distress, and PTSS primarily differentiated children who were functioning without significant problems (No Problems Reported and Typical clusters) from those who were symptomatic (Acute PTSD and General Distress clusters). These findings are consistent with evidence that mothers' distress (anxiety and hostility) predicts mothers' report of children's internalizing and externalizing behavior problems (Jarvis et al. 2005; Laor et al. 2001). In comparison to children in the Typical cluster, mothers of those in the Acute PTSD cluster had higher PTSS symptoms (but not global distress), and mothers of those in the General Distress cluster had higher global distress (but not PTSS). While this suggests that children have symptom patterns that mirror their mothers' own symptoms, differences between children in the Acute PTSD and General Distress clusters were not significant on any predictor variables. Thus, maternal aggression, male partner aggression, maternal distress, or child trauma history did not distinguish children who had high levels of PTSS from those with had broader adjustment problems.

The finding that clusters were not differentiated by any measures of male partner aggression contrasted previous research associating child maladjustment with fathers' violence toward mothers (Grych et al. 2000). It is likely that families in the current community-based sample of less severe violence differed from the shelter-based sample used

in the Grych et al. study. For example, women in a shelter are more likely to have been victims of severe violence and IPV is apt to be more one-sided, with women as the victims. Women in this sample were often still living with the perpetrator or had frequent contact with him due to shared children. They still lived within their communities without the stress of dislocation to a new city or a shelter.

Limitations There are several important limitations of this study. First, the small sample size results in a less reliable cluster analysis that must be replicated with larger samples before generalizations can be made. Second, the wide age range of the sample is both a strength and a limitation. While replication of the clusters in both the younger and older halves of the sample lends support to the cluster solution across different developmental periods, we did not have sufficient numbers of participants to examine cluster distinctions at different ages. Third, we do not have child self-report data for this sample. Children who are old enough to report on their own functioning are better reporters of internalizing behaviors than their parents (Weissman et al. 1987). In addition, using only mothers' reports makes it impossible to determine if women in the Asymptomatic cluster were under-reporting or whether their children were resilient. Finally, the sample varied in some ways from a more typical community population as indicated by the small percentage (25%) of recruitment eligible women who agreed to participate in the study. Participants were less likely to be living with or married to the perpetrator, and had cases with less serious police charges, than the pool of eligible participants based on police record review. Women living with, or married to, the perpetrator are more likely to stay with the perpetrator and would not want to disclose details of the violence, which they might fear would bring additional charges or scrutiny by law enforcement or child welfare. The same could be true of women with more serious incidents. Thus, the results from this study might not be representative of the children of women in long term relationships or those in relationships with more severe violence.

Implications and Future Directions Findings from this exploratory investigation of symptoms among children exposed to IPV suggest that distinct symptom patterns can be identified, and are related to maternal functioning and child trauma history. These findings suggest that evaluations of children exposed to IPV should include assessments of maternal functioning. Interventions should be provided to decrease maternal aggression and/or distress when significant. Treatment of depressed mothers is associated with significant improvement in child functioning, even with no direct child intervention (Weissman et al. 2006). Educating mothers about the effects of their own symptoms on their child's functioning

should be a routine component of any evaluation and treatment. Further research is needed to evaluate under what conditions treating mothers can improve their children's functioning following exposure to IPV, and to determine where to focus intervention efforts for the greatest improvements.

Because cluster analysis is an exploratory procedure, future research must also replicate the clusters found in the current study with other samples. Investigation of other child outcomes associated with IPV exposure, such as socialization and academic problems, should also be examined in person-oriented analyses with larger sample sizes. Similarly, confirmation of the predictors of distinct child symptom patterns is necessary. Replicated symptom patterns and predictors will inform interventions for children following exposure to IPV by focusing treatment efforts on the most salient factors related to their symptoms. Longitudinal studies will also be important to identify whether symptom clusters are stable over time and to identify factors associated with changes in symptom patterns.

Finally, it is notable that 75% of children in the sample did not display patterns of emotional and behavioral problems indicative of significant distress. These children had less lifetime exposure to trauma and had mothers who were less aggressive and were in less psychological distress. This finding suggests that many children exposed to IPV are resilient, provided that their mother is not overly aggressive or distressed (again, with the important caveat that this would not be the case if mothers of children in the Asymptomatic cluster were in fact under-reporting symptoms globally). Future person-oriented research that identifies additional predictors of resiliency among IPV-exposed children will be helpful to inform prevention efforts.

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