

# Development and Validation of the Subtypes of Antisocial Behavior Questionnaire

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There is converging evidence that physical aggression, rule-breaking, and social aggression constitute meaningfully distinct, if somewhat overlapping, components of the broader construct of antisocial behavior. Indeed, these subtypes appear to have different developmental trajectories, demographic correlates, and personological underpinnings. They also demonstrate important etiological distinctions. One potential limitation to accumulating additional scientific insights into the correlates and origins of these three types of antisocial behavior is the lack of an efficient self-report assessment in the public domain. We developed the 32-item Subtypes of Antisocial Behavior Questionnaire (STAB) to fill this gap. Our goal was to develop a brief measure that could reliably and validly assess each of the three major subtypes of antisocial behavior and that would be freely available for other researchers. The present series of studies provides initial evidence of the factorial validity, internal consistency, and criterion-related validity of the STAB scales. In short, it appears that the STAB is a brief and useful measure that can be used to differentiate and assess physically aggressive, rule-breaking, and socially aggressive forms of antisocial behavior. *Aggr. Behav.* 35:376–398, 2009. © 2009 Wiley-Liss, Inc.

**Keywords:** physical aggression; social aggression; rule-breaking; antisocial behavior instrument; Subtypes of Antisocial Behavior Questionnaire

## INTRODUCTION

Antisocial behaviors are actions that harm others, violate societal norms, and/or infringe on the personal or property rights of others. Typical examples include illegal actions such as vandalism, theft, and assault as well as interpersonally harmful behaviors such as the use of racial slurs and the spreading of damaging rumors. Even so, the specific manifestation of antisocial behavior varies markedly from individual to individual [Lahey and Waldman, 2003; Loeber and Stouthamer-Loeber, 1998; Offord and Bennett, 1994; White et al., 2001]. Consistent with this observation, factor analytic studies have indicated that there are at least two moderately correlated antisocial factors: an “overt” or physically aggressive/oppositional factor and a “covert” or nonaggressive/rule-breaking factor [Frick et al., 1993; Loeber and Schmalong, 1985]. This distinction is evident in both empirically derived behavioral rating scales, such as Achenbach’s Child Behavior Checklist (CBCL), and in factor analyses of conduct disorder and oppositional defiant disorder symptoms [Tackett et al., 2003, 2005]. Physical aggression (e.g., physically attacking others and bullying) and nonaggressive rule-breaking (e.g., lying, stealing

without confrontation, and vandalism) also appear to have different developmental trajectories. Physical aggression is most prevalent during the toddler years [Tremblay, 2003], after which mean levels of these behaviors steadily decrease [Stranger et al., 1997; Tremblay, 2003]. Rule-breaking, by contrast, is relatively infrequent during childhood, and increases dramatically over the course of adolescence, only to fall off again during the transition into adulthood [Stranger et al., 1997]. Moreover, physical aggression exhibits high levels of rank-order stability across development, such that those young children with the highest levels of these behaviors continue to be particularly aggressive as adults [Tremblay, 2003], whereas rule-breaking does not exhibit this high level of stability.

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Research has also supported distinctions between the correlates of physically aggressive and rule-breaking antisocial behavior, such that deficits in affective regulation are particularly characteristic of physical aggression [Burt and Donnellan, 2008; Burt and Larson, 2007; Cohen and Strayer, 1996; DeMarte, 2008; Pardini et al., 2003], whereas impulsivity appears to be more strongly associated with rule-breaking [Burt and Donnellan, 2008; DeMarte, 2008]. Physical aggression and rule-breaking also demonstrate etiological distinctions. Specifically, physical aggression appears to be more heritable than rule-breaking (i.e., genetic influences account for 65 and 48% of the variance, respectively), whereas rule-breaking is influenced more by the shared environment than is aggression (i.e., shared environmental influences account for 5 and 18% of the variance, respectively) [Burt, 2009; Tackett et al., 2005]. Recent work has also suggested that associations with particular candidate genes (namely, 5HT<sub>2A</sub> His452Tyr and DAT1) vary across physical aggression and rule-breaking [Burt and Mikolajewski, 2008], such that these particular genes are uniquely associated with rule-breaking. In short, there is converging evidence that physical aggression and nonaggressive, rule-breaking constitute two separable though correlated subtypes of antisocial behavior.

Social aggression (also described as indirect or relational aggression) constitutes yet another form of antisocial behavior, one that uses social relationships as a means of harming others. It encompasses behaviors such as gossiping, ostracism, and "stealing" friends, behaviors that can be expressed either overtly (e.g., threatening to end a friendship) or covertly (e.g., spreading rumors). Researchers have suggested that social aggression should be distinguished from other types of antisocial or aggressive behaviors [Bjorkqvist et al., 1992; Crick et al., 1997; Crick and Grotpeter, 1995; Vaillancourt et al., 2003], in part because of purported gender differences in base rates. It is proposed that girls are far less likely to engage in physical aggression but are equally or even more likely to engage in social aggression. The exclusion of social aggression from assessment batteries may thus lead researchers to overlook girls with antisocial proclivities [Crick and Zahn-Waxler, 2003]. Nonetheless, social aggression appears to be antisocial to the extent that victims of social aggression report psychological outcomes (e.g., loneliness and depressive symptoms) quite similar to those experienced by victims of physically aggressive behaviors [Crick and Bigbee, 1998; Crick et al., 2002]. In short, although the socially aggressive behaviors in

question are not necessarily illegal, they do constitute a form of antisocial behavior.

Recent evidence also suggests that social aggression may be somewhat distinct from both rule-breaking and physical aggression. For example, DeMarte [2008] found that physical aggression, rule-breaking, and social aggression comprised three oblique dimensions of antisocial behavior, findings that replicated in both normative and criminally active samples. Moreover, social aggression predicts psychological maladjustment over and above the effects of physical aggression, indicating that the harmful effects of social aggression are not redundant with other forms of antisocial behavior [Crick and Bigbee, 1998]. Social aggression also differs from the other two subtypes demographically. Social aggression may be more pronounced in females than in males [though results have been inconsistent, as some studies have reported equivalent levels of social aggression across gender; Forrest et al., 2005], a demographic pattern that does not extend to either physical aggression or rule-breaking, both of which are more common in males as compared with females [Moffitt, 2003]. Moreover, research has demonstrated that the developmental trajectory of social aggression is distinct from those of both physical aggression and rule-breaking (as described above). Social aggression is consistently observed as early as the preschool years [e.g., Crick et al., 1997; McNeilly-Choque et al., 1996], but is most common during adolescence [e.g., Cairns et al., 1989; Osterman et al., 1998]. It then remains relatively frequent until early adulthood when it decreases [e.g., Xie et al., 2005].

Finally, physical and social aggression evidence different associations with comorbid psychopathology, peer relations, and neuroendocrine functioning. Whereas physical aggression is highly comorbid with externalizing disorders, social aggression more often coexists with internalizing disorders [Crick, 1997]. Similarly, physical aggression has been associated with increased peer rejection, whereas social aggression has been associated with higher levels of peer acceptance (at least among males) [Crick et al., 1997]. Finally, social aggression appears to have unique biological correlates. Physical aggression is linked to heightened cortisol in the morning and steep declines over the course of the day. By contrast, social aggression is associated with low levels of cortisol in the morning and blunted diurnal changes during the day [Murray-Close et al., 2008]. Similarly, DeMarte [2008] found that social aggression is associated with delayed pubertal onset and more feminine finger length

ratios (which are thought to index low levels of prenatal exposure to testosterone). In sum, physical aggression, rule-breaking, and social aggression appear to be major subtypes of antisocial behavior, each with different developmental trajectories, demographic patterns, correlates, and etiological underpinnings.

### **Need for a New Instrument**

The emergence of the three constructs of physical aggression, rule-breaking, and social aggression creates a need for explicit measures of these facets of antisocial behavior. The existing literature has relied on a combination of measures to provide coverage of these three constructs or used measures that were extremely long. For example, Krueger et al. [2007] recently developed a comprehensive set of true/false items that covers the full spectrum of externalizing problems. However, the length of this instrument (415 items for the entire battery, 114 of which explicitly tap the constructs of physical aggression, rule-breaking, and social aggression) could create practical problems for many applications (i.e., longitudinal panel studies) where space and subject time constraints are a limiting factor (e.g., their true-false response option necessitates more items to achieve adequate variance and reliability). In addition, most existing measures do not assess all three of these constructs. This includes the 29-item Aggression Questionnaire [Buss and Perry, 1992] which provides good coverage of physical aggression and what they term "verbal" aggression but lacks coverage of rule-breaking, the Achenbach Adult Self-Report [Achenbach and Rescorla, 2003], which provides coverage of physical aggression and rule-breaking but lacks a scale explicitly tapping social aggression, or the Relational Aggression questionnaire [Loudin et al., 2003], which does not cover physical aggression or rule-breaking. Finally, many instruments are proprietary (e.g., the Achenbach, the Personality Assessment Inventory) and thus researchers have to pay to use them. This creates demands on limited research budgets and may force researchers to limit sample sizes, a pragmatic decision that undermines statistical power. In short, there is a gap in the literature for researchers who want a public domain and comprehensive yet relatively short measure that has separate scales for physical aggression, social aggression, and rule-breaking.

These considerations motivated us to develop the Subtypes of Antisocial Behavior Questionnaire (STAB). Our goal was to obtain a measure of

around 30 items in length that would reliably and validly assess each of the three major subtypes of antisocial behavior. We also wanted a measure that was suitable for research on college students [especially given their high rates of adolescent-limited antisocial behavior; Burt and Mikolajewski, 2008; Moffitt, 1993] and community samples, as well as "clinical" samples (i.e., individuals involved in the criminal justice system). Finally, we planned to make the measure to be freely available for other researchers in the hopes that this would lead to a faster accumulation of findings.

### **Overview of the Present Studies**

We developed and evaluated the STAB across five independent and diverse samples. The final measure has 32 items. Study 1 details the development of the STAB using a relatively large sample of college students ( $N = 400$ ; 50% women). Once the scales were constructed, we then examined how well the STAB scales related to personality as assessed via the Multidimensional Personality Questionnaire-Brief Form [MPQ-BF; Patrick et al., 2002]. We used Study 2 to further examine the psychometric properties of the STAB in an independent sample of college students ( $n = 500$ ; 50% women). Moreover, we sought to establish convergent and discriminant validity with relevant subscales in the Externalizing Spectrum Model (ESM) [Krueger et al., 2007], and to extend the personological findings from Study 1 to the Big Five domains. Study 3 was designed to provide initial evidence of criterion-related validity for the STAB by evaluating whether the scales can successfully discriminate antisocial behaviors in normative populations from those in criminally active populations. We thus collected data on a sample of 218 adjudicated adults (15% women) currently under court supervision (i.e., probation or parole) and in one of three treatment groups (i.e., substance use problems, domestic violence, or anger management). Study 4 was designed to provide additional evidence of criterion-related validity, both via mean-level comparisons with normative populations and via associations with the ESM. To do so, we collected data on a second, independent sample of adjudicated adults ( $n = 155$ , 17% women) currently under court supervision and in treatment. Study 5 assessed a community sample of adults ( $n = 402$ , 60% women) to allow for mean-level comparisons with the other sample types assessed herein (i.e., adjudicated, college student).

## STUDY 1: DEVELOPMENT OF THE 32-ITEM STAB Sample

The sample consisted of 400 undergraduate students (50% women; average age = 19) enrolled in psychology courses at a large public university in the Midwest. They participated in exchange for course credits or extra credit during Spring Semester 2007. Data were collected over the Internet using an anonymous web-based interface. The ethnic breakdown was Caucasian (87%), African-American (5%), Asian or Pacific Rim (5%), Hispanic/Latino (1%), and other (2%) ethnicities. Research protocol was approved by the Michigan State University IRB. All participants provided informed consent.

### Item Content

Items were written by the authors, both of whom study antisocial behavior. Existing instruments that measure physical aggression, rule-breaking, and social aggression were first consulted to form an initial item pool. These included the following measures: the Aggression Questionnaire [Buss and Perry, 1992]; the Delinquent Behavior Index [Burt and Donnellan, 2008; Farrington and West, 1971]; a measure of Workplace Deviance [Bennett and Robinson, 2000]; the Displaced Aggression Questionnaire [Denson et al., 2006]; a measure of peer delinquency [the Friends questionnaire; Walden et al., 2004]; a measure of antisocial behaviors among college students modified from the National Youth Survey [Elliott and Ageton, 1980; Paulhus and Williams, 2002]; the Verbal Aggressiveness Scale [Infante and Wigley, 1986]; the Richardson Conflict Response Questionnaire [Richardson and Green, 2003]; the Relational Aggression Questionnaire [Loudin et al., 2003]; and the Self-Report Aggressive Driving Questionnaire [Hennessy and Wiesenthal, 2001]. We also consulted diagnostic criteria for Conduct Disorder and Antisocial Personality Disorder as listed in the DSM-IV-TR. Items were selected for inclusion in the initial item pool based on estimated severity of the behavior in question, relevance to one of the three constructs, and readability. We then developed additional items to assess aspects of physical aggression, rule-breaking, and social aggression that were otherwise not adequately assessed. A similar strategy was followed by Denson et al. [2006] to create the Displaced Aggression Questionnaire. We derived 120 items for possible inclusion (i.e., 38 physical aggression items, 47 rule-breaking items, and 35 social aggression

items), all of which were administered to Study 1 participants.

We used the following instructions: "The following items describe a number of different behaviors. Please read each item and report how often you have done this *during the past year* using the following scale." Items were administered using a five-point scale (1 = "never," 2 = "hardly ever," 3 = "sometimes," 4 = "frequently," and 5 = "nearly all the time"). The items were written so that the time frame could be changed (e.g., past year to lifetime) and so that observers could use the same core items to provide informant reports of antisocial behavior. In this study, we made use of the stem "in the past year" and relied on self-reports.

### Personality

Participants completed the 155-item MPQ-BF [Patrick et al., 2002]. The MPQ-BF is composed of ten primary scales that coalesce into three higher-order factors: Positive Emotionality (PEM; the dispositional tendency to experience positive affect/emotions), Negative Emotionality (NEM; the dispositional tendency to experience negative affect/emotions), and Constraint (CON; reverse-scored impulsivity and behavioral restraint). Note that NEM includes an Aggression scale as one of its three subscales. Given this, although we focused our primary attention on the three higher-order factors, we also examined the MPQ-BF Aggression scale separately.

## STUDY 1 RESULTS

### Initial Item Winnowing

We first conducted a series of principal axis exploratory factor analyses (EFA) on the pool of items that were developed for each expected dimension. We forced a single-factor solution for each dimension and selected items that loaded highly on that factor (i.e.,  $>.40$ ). Following this procedure, 20 physical aggression items, 18 rule-breaking items, and 21 social aggression items were selected for further analyses. We submitted these 59 items to another principal axis EFA where we forced a three-factor solution using a promax (i.e., oblique) rotation. We selected those items that loaded cleanly on only one of the three factors (i.e., loadings greater than .40 on one factor, and less than .30 on the other factors). This process yielded 10 physical

aggression items, 11 rule-breaking items, and 11 social aggression items.<sup>1</sup>

### **EFA of 32-Item STAB**

We subjected the final set of 32 items to an additional EFA with normalized promax rotation. We used FACTOR 7.0 [Lorenzo-Seva and Ferrando, 2006] and analyzed the polychoric correlation matrix given that many of the items had asymmetric distributions. Five eigenvalues were greater than 1.0 (12.549, 3.844, 2.263, 1.311, and 1.277); however, a parallel analysis with 500 randomly generated matrices suggested three dimensions (95th percentile of random eigenvalues: 1.672, 1.576, and 1.510). A parallel analysis is superior to the K1 rule (i.e., extract the number of factors based on eigenvalues above 1.00) for deciding on the appropriate number of factors to extract [e.g., Goldberg and Velicer, 2006; Russell, 2002]. This approach is based on the consideration of the eigenvalues that emerge from random datasets that have the same sample size and items as the actual dataset. The underlying logic is that the factor analyst should only extract the number of factors that correspond to the number of eigenvalues in the real dataset that are well above the eigenvalues obtained from simulated data. See Russell [2002, p 1633] for more detail about parallel analyses.

Table I displays the pattern coefficients from the three-factor solution (structure coefficients are available upon request). The factors were moderately correlated:  $r = .34$  for the rule-breaking (I) and social aggression factors (II);  $r = .49$  for the rule-breaking (I) and physical aggression factors (III);  $r = .39$  for the social aggression (II) and physical aggression factors (III). Items generally showed relatively high independent associations (i.e.,  $\geq .40$ )

<sup>1</sup>Of our ten physical aggression items, two appear to relate more specifically to anger (i.e., “got angry quickly,” “had trouble controlling temper”). Importantly, however, several of the most frequently used measures of physical aggression include items that directly or indirectly tap anger. For example, the nine-item Physical Aggression scale in the Buss and Perry [1992] Aggression Questionnaire includes items that at least indirectly tap anger (i.e., “I have become so mad that I have broken things;” “There are people who pushed me so far that we came to blows”), as do at least two of six items on the Physical Aggression scale in the Personality Assessment Inventory (PAI). In short, items tapping anger are frequently included in measures of physical aggression. Nonetheless, we re-ran analyses linking our scales to criterion-related variables omitting those items to ensure that our results were not dependent on these items. Associations were essentially identical to those reported herein. Such findings suggest that the presence of anger items does not change the positioning of our physical aggression scale in the broader nomological net.

with their respective factor and generally low cross-loadings (i.e.,  $\leq .30$ ). However, a handful of the physical aggression items with content involving threatening, hitting, or fighting others tended to cross-load on the rule-breaking factor (e.g., “threatened others,” “felt better after hitting,” “Got into fights more than the average person”). In psychological terms, this may reflect the fact that acts of physical aggression also tend to violate local rules and norms. Moreover, selecting items that are purely unidimensional would be a stringent requirement for our scale development efforts that is very difficult to achieve in practice; indeed, prominent factor analysts have noted that “there are few factor univocal items, most items have secondary factor loadings of substantial size” (p 230) [Goldberg and Velicer, 2006]. Similar pattern loadings and factor correlations were obtained when we analyzed the correlation matrix rather than the polychoric correlation matrix. Scales created from these items had relatively high levels of internal consistency as seen in Table I (all  $\alpha$ 's  $\geq .85$ ). The average inter-item  $r$  for physical aggression items was .37, the average inter-item  $r$  for social aggression items was .36, and the average inter-item  $r$  for rule-breaking items was .38.

### **Correlations with Personality Traits**

Associations between the resulting STAB scales and the MPQ-BF superfactors are reported in Table II. Table II displays zero-order correlations and partial correlations controlling for the overlap between the STAB scales. The latter are important given the oblique nature of our scales (i.e., these partial correlations capture subtype-specific associations with personality). Importantly, results suggest that physical aggression, social aggression, and rule-breaking were linked to relatively distinct personality configurations, even when controlling for overlap with the other STAB scales. Physical aggression was associated with high NEM and low CON whereas social aggression was uniquely associated with high NEM. Rule-breaking was associated with all three personality dimensions. The association with physical aggression may partially reflect the fact that NEM includes an Aggression subscale (which was correlated .58 with the STAB physical aggression measure as compared with .24 for social aggression and .42 for rule-breaking). In any case, such findings hint at potentially important distinctions between subtypes of antisocial behavior in terms of their personality correlates.

**TABLE I.** Pattern Coefficients for 32-Item STAB (Study 1)

	I	II	III
Physical aggression ( $\alpha = .85$ )			
Felt like hitting people	-.09	.13	.61
Got angry quickly	-.25	.29	.45
Hit back when hit by others	.12	-.23	.66
Threatened others	.42	-.08	.53
Had trouble controlling temper	-.02	.32	.54
Hit others when provoked	.30	-.13	.69
Got into fights more than the average person	.49	.01	.37
Swore or yelled at others	-.04	.24	.42
Got into physical fights	.55	-.25	.48
Felt better after hitting	.40	.02	.49
Social aggression ( $\alpha = .86$ )			
Blamed others	.15	.51	-.04
Tried to hurt someone's feelings	.11	.41	.27
Made fun of someone behind his/her back	.44	.81	.48
Excluded someone from group activities when angry with him/her	.06	.68	.00
Intentionally damaged someone's reputation	.38	.50	-.05
Tried to turn others against someone when angry with him/her	.16	.91	-.17
Gave someone the silent treatment when angry with him/her	.03	.51	-.04
Called someone names behind his/her back	-.06	.62	.02
Revealed someone's secrets when angry with him/her	.41	.53	-.17
Was rude towards others	.12	.54	.04
Made negative comments about other's appearance	.05	.55	.07
Rule-breaking ( $\alpha = .87$ )			
Broke into a store, mall or warehouse	.89	.00	-.02
Broke the windows of an empty building	.91	.02	-.07
Shoplifted things	.73	.14	-.05
Littered public areas by smashing bottles, tipping trash cans, etc.	.73	-.05	.03
Stole a bicycle	.88	.06	-.09
Stole property from school or work	.63	.16	.07
Left home for an extended period of time without telling family/friends	.72	.09	-.06
Sold drugs, including marijuana	.83	.01	.06
Was suspended, expelled, or fired from school or work	.77	-.07	.10
Had trouble keeping a job	.80	.05	.01
Failed to pay debts	.56	.21	-.04

**TABLE II.** Associations Between the STAB Scales and Personality Traits (Study 1)

	Positive Emotionality		Negative Emotionality		Constraint	
	r	Partial r	r	Partial r	r	Partial r
<b>STAB Scale</b>						
Physical aggression	-.04	.05	.42*	.26*	-.21*	-.12*
Social aggression	-.05	-.01	.35*	.20*	-.06	.06
Rule-breaking	-.17*	-.16*	.32*	.11*	-.24*	-.17*

Partial correlations control for other STAB scales. For example, the partial correlations for personality and Physical aggression control for Social Aggression and Rule-breaking.

\* $P < .05$ .

## STUDY 2: PSYCHOMETRIC REPLICATION AND CRITERION-RELATED VALIDITY OF THE STAB

### Sample

This sample consisted of 500 undergraduate students (50% women; average age = 19) enrolled in psychology courses at a large public university in

the Midwest. College students participated in exchange for course credits or extra credit during Fall Semester 2007. Data were collected over the Internet using an anonymous web-based interface. The ethnic breakdown was Caucasian (84%), African-American (5%), Asian or Pacific Rim (8%), Hispanic/Latino (1%), and other (2%)

ethnicities. Research protocol was approved by the Michigan State University IRB. All participants provided informed consent.

## Measures

**Antisocial behaviors.** Participants completed the 32-item STAB (all  $\alpha > .77$ ; see Table III), again reporting on behaviors during the past year. Participants also completed the 114 antisocial behavior items from the ESM [Krueger et al., 2007]. They specifically completed the following ESM scales: Physical Aggression, Relational Aggression, Theft, Rebelliousness, Destructive Aggression, Honesty, and Fraud. The scale names are generally quite reflective of item content with the exception of Destructive Aggression, which includes items that inquire about vandalism and the destruction of property as opposed to acts of personal

violence perpetrated on others (e.g., "I have vandalized public property just for kicks"). We selected these particular scales both because their content maps to the STAB scales and because this measure was not consulted during the item generation phase of STAB. Accordingly, comparison with these scales allows us to meaningfully assess both the convergent and discriminant validity of the STAB. We expected that the physical aggression and social aggression scales would be strongly associated with Physical Aggression and Relational Aggression, respectively, and more weakly associated with Theft, Rebelliousness, Destructive Aggression, Honesty, and Fraud. We further expected rule-breaking to be strongly associated with Theft, Rebelliousness, Destructive Aggression, Honesty, and Fraud, and more weakly associated with Physical Aggression and Relational Aggression. Reliability information for these scales is reported in Table V.

**TABLE III. Pattern Coefficients for 32-Item STAB (Study 2)**

	I	II	III
Physical aggression ( $\alpha = .84$ )			
Felt like hitting people	-.18	.15	.69
Got angry quickly	-.36	.39	.48
Hit back when hit by others	.03	-.09	.68
Threatened others	.11	.18	.55
Had trouble controlling temper	-.04	.26	.45
Hit others when provoked	.13	-.12	.74
Got into fights more than the average person	.37	.00	.49
Swore or yelled at others	-.02	.31	.39
Got into physical fights	.31	-.14	.68
Felt better after hitting	.18	-.03	.65
Social aggression ( $\alpha = .85$ )			
Blamed others	-.07	.63	.01
Tried to hurt someone's feelings	.17	.53	.08
Made fun of someone behind his/her back	-.05	.58	.07
Excluded someone from group activities when angry with him/her	.11	.74	-.12
Intentionally damaged someone's reputation	.50	.44	-.04
Tried to turn others against someone when angry with him/her	.26	.71	-.14
Gave someone the silent treatment when angry with him/her	-.04	.49	.04
Called someone names behind his/her back	-.01	.68	-.03
Revealed someone's secrets when angry with him/her	.21	.56	-.07
Was rude towards others	-.20	.62	.19
Made negative comments about other's appearance	-.02	.58	.03
Rule-breaking ( $\alpha = .78$ )			
Broke into a store, mall or warehouse	.99	-.10	-.06
Broke the windows of an empty building	.82	-.08	.07
Shoplifted things	.77	.04	-.02
Littered public areas by smashing bottles, tipping trash cans, etc.	.76	-.06	.05
Stole a bicycle	.75	-.01	.04
Stole property from school or work	.67	.13	-.01
Left home for an extended period of time without telling family/friends	.54	.16	.01
Sold drugs, including marijuana	.86	-.10	-.03
Was suspended, expelled, or fired from school or work	.70	-.08	.15
Had trouble keeping a job	.67	.07	.04
Failed to pay debts	.59	-.09	-.09

**Personality.** Participants completed the 50-item International Personality Item Pool-Five Factor Model [IPIP-FFM; Goldberg, 1999], a measure of the Big Five factors of personality: Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Intellect/Imagination (or Openness). As compared with the MPQ-BF, the Big Five represents the more dominant structural model of personality structure in the literature, and it was thus important to extend our prior personality findings to the Big Five. That said, the two personality models tap many of the same constructs: Neuroticism is akin to NEM (especially the Stress Reaction scale), Conscientiousness is akin to CON, and Extraversion is akin to PEM. Agreeableness includes aspects of low NEM (i.e., the Aggression and Alienation scales) and high PEM (i.e., the Social Closeness scale). Big Five reliability information is reported in Table VI.

## STUDY 2 RESULTS

### EFA

We subjected the 32 STAB items to an EFA with a normalized promax rotation based on the polychoric correlation matrix using FACTOR 7.0 [Lorenzo-Seva and Ferrando, 2006]. Six eigenvalues were greater than 1.0 (11.914, 3.452, 2.100, 1.226, 1.179, and 1.039); however, a parallel analysis with 500 random matrices once again suggested three dimensions (95th percentile of random eigenvalues: 1.588, 1.506, and 1.445). Pattern loadings (see Table III) were quite similar to those reported in Study 1. To quantify this impression, we calculated Tucker congruence coefficients for the pattern loadings for the three factors; these were acceptably high (coefficients = .95, .96, and .94 for factors I, II, and III, respectively). Moreover, many of the cross-loadings observed in Study 1 did not clearly replicate in this study. We thus concluded that there was additional support for the three-factor structure of the STAB.

### Confirmatory Factor Analysis (CFA)

Although the EFA results were consistent across Studies 1 and 2, a more rigorous evaluation of the three factor model underlying the STAB would be accomplished using CFA. However, the evaluation of model fit within a CFA context is adversely affected by unspecified but nonetheless minor cross-loadings [Lee and Ashton, 2007]. Indeed, the two previous EFA results indicated that most items had

minor relations with other factors and thus cross-loadings would be present. At the same time, we also suspected that many of the cross-loadings would be sample specific given the subtle differences between the EFA results in Studies 1 and 2. One solution to the issue of fluctuating cross-loadings is to construct item parcels for use in the CFA such that item specific idiosyncrasies are potentially “washed out” in the process of aggregation. The advantages of creating parcels of related items is that true error variance and item-specific variance are minimized (i.e., they account for less overall variance in the newly created composite) whereas true score variance is increased [see Little et al., 2002, pp 155–158]. Put differently, combining a number of relatively imperfect items results in a composite measure that typically has more desirable psychometric properties than any of the individual single items. This is the same rationale behind the practice of summing related items into scales for use in typical data analytic contexts.

We thus created three parcels of items for each of our hypothesized latent variables. We first rank-ordered the pattern coefficients from Study 1 for each primary factor and then selected items according to this ordering. For example, for physical aggression, Parcel 1 contained the 1st best coefficient (i.e., “Hit others when provoked”), the 6th best coefficient (“Felt better after hitting”), and the 7th best coefficient (“Got into physical fights”). Parcel 2 contained the 2nd best coefficient (“Hit back when hit by others”), the 5th best coefficient (“Threatened others”), and 8th best coefficient (“Got angry quickly”). Parcel 3 contained the 3rd best coefficient (“Felt like hitting people”), the 4th best coefficient (“Had trouble controlling temper”), the 9th best coefficient (“Swore or yelled at others”), and the 10th best coefficient (“Got into fights more than the average person”). A similar strategy was followed to create parcels out of the social aggression and rule-breaking items. A total of 498 participants had parcel level data.

An inspection of descriptive statistics indicated that the three rule-breaking parcels were considerably kurtotic (range of values: 6.709–10.494) and skewed (range of values: 2.431–2.934). As the data departed from multivariate normality assumptions, we elected to use the Mplus program (version 5.2) to conduct the CFA so we could use maximum likelihood estimation with robust standard errors (MLR). Factor variances were fixed to 1.0 and all parcel loadings and factor

covariances were freely estimated. The fit for the initially specified model was more or less acceptable ( $\chi^2 = 75.102$ ,  $df = 24$ ;  $CFI = .973$ ;  $TLI = .960$ ;  $RMSEA = .065$ ). This judgment was based on the common rule of thumb that adequate models should have CFI and TLI values of around .95 or higher as well as RMSEA values less than .08 [see Brown, 2006, p 87].

Nonetheless, we examined modification indices to identify sources of misfit. We then evaluated whether the inclusion of any additional parameters would change the substantive interpretations we drew from the model. We focused only on modifications associated with parcel cross-loadings (i.e., we ignored correlated parcel-specific residuals). The largest value was associated with a secondary loading from the first physical aggression parcel to the rule-breaking latent factor. Accordingly, we specified this loading and the fit generally improved ( $\chi^2 = 60.825$ ,  $df = 23$ ;  $CFI = .980$ ;  $TLI = .969$ ;  $RMSEA = .057$ ). Relevant results are reported in Table IV. As seen there, the unanticipated pattern loading was not substantial (.196). Correlations between latent factors were as follows (note that because latent factors are attenuated for measurement error, these correlations are slightly higher than those among the observed STAB scales): physical aggression and social aggression:  $r = .61$ ; physical aggression and rule-breaking:  $r = .44$ ; and social aggression and rule-breaking:  $r = .42$ . When viewed in conjunction with the EFA results from Study 2, these results suggest that a three-factor structure for STAB was more or less reasonable and replicable.

### **Associations with Krueger et al. [2007] ESM Scales**

The associations between the STAB scales and the Krueger et al. [2007] ESM scales are presented in Table V. As seen there, the STAB physical aggression scale was strongly correlated with the ESM Physical Aggression scale ( $r = .67$ ). This strong association across physical aggression scales persisted even when controlling for the other two STAB scales (partial  $r = .59$ ) and, moreover, was significantly larger than the partial correlations between STAB physical aggression and the other ESM scales ( $\Delta\chi^2 \geq 58.5$  on 1 df, all  $P$ 's  $< .0001$ ; remaining partial  $r$ 's  $\leq .19$ ). Furthermore, the unique association of ESM Physical Aggression with STAB physical aggression was significantly larger ( $\Delta\chi^2 \geq 29.8$  on 1 df, both  $P$ 's  $< .0001$ ) than its corresponding associations with STAB social aggression and rule-breaking

(partial  $r$ 's =  $-.15$  and  $.32$ , respectively). Similarly, the STAB social aggression scale was strongly associated with the Relational Aggression scale ( $r = .64$ ; partial  $r = .50$ ). Associations between the STAB social aggression scale and all other ESM scales were significantly smaller (remaining partial  $r$ 's  $\leq .26$ ;  $\Delta\chi^2 \geq 19.9$  on 1 df, all  $P$ 's  $< .000$ ). Moreover, the unique association of ESM Relational Aggression with STAB social aggression was significantly larger than its corresponding partial correlations with STAB physical aggression and rule-breaking (partial  $r$ 's =  $.19$  and  $.15$ , respectively;  $\Delta\chi^2 \geq 31.6$  on 1 df, both  $P$ 's  $< .001$ ). Such results provide clear evidence of convergent and discriminant validity for the STAB physical aggression and social aggression scales.

As expected, the STAB rule-breaking scale was strongly correlated with several measures in the ESM, namely Theft, Fraud, Rebelliousness, and Destructive Aggression ( $r$ 's between  $.52$  and  $.64$ ). This overlap persisted when variance shared with the other STAB scales were controlled (i.e., the partial correlations were also strong, ranging from  $.46$  to  $.59$ ). Moreover, these unique associations of ESM Theft, Fraud, Rebelliousness, and Destructive Aggression with STAB rule-breaking were significantly larger than their corresponding partial correlations with STAB physical and social aggression ( $\Delta\chi^2 \geq 13.3$  on 1 df, all  $P$ 's  $< .001$ ). By contrast, the unique associations of the STAB rule-breaking scale with ESM Physical Aggression and Relational Aggression scales (i.e., partial  $r$ 's =  $.32$  and  $.15$ , respectively) were significantly smaller than its partial correlations with ESM Theft, Fraud, Rebelliousness, and Destructive Aggression ( $\Delta\chi^2 \geq 6.8$  on 1 df, all  $P$ 's  $< .01$ ). Indeed, the only ESM scale that did not perform as expected was Honesty, which was moderately associated with all three STAB scales. Nevertheless, the totality of the evidence leads us to conclude that the STAB rule-breaking scale also has convergent and discriminant validity. In sum, these results provide good evidence of criterion-related validity for all three STAB scales.

### **Associations with the Big Five**

Associations between the STAB scales and the Big Five scales are reported in Table VI. Results again suggest that the three STAB scales were uniquely associated with relatively distinct personality attributes (i.e., personality results are more distinct when considering partial correlations as opposed to the zero-order correlations). As in study 1, both social

**TABLE IV. CFA Results for the STAB Using Item Parcels (Studies 2, 3, 4, and 5)**

Study	Parcels	Physical aggression	Social aggression	Rule-breaking	<i>R</i> <sup>2</sup>
Study 2 (college sample, <i>n</i> = 500)	Physical aggression				
	Parcel 1	.604		.196	.508
	Parcel 2	.839			.704
	Parcel 3	.863			.745
	Social aggression				
	Parcel 1		.838		.702
	Parcel 2		.792		.628
	Parcel 3		.887		.787
	Rule-breaking				
	Parcel 1			.782	.611
	Parcel 2			.739	.545
	Parcel 3			.789	.622
Study 3 (adjudicated sample, <i>n</i> = 218)	Physical aggression				
	Parcel 1	.631		.281	.694
	Parcel 2	.884			.781
	Parcel 3	.913			.833
	Social aggression				
	Parcel 1		.798		.636
	Parcel 2		.784		.615
	Parcel 3		.835		.697
	Rule-breaking				
	Parcel 1			.811	.657
	Parcel 2			.464	.215
	Parcel 3			.734	.539
Study 4 (adjudicated sample, <i>n</i> = 155)	Physical aggression				
	Parcel 1	.632		.294	.736
	Parcel 2	.853			.728
	Parcel 3	.910			.829
	Social aggression				
	Parcel 1		.819		.670
	Parcel 2		.715		.512
	Parcel 3		.898		.806
	Rule-breaking				
	Parcel 1			.735	.540
	Parcel 2			.655	.430
	Parcel 3			.845	.714
Study 5 (community adult sample, <i>n</i> = 398) Past Year report	Physical aggression				
	Parcel 1	.577		.211	.500
	Parcel 2	.883			.780
	Parcel 3	.911			.831
	Social aggression				
	Parcel 1		.819		.671
	Parcel 2		.825		.681
	Parcel 3		.891		.794
	Rule-breaking				
	Parcel 1			.802	.644
	Parcel 2			.504	.254
	Parcel 3			.827	.683

Completely Standardized Pattern Coefficients Reported.

and physical aggression were associated with high Neuroticism, whereas physical aggression was also associated with low Agreeableness. Rule-breaking was associated with Agreeableness, Conscientious-

ness, and to a lesser extent, Neuroticism. Such findings further highlight the presence of relatively distinct personality correlates of the three subtypes of antisocial behavior.

**TABLE V. Associations Between the STAB Scales and the Externalizing Spectrum Model (ESM) Scales (Study 2)**

	STAB Scales					
	Physical aggression ( $\alpha = .84$ )		Social aggression ( $\alpha = .85$ )		Rule-breaking ( $\alpha = .78$ )	
	<i>r</i>	Partial <i>r</i>	<i>r</i>	Partial <i>r</i>	<i>r</i>	Partial <i>r</i>
ESM Scales ( $\alpha$ )						
Physical aggression (.77)	.67*	.59*	.30*	-.15*	.48*	.32*
Relational aggression (.85)	.49*	.19*	.64*	.50*	.37*	.15*
Theft (.75)	.28*	.02	.23*	-.01	.64*	.59*
Fraud (.71)	.41*	.10*	.45*	.26*	.57*	.46*
Rebelliousness (.81)	.29*	.09*	.20*	-.02	.52*	.46*
Destructive aggression (.84)	.32*	.11*	.22*	-.04	.59*	.53*
Honesty (.83)	-.30*	-.07	-.37*	-.23*	-.34*	-.21*

Partial correlations control for other STAB scales. For example, the partial correlation between ESM Physical Aggression and STAB Physical Aggression controls for STAB Social Aggression and Rule-breaking.

\* $P < .05$ .

**TABLE VI. Associations Between the STAB Scales and the Big Five (Study 2)**

	STAB Scales					
	Physical aggression		Social aggression		Rule-breaking	
	<i>r</i>	Partial <i>r</i>	<i>r</i>	Partial <i>r</i>	<i>r</i>	Partial <i>r</i>
Big Five Dimension ( $\alpha$ )						
Extraversion (.89)	.00	-.01	.03	.03	.00	.00
Agreeableness (.82)	-.33*	-.20*	-.22*	-.02	-.32*	-.20*
Conscientiousness (.82)	-.17*	-.02	-.20*	-.09	-.28*	-.21*
Neuroticism (.88)	.38*	.24*	.41*	.28*	.11*	-.11*
Intellect/Imagination (.80)	-.01	.01	-.01	.00	-.06	-.06

Partial correlations control for other STAB scales. For example, the partial correlation between Agreeableness and Physical Aggression are calculated controlling for Social Aggression and Rule-breaking.

\* $P < .05$ .

### STUDY 3: INITIAL EVIDENCE OF CRITERION-RELATED VALIDITY FOR THE STAB IN A CLINICAL SAMPLE

The primary objectives of Study 3 were to confirm the factor analytic structure of the STAB in a criminally active sample and to establish links between the STAB scales and reports of criminal convictions. We also wanted to compare mean levels of the STAB scales across different types of offenders and compare average levels of the STAB scales in a criminally active/clinical sample to those in college and community samples (the latter of which is presented in Study 5).

#### Sample

Participants were drawn from an outpatient psychiatric treatment facility for adjudicated adults ( $n = 218$ ; 15% women). Clients at these facilities

were either on parole or probation and were mandated to attend group therapy by the court system. Treatment groups were centered on one of three themes: substance abuse ( $n = 82$ ), domestic violence ( $n = 117$ ), and anger management ( $n = 19$ ). The average participant had been convicted of just over two crimes (with a range of 1–22 convictions) ranging from petty theft to sexual offenses. Of these, approximately 40% were violent or physically aggressive offenses (e.g., mugging, assault, sexually based offenses). The average age was 30 years old ( $SD = 10$  years; range = 18–65 years). The ethnic breakdown was 59% Caucasian, 21% African-American, 13% Hispanic/Latino, and 7% other. Participants received a small financial incentive (\$15). Research protocol was approved by the Michigan State University IRB. All participants provided informed consent.

**TABLE VII.** Comparison of Groups Within Adjudicated Sample (Study 3)

	Substance abuse (n = 82)		Domestic violence (n = 117)		Anger management (n = 19)	
	M	SD	M	SD	M	SD
<b>Criminal History</b>						
No. of convicted crimes ( $F(2, 215) = 2.6, P = .08$ )	2.01	1.23	2.44	1.84	1.74	1.79
No. of convicted violent crimes ( $F(2, 215) = 59.7, P < .01$ )	.28	.59	1.27	.64	1.32	.95
% violent crimes ( $F(2, 215) = 124.4, P < .01$ )	.12	.25	.70	.31	.88	.21
<b>STAB Scales, past year</b>						
Physical aggression ( $\alpha = .91; F(2, 215) = 4.5, P = .01$ )	20.21	6.84	22.80	7.57	24.68	7.69
Social aggression ( $\alpha = .83; F(2, 215) = 3.6, P = .03$ )	20.78	4.61	22.73	5.63	22.79	5.11
Rule-breaking ( $\alpha = .71; F(2, 215) = 4.0, P = .02$ )	14.06	4.03	15.70	4.06	15.26	3.00

Mean levels of the STAB scales generally differed across the treatment groups, as indicated by one-way ANOVAs ( $F$ -test results are presented on the left side of the table).

## Measures

Participants completed the 32-item STAB (internal consistency reliabilities are again good, all  $\alpha > .70$ ; as presented in Table VII). As with the two prior studies, they again reported on behaviors only during the last year. We also collected information on the lifetime number of criminal convictions (those offenses that were formally prosecuted), and the number of these convictions that were violent in nature (i.e., involved physically hurting another person), via two single items. Though these are admittedly crude measures of the prevalence of criminal offenses, they nevertheless allowed us to evaluate associations between the STAB and a measure of criminal activity.

We also administered a reading screen to ensure that participants had the requisite reading ability. In particular, we made use of the Test of Word Reading Efficiency [TOWRE; Torgesen et al., 1999], a brief measure that captures sight word reading ability. TOWRE data was missing for only one participant. The average reading grade equivalent was 9.80, with 12% of the sample falling at or below a 5th grade reading level. Analyses were conducted first on the full adjudicated sample, and then repeated excluding those with reading difficulties. Similar results emerged in either case, and thus results are reported on the former (the latter are available upon request).

## STUDY 3 RESULTS

### CFA

We used the same item parcels for the CFA as were used in Study 2. Mplus 5.2 was again used for analyses with the MLR estimator. We also specified

the secondary cross-loading identified in Study 2 (involving the first aggression parcel and the rule-breaking factor). Results are reported in Table IV. The fit for the initially specified model was more or less acceptable ( $\chi^2 = 55.778, df = 23; CFI = .962; TLI = .941; RMSEA = .081$ ). The largest modification index value suggested that a cross-loading from the physical aggression factor to the last social aggression parcel would improve fit. Although overall fit improved ( $\chi^2 = 43.049, df = 22; CFI = .976; TLI = .961; RMSEA = .066$ ), the added cross-loading was actually negative (-.41) and it caused the primary loading for this parcel to exceed 1.0 (1.19). Although a completely standardized loading above 1.0 is possible [see Brown, 2006, p 149], we elected to retain our original model in light of the possibility of over-fitting. Correlations between latent factors were as follows (as before, because latent factors are attenuated for measurement error, these correlations are slightly higher than those among the observed STAB scales): physical aggression and social aggression:  $r = .67$ ; physical aggression and rule-breaking:  $r = .61$ ; and social aggression and rule-breaking:  $r = .37$ .

### Associations Between the Past-Year STAB Scales and Lifetime Criminal Convictions

The past-year physical aggression and rule-breaking scales were correlated with self-reported lifetime number of convictions (both  $r$ 's = .24,  $P$ 's < .05) whereas social aggression was not ( $r = .13, P = .057$ ). The pattern of results using partial correlations was similar (physical aggression: partial  $r = .14, P < .05$ ; rule-breaking: partial  $r = .14, P < .05$ ; social aggression: partial  $r = -.03, P = .634$ ). In terms of violent crimes, all three scales had significant zero-order associations ( $r = .31, .27,$

and .16, for physical aggression, rule-breaking, and social aggression, respectively); however, only physical aggression and rule-breaking had statistically significant partial correlations with number of violent convictions (partial  $r = .20$  and  $.14$ , respectively). Variance unique to the social aggression scale was not significantly associated with self-reported violent crime (partial  $r = -.04$ ,  $P = .543$ ). Collectively, these results suggest that at least two of the three STAB scales are associated with criminal convictions, and that relations are primarily evident for those scales actively assessing actual criminal acts (viz. physical aggression and rule-breaking).

### **Comparison of Treatment Groups**

We next compared treatment groups (see Table VII) on the STAB scales, number of convicted crimes, number of violent convicted crimes, and the proportion of convicted crimes that were violent in nature (i.e., no. of violent convictions/no. of total convictions). Members of the substance abuse treatment groups reported far fewer violent criminal convictions than those in the other groups, as evaluated via independent samples  $t$ -tests (Cohen's  $d$  effect size comparing the substance group to a combined domestic violence and anger management group was  $1.56$ ,  $P < .01$ ) and somewhat fewer overall criminal convictions, though not significantly so (Cohen's  $d = 0.22$ , ns). It thus appears that the substance abuse treatment group contained individuals engaging in relatively low levels of violent antisocial behavior. Importantly, this pattern persisted to the STAB scales (Cohen's  $d$  comparing the substance group to a combined domestic violence and anger management group ranged from  $0.38$  to  $0.40$ , all  $P$ 's  $< .01$ ; again evaluated via independent samples  $t$ -tests), suggesting that the STAB is also able to detect differences in antisocial activity even within high-risk clinical samples.

### **STUDY 4: ADDITIONAL EVIDENCE OF THE CRITERION-RELATED VALIDITY FOR THE STAB IN A CLINICAL SAMPLE**

The objectives of Study 4 were to confirm links between the STAB scales and reports of criminal convictions in an independent adjudicated sample, as well as to constructively replicate treatment group comparisons and associations with a related measure (i.e., the ESM) in a criminally active sample. We also sought to offer additional confirmation of the STAB factor analytic structure. Finally, we compared average levels of the general STAB scales

in this sample to those in a community sample (results are presented as part of Study 5).

### **Sample**

Participants were drawn from the outpatient psychiatric treatment facility described in Study 3. Only participants who did not participate in Study 3 were eligible for participation in this study ( $n = 155$ ; 17% women). Treatment groups were centered on one of three themes: substance problems/abuse ( $n = 58$ ), domestic violence ( $n = 82$ ), and economic crimes ( $n = 15$ ; e.g., fraud, check forgery, etc.). The average participant had been convicted of 2.73 crimes (with a maximum of 15 convictions) ranging from petty theft to sexual offenses. The average age was 33 years old ( $SD = 11$  years; range = 18–65 years). The ethnic breakdown was 55% Caucasian, 22% African-American, 10% Hispanic/Latino, and 13% other. Participants received a small financial incentive (\$15) for their time. Research protocol was approved by the Michigan State University IRB. All participants provided informed consent.

### **Measures**

**Antisocial behaviors.** Participants completed the 32-item STAB (all  $\alpha \geq .80$ ; as presented in Table VIII). However, unlike in prior studies, they reported on behaviors in general (i.e., without regard to a specific time period), an assessment strategy that we expected to capture typical or trait-like levels of antisocial behavior. We also collected information on the lifetime number of criminal convictions and the number of these convictions that were violent in nature via the same two items administered in Study 3. Participants completed 114 antisocial behavior items from the ESM [Krueger et al., 2007; ESM scales: Physical Aggression, Relational Aggression, Theft, Rebelliousness, Destructive Aggression, Honesty, and Fraud], as examined in Study 2. Reliability information for these scales is reported in Table VIII.

**Reading ability.** We again administered the TOWRE reading screen [Torgesen et al., 1999] to ensure that participants had the requisite reading ability. The average reading grade equivalent was 9.32, with 17% of the sample falling at or below a 5th grade reading level. As before, analyses were conducted first on the full sample, and then repeated excluding those with reading difficulties. Similar results emerged in either case, and thus results are reported on the former (the latter are available upon request).

**TABLE VIII.** Associations Between the STAB Scales and the Externalizing Spectrum Model (ESM) Scales (Study 4)

	STAB Scales					
	Physical aggression ( $\alpha = .89$ )		Social aggression ( $\alpha = .84$ )		Rule-breaking ( $\alpha = .80$ )	
	<i>r</i>	Partial <i>r</i>	<i>r</i>	Partial <i>r</i>	<i>r</i>	Partial <i>r</i>
ESM Scales ( $\alpha$ )						
Physical aggression (.86)	.80*	.60*	.58*	.00	.65*	.31*
Relational aggression (.70)	.50*	.06	.62*	.39*	.50*	.18*
Theft (.85)	.43*	.00	.39*	-.03	.70*	.60*
Fraud (.81)	.35*	-.19*	.50*	.29*	.60*	.48*
Rebelliousness (.87)	.43*	-.04	.50*	.22*	.62*	.44*
Destructive aggression (.91)	.52*	.10	.48*	.08	.69*	.52*
Honesty (.81)	-.30*	.16	-.41*	-.18*	-.57*	-.46*

Partial correlations control for other STAB scales. For example, the partial correlation between ESM Physical Aggression and STAB Physical Aggression controls for STAB Social Aggression and Rule-breaking.

\* $P < .05$ .

## STUDY 4 RESULTS

### CFA

We used the same item parcels and CFA analyses as used in Studies 2 and 3. We fit the model identified in Study 2 and the overall fit was acceptable ( $\chi^2 = 31.072$ ,  $df = 23$ ;  $CFI = .988$ ;  $TLI = .981$ ;  $RMSEA = .048$ ). Table IV displays the standardized parameters from this model. Correlations between latent factors were as follows (as a reminder, latent factors are attenuated for measurement error, and thus these correlations are slightly higher than those among the observed STAB scales): physical aggression and social aggression:  $r = .74$ ; physical aggression and rule-breaking:  $r = .67$ ; and social aggression and rule-breaking:  $r = .695$ . When combined with the factor analytic results from Studies 1, 2, and 3, these results support the hypothesized three-factor structure for the STAB.

### Associations Between the STAB Scales and Lifetime Criminal Convictions

The physical aggression and rule-breaking scales were moderately correlated with the overall number of lifetime convictions ( $r$ 's = .39 and .50, respectively,  $P$ 's  $< .05$ ), as was social aggression ( $r = .35$ ,  $P < .05$ ). In terms of violent crimes, all three scales again had significant zero-order associations ( $r = .42$ , .35, and .31, for physical aggression, rule-breaking, and social aggression, respectively). Both sets of correlations appear stronger than those reported in Study 3, which may reflect the fact that the STAB scales in this study were assessed using something akin to a lifetime or trait-like assessment (rather than just the past year, as in Study 3). Moreover, the pattern of partial correlations in these

data was far more specific. Only rule-breaking remained significantly associated with the overall number of crimes once we controlled for overlap among the STAB measures (physical aggression: partial  $r = .08$ ,  $P = .35$ ; rule-breaking: partial  $r = .34$ ,  $P < .05$ ; social aggression: partial  $r = .04$ ,  $P = .62$ ). By contrast, only physical aggression remained significantly associated with number of violent crimes (physical aggression: partial  $r = .24$ ,  $P < .05$ ; rule-breaking: partial  $r = .10$ ,  $P = .22$ ; social aggression: partial  $r = .03$ ,  $P = .76$ ). As with Study 3, these results collectively suggest that only two of the three STAB scales are associated with criminal convictions, and that these relations are specific to those scales assessing actual criminal acts (viz. physical aggression and rule-breaking). The current results extend conclusions from Study 3, however, as the general STAB physical aggression and rule-breaking scales evidenced unique associations with violent crime and overall crime, respectively. Such findings further augment the validity of those particular scales.

We then compared our treatment groups (via independent samples *t*-tests) on the STAB scales, the overall number of convicted crimes, number of violent convicted crimes, and the proportion of convicted crimes that were violent in nature. Because of the small sample size, the economic crimes group was omitted from these treatment group comparisons (but was included in other analyses with these data). Members of the substance abuse treatment groups again reported far fewer violent criminal convictions than those in the domestic violence group (mean (SD) = 0.13 (0.39) and 1.12 (0.84), respectively; Cohen's  $d = 1.51$ ,  $P < .0001$ ) and fewer criminal convictions overall (mean (SD) = 2.13 (1.98) and 3.31 (3.25), respectively;

Cohen's  $d = 0.44$ ,  $P < .05$ ). It thus appears that the substance abuse treatment group again contained individuals engaging in relatively low levels of antisocial behavior. Importantly, this pattern persisted to the STAB physical aggression (mean (SD) = 20.24 (6.10) and 24.02 (6.41) for substance abuse and domestic violence groups, respectively; Cohen's  $d = 0.61$ ,  $P < .01$ ) and rule-breaking scales (means (SD) = 15.05 (4.91) and 17.75 (5.05) for substance abuse and domestic violence groups, respectively; Cohen's  $d = 0.53$ ,  $P < .01$ ), but not to the social aggression scale (mean (SD) = 22.54 (5.13) and 23.56 (5.62) for substance abuse and domestic violence groups, respectively; Cohen's  $d = 0.18$ , ns). Such results offer additional evidence that the physical aggression and rule-breaking scales on the STAB are able to detect incremental differences in actual antisocial activities even within criminally active samples.

### **Associations with Krueger et al. [2007] ESM Scales**

The associations between the STAB scales and the Krueger et al. [2007] ESM scales are presented in Table VIII. As in study 2, the STAB physical aggression scale was strongly correlated with the ESM Physical Aggression scale ( $r = .80$ ; partial  $r = .60$ ), an association that was significantly larger than the partial correlations between STAB physical aggression and the other ESM scales ( $\Delta\chi^2 \geq 21.5$  on 1 df, all  $P$ 's  $< .0001$ ; remaining partial  $r$ 's  $\leq .16$ ). Moreover, the unique association of ESM Physical Aggression with STAB physical aggression was significantly larger than its corresponding associations with STAB social aggression and rule-breaking (partial  $r$ s = .00 and .31, respectively;  $\Delta\chi^2 \geq 10.6$  on 1 df, both  $P$ 's  $\leq .001$ ). The STAB social aggression scale was again strongly associated with the Relational Aggression scale ( $r = .62$ ; partial  $r = .39$ ). Although a trend was observed, this association was no longer significantly larger than associations with all other ESM scales (remaining partial  $r$ 's  $\leq .29$ ). However, the unique association of ESM Relational Aggression with STAB social aggression was significantly larger than its corresponding associations with STAB physical aggression and rule-breaking (partial  $r$ 's = .06 and .18, respectively;  $\Delta\chi^2 \geq 4.01$  on 1 df, both  $P$ 's  $< .05$ ).

Finally, as before, the STAB rule-breaking scale was strongly and largely uniquely associated with Theft, Fraud, Rebelliousness, and Destructive Aggression ( $r$ 's between .60 and .70; partial  $r$ 's between .44 and .60). This association was larger

than the partial correlation with ESM Relational Aggression ( $\Delta\chi^2 \geq 6.40$  on 1 df,  $P = .01$ ; partial  $r = .18$ ), but was no longer significantly larger than associations with ESM Physical Aggression (partial  $r = .31$ ). However, the unique associations of ESM Theft, Fraud, Rebelliousness, and Destructive Aggression with STAB rule-breaking were significantly larger than their corresponding partial correlations with STAB physical and social aggression ( $\Delta\chi^2 \geq 4.70$  on 1 df, all  $P$ 's  $\leq .05$ ). In short, the only substantive difference between these results and the corresponding analyses in Study 2 was the association with Honesty. In the current sample, Honesty performed as initially anticipated, evidencing strong and largely unique associations with rule-breaking (partial  $r = -.46$ ; this association is significantly larger than the corresponding associations with STAB physical and social aggression,  $\Delta\chi^2 \geq 7.56$  on 1 df, both  $P \leq .01$ ). Such results therefore provide important additional evidence of convergent and discriminant validity for all three of the STAB scales, and moreover, suggest that such relations are not specific to college student populations.

### **STUDY 5: COMPARISONS OF ADJUDICATED, COLLEGE, AND COMMUNITY SAMPLES**

The core objective of Study 5 was to offer further evidence of the validity for the STAB via comparisons of mean levels of STAB physical aggression, rule-breaking, and social aggression across the three sample types (adjudicated, college, and community adults). To achieve this goal, we collected additional STAB data from a community sample of adults using an Internet-based market research company. These community data were then compared to our adjudicated samples (i.e., samples 3 and 4) and college students' samples (i.e., samples 1 and 2). We also examined the impact of gender and age on STAB scale scores across the three sample types. Finally, we sought to confirm the STAB factor analytic structure in a sample of community adults.

#### **Sample**

The community sample consisted of 402 adults (60% women) recruited through Zoomerang, a market research company that maintains a database of 2.5 million Internet users. Individuals opt-in to take up to four surveys a month in exchange for points that are redeemable for gifts, such as movies, music, gift cards, and other merchandise. Data were collected over the Internet. Four participants were

excluded from analysis because they did not indicate gender so the sample size used for analyses was 398. Participants' average age was 43 years old ( $SD = 16$  years; range = 18–66 or more years). The ethnic breakdown was 70% Caucasian, 5% African-American, 5% Hispanic/Latino, 4% Asian, and 14% other (2% of the sample did not provide this information). Research protocol was approved by the Michigan State University IRB. All participants provided informed consent.

## Measures

**Antisocial behaviors.** Participants completed the 32-item STAB two times, reporting on their behaviors over the last year and in general (all  $\alpha \geq .80$ ). The two administrations were separated by a 40-item questionnaire unrelated to the goals of this study. The order of administration was counterbalanced across the sample (i.e., 50% reported on the past year first followed by their general report, while the other 50% completed the STAB administrations in the reverse-order). As compared with men who completed the STAB questionnaires in order 1 (i.e., past year, general), men who completed the STAB in order 2 (i.e., general, past year) reported equivalent levels of all past year antisocial behaviors, as well as general rule-breaking. The two administration groups did differ, however, on general physical aggression and social aggression, such that those completing the general assessment first endorsed more general physical aggression and social aggression than those completing the past year assessment first (Cohen's  $d = 0.56$  and  $0.34$ , respectively, both  $P$ 's  $< .05$ ). Among women, differences emerged only for past-year rule-breaking (which was slightly lower in those completing the general STAB first; Cohen's  $d = 0.36$ ,  $P < .05$ ) and general physical aggression (which was again slightly higher in those completing the lifetime STAB first; Cohen's  $d = 0.31$ ,  $P < .05$ ). The only consistent difference across the STAB orderings was thus observed for the general physical aggression scale. Importantly, however, physical aggression scores were significantly higher for general reports as compared with past year reports regardless of administration order (both  $P$ 's  $< .001$ ), a pattern that persisted to the social aggression and rule-breaking scales as well (all  $P$ 's  $< .001$ ). In short, although mean levels of general physical aggression (but not past year physical aggression) varied by order of STAB administration, all participants reported higher levels of general physical aggression, social aggression, and rule-breaking than past year

physical aggression, social aggression, and rule-breaking, respectively (as would be expected).

## STUDY 5 RESULTS

### CFA

We used the same item parcels (for past year items) and CFA analyses as used in Studies 2, 3, and 4. We fit the model identified in Study 2 and the overall fit was acceptable ( $\chi^2 = 62.528$ ,  $df = 23$ ;  $CFI = .970$ ;  $TLI = .954$ ;  $RMSEA = .066$ ). Table IV displays the standardized parameters from this model. Correlations between latent factors were as follows (as a reminder, latent factors are attenuated for measurement error, and thus these correlations are slightly higher than those among the observed STAB scales): physical aggression and social aggression:  $r = .79$ ; physical aggression and rule-breaking:  $r = .50$ ; and social aggression and rule-breaking:  $r = .60$ . When combined with the factor analytic results from Studies 1, 2, 3, and 4, these results offer strong support for the hypothesized three-factor structure of the STAB.

### Demographic Correlates of the STAB Scale Scores

We first examined the impact of age and gender on the STAB scale scores, combining all five samples (i.e., those from studies 1–5) for analysis. We expected men to report higher levels of physical aggression and rule-breaking than women, whereas we expected that women would score higher than men on social aggression. We also expected antisocial behaviors to generally decrease with age, consistent with prior research [Hirschi and Gottfredson, 1983; Moffitt, 1993]. Gender (men = 1, women = 2) was negatively associated with physical aggression and rule-breaking, such that men reported higher levels of these particular behaviors than did women (point-biserial correlations ranged from  $-.11$  to  $-.25$ , all  $P$ 's  $< .01$ ). Such findings are clearly consistent with our expectations and with prior research. By contrast, there was no association observed between gender and social aggression ( $r = .03$ ), results that were not consistent with our hypotheses. That said, other studies have similarly found that social aggression does not vary across gender [Forrest et al., 2005]. Age was associated with all three scales (both past year and general) in the expected direction, with correlations ranging from  $-.11$  to  $-.36$  (all  $P$ 's  $< .01$ ). In short, all three forms of antisocial behavior were more pronounced

in younger participants. Such findings further buttress the validity of the STAB physical aggression, rule-breaking, and social aggression scales.

### **Mean Comparisons Across Sample Types**

The primary objective in Study 5 was to examine mean differences on the STAB scales across our three sample types (i.e., college students, community adults, and adjudicated adults), analyses that would provide a final and important indication of the validity of the STAB scales. The specific types of samples analyzed here were thought to be particularly advantageous in regards to this objective. Adults in the community were expected to report the lowest levels of antisocial behavior. By contrast, antisocial behavior in college students should be relatively common, reflecting the transient, adolescent-limited antisocial behavior characteristic of late adolescence/emerging adulthood [Moffitt, 1993]. Antisocial behavior in an adjudicated sample was expected to be the most common, and should represent clinically significant and longer term antisocial behavior. Given this, we expected that the adjudicated sample would report higher mean scores on the STAB physical aggression and rule-breaking scales than both the college students and the community adults. We also expected that college students would report higher levels of STAB physical aggression and rule-breaking than would the community adults. We did not have strong prior expectations regarding social aggression, as social aggression is not generally prosecuted as a criminal act (and thus the adjudicated sample need not have higher scores on social aggression).

We conducted analyses separately by sex because there were proportionally more females in the college and community adult samples than in the adjudicated samples and mean levels of physical aggression and rule-breaking vary across sex. Analyses were also conducted separately for past year STAB administrations and general STAB administrations. The former set of analyses compared samples 1 and 2 (combined), 3, and 5, whereas the latter set of analyses compared samples 4 and 5. Results are presented in Tables IX–XI. Whenever possible (i.e., Tables IX and XI), we report the means actually observed in the data, with the goal of facilitating discussion of the *magnitude* of sample differences (via standardized Cohen's *d* effect sizes). There is now increasing recognition that significance testing per se is not particularly informative [Cohen, 1994; Kline, 2004], yielding information only on the presence and direction of mean differences. Effect

sizes, by contrast, provide a direct assessment of the magnitude of a given difference, thereby offering important additional information regarding the validity of the current instrument.

As expected, adults from the community had significantly lower scores on all three STAB scales when compared with the college students and the adjudicated adults (see Table IX).<sup>2</sup> Specifically, as evaluated via independent samples *t*-tests, adults on parole or probation reported substantially higher levels of physical aggression, rule-breaking, and social aggression during the last year than did adults in the community, with an average Cohen's *d* effect size of 0.58 (considered moderate-to-large in magnitude). The differences observed for physical aggression and rule-breaking appeared slightly stronger in men than in women (Cohen's *d*'s ranged from 0.59 to 0.72 for men and 0.30 to 0.57 for women), whereas differences on social aggression appeared stronger in women than in men (Cohen's *d* effect sizes of 0.72 vs. 0.59, respectively), although all effects were moderate-to-large in magnitude. That said, the very small number of women in the adjudicated sample prohibits any firm conclusions. Next, college students reported somewhat lower levels of physical aggression and rule-breaking than did the adjudicated adults, although these effect sizes were only small-to-medium in magnitude (ranging from .15 to .44). The two samples did not differ in their social aggression scores, however (and, in any case, the trend was for higher social aggression in the college students than in the adjudicated adults). Finally, we compared the community adult and college student samples. College students reported significantly more physical aggression, social aggression, and rule-breaking than did adults in the community, with an average Cohen's *d* effect size of 0.45 (with the exception of

<sup>2</sup>Importantly, these main effects of sample persisted even when statistically controlling for the effects of sex. We conducted a 2 (sex)  $\times$  3 (sample) ANOVA for each STAB scale: physical aggression (main effect of sample  $F(2,1507) = 35.0$ ,  $P < .001$ ; main effect of sex  $F(1,1507) = 14.2$ ,  $P < .001$ ; sample-type by sex interaction  $F(2,1507) = 3.7$ ,  $P < .05$ ), rule-breaking (main effect of sample  $F(2,1507) = 8.9$ ,  $P < .001$ ; main effect of sex  $F(1,1507) = 25.5$ ,  $P < .001$ ; sample-type by sex interaction  $F(2,1507) = 9.7$ ,  $P < .001$ ), and social aggression (main effect of sample  $F(2,1507) = 83.0$ ,  $P < .001$ ; main effect of sex  $F(1,1507) = 3.0$ ,  $P = .08$ ; sample-type by sex interaction  $F(2,1507) = 0.3$ ,  $P = .75$ ). This main effect of sample persisted even when additionally modeling age as a covariate (physical aggression:  $F(2,1500) = 12.0$ ,  $P < .001$ ; rule-breaking:  $F(2,1500) = 7.4$ ,  $P = .001$ ; social aggression:  $F(2,1500) = 5.4$ ,  $P < .01$ ). Such findings suggest that the main effects of sample observed in Tables IX and X are robust to simultaneous considerations of sex.

**TABLE IX. Comparison of Past Year STAB Across Samples**

	Adults mean (SD)	College mean (SD)	Adjudicated mean (SD)	Cohen's <i>d</i>		
				Adjudicated vs. adults	Adjudicated vs. college	College vs. adults
Males	<i>n</i> = 158	<i>n</i> = 440	<i>n</i> = 185			
AGG ( $F(2,780) = 27.3, P < .01$ )	17.39 (5.92)	20.96 (5.91)	22.28 (7.62)	.72**	.19*	.60**
RB ( $F(2,780) = 11.8, P < .01$ )	13.05 (3.42)	14.63 (4.78)	15.29 (4.12)	.59**	.15~	.38**
SA ( $F(2,780) = 30.4, P < .01$ )	18.44 (6.18)	22.58 (5.73)	21.88 (5.38)	.59**	-.13	.69**
Females	<i>n</i> = 240	<i>n</i> = 457	<i>n</i> = 33			
AGG ( $F(2,727) = 11.0, P < .01$ )	16.84 (6.16)	18.47 (4.64)	20.36 (6.09)	.57**	.35~	.30**
RB ( $F(2,727) = 4.8, P < .01$ )	12.78 (2.59)	12.42 (2.44)	13.67 (3.24)	.30	.44*	-.14~
SA ( $F(2,727) = 58.1, P < .01$ )	18.87 (5.78)	23.52 (5.28)	22.70 (4.75)	.72**	-.16	.84**

AGG, RB, and SA represent the past year STAB scales of physical aggression, rule-breaking, and social aggression, respectively. STAB scales were summed across items. These analyses compare samples 1 and 2 (i.e., college), 3 (i.e., adjudicated), and 5 (i.e., adults). Mean levels of the STAB scales differed significantly across the sample types, as indicated by ANOVAs (*F*-test results are presented on the left-hand side of the table). A positive Cohen's *d* effect size (right-hand side of the table) indicates that mean levels are higher in the adjudicated sample (columns 1 and 2 on the right side of the table) or in the college sample (column 3 on the right side of the table). \*\* and \* indicate that sample means were significantly different in an independent-samples *t*-test at  $P < .01$  and  $P < .05$ , two-tailed, respectively. ~ indicates that sample means were marginally different at  $P < .10$ , two-tailed.

**TABLE X. Comparison of Past Year STAB Across Samples, With Age as a Covariate**

	Estimated marginal means			Significant differences, $P < .05$
	Adults mean (SE)	College mean (SE)	Adjudicated mean (SE)	
Males	<i>n</i> = 158	<i>n</i> = 440	<i>n</i> = 185	
AGG ( $F(2,777) = 13.6, P < .01$ )	19.79 (0.69)	19.94 (0.36)	22.66 (0.47)	Adult, college < adjudicated
RB ( $F(2,777) = 6.1, P < .01$ )	14.12 (0.48)	14.18 (0.25)	15.46 (0.33)	Adult, college < adjudicated
SA ( $F(2,777) = 4.3, P = .01$ )	20.03 (0.63)	21.91 (0.33)	22.13 (0.42)	Adult < college, adjudicated
Females	<i>n</i> = 240	<i>n</i> = 457	<i>n</i> = 33	
AGG ( $F(2,722) = 8.3, P < .01$ )	19.15 (0.45)	17.26 (0.29)	20.29 (0.88)	College < adult, adjudicated
RB ( $F(2,722) = 12.5, P < .01$ )	13.40 (0.22)	12.09 (0.14)	3.65 (0.44)	College < adult, adjudicated
SA ( $F(2,722) = 2.2, P = .12$ )	21.11 (0.46)	22.34 (0.30)	22.63 (0.92)	None

AGG, RB, and SA represent the past year STAB scales of physical aggression, rule-breaking, and social aggression, respectively. These analyses compare samples 1 and 2 (i.e., college), 3 (i.e., adjudicated), and 5 (i.e., adults). Mean levels of the STAB scales generally differed across the sample types, as indicated by ANOVAs (*F*-test results are presented on the left-hand side of the table). Estimated marginal means are presented with age as a covariate. Least Significant Difference (LSD) pairwise comparisons were used to statistically compare these estimated marginal means across samples.

rule-breaking in women). As before, the differences observed for physical aggression and rule-breaking appeared stronger in men (average Cohen's *d* effect size was 0.49 for men and 0.08 for women), whereas differences on social aggression across samples appeared larger in women (Cohen's *d* effect sizes of 0.69 vs. 0.84, respectively).

The above results thus suggest that adults in the community (and particularly men) demonstrate significantly less physical aggression and rule-breaking than either the adjudicated adults or the college students, the latter of whom also evidence less physical aggression and rule-breaking than the adjudicated adults. Such findings are fully consistent with our expectations. That said, however,

samples differed on key demographic variables that were also associated with the STAB scales. Specifically, although we accounted for the different proportion of women across samples, we have not accounted for age effects (mean ages were 19 years for college students, 30 years for adjudicated adults, and 43 years for community adults). We thus conducted mean comparisons using a general linear model analysis with age as a covariate. We expected that adjudicated adults, as the only high-risk clinical sample, would continue to evidence higher levels of physical aggression and rule-breaking than either the college students or the community adults. However, because adolescent-limited antisocial behavior is expected to be largely transient [Moffitt,

**TABLE XI. Comparison of the General STAB Scales Across Samples**

	Adults mean (SD)	College mean (SD)	Adjudicated mean (SD)	Cohen's <i>d</i>
				Adults vs. adjudicated
Males	<i>n</i> = 158	—	<i>n</i> = 128	
AGG	20.77 (6.54)		23.06 (6.60)	.35**
RB	14.99 (4.72)		17.10 (5.17)	.43**
SA	21.26 (6.29)		23.09 (5.50)	.31**

AGG, RB, and SA represent the general STAB scales of physical aggression, rule-breaking, and social aggression, respectively. STAB scales were summed across items. These analyses compare samples 4 (i.e., adjudicated) and 5 (i.e., adults) using an independent samples *t*-test. A positive Cohen's *d* effect size indicates that mean levels are higher in the adjudicated sample. \*\*indicates that sample means were significantly different at  $P < .01$ .

1993], and because both college students and adults in the community constitute nonclinical samples (albeit in different developmental stages), we expected that college students and adults would not evidence different levels of physical aggression and rule-breaking once we controlled for age.

Results of these analyses are reported in Table X (note that Cohen's *d* cannot be computed for estimated marginal means, and thus our discussion of these results centers entirely on the statistical significance of the differences). Consistent with our predictions, we again observed a main effect of sample for the physical aggression and rule-breaking scales (although social aggression differed across sample type only in men). Simple pairwise comparisons of the estimated marginal means (via Least Significant Difference) specifically revealed that adjudicated men continued to report higher levels of physical aggression and rule-breaking as compared with men in the community and male college students. Perhaps more importantly, however, male college students and community adults no longer differed on either scale. In short, the differences we had observed on physical aggression and rule-breaking between college males and men in the community were largely a function of the age differences between the two samples. By contrast, differences with the adjudicated adults appear to be more robust (or at least, are not a function of age or ethnicity; latter analyses not shown). These results did not extend to women, however. Indeed, adult women in the community reported higher levels of both physical aggression and rule-breaking than the college students once age was taken into account. However, community adults did not differ from the adjudicated adults (though again, given the very

small sample of adjudicated adults, interpretative caution is warranted).

Comparisons of the general STAB scales across the adjudicated and community adult samples (see Table XI) were also encouraging (as a reminder, general STAB reports were not collected on college students). As the particularly small number of adjudicated females in sample 4 ( $n = 27$ ) precluded meaningful comparisons across the two samples, these analyses were restricted to men only. Adult men in the community reported less aggressive, rule-breaking, and socially aggressive behaviors than did adult men on parole or probation, as evaluated via independent samples *t*-tests (average Cohen's *d* effect size was 0.36, which is considered small-to-moderate in magnitude). When combined with comparisons using past year STAB data, such results are collectively thought to provide important support for the validity of the STAB scales.

## OVERALL DISCUSSION

There is growing recognition that meaningful and substantively important behavioral distinctions exist within the broader category of antisocial behavior. In particular, there is emerging interest in the distinctions among physically aggressive behaviors, rule-breaking behaviors, and socially aggressive behaviors. One potential limitation to accumulating additional scientific insights into the correlates and origins of these three varieties of antisocial behavior is the lack of an efficient self-report assessment in the public domain. We developed the STAB as a relatively short but comprehensive assessment of these three types of antisocial behavior to fill this gap. The final STAB questionnaire is presented in Appendix.

The present series of studies provides initial evidence of the factorial validity, internal consistency, and criterion-related validity of the STAB scales. The factor structure of the STAB was initially established a sample of college students, and was then confirmed in a second sample of college students, a sample of community adults, and two samples of adjudicated adults. Internal consistency reliabilities were also found to be quite good across all five samples.  $\alpha$ s ranged from .84 to .91 for physical aggression, from .83 to .90 for social aggression, and from .71 to .87 for rule-breaking. In short, there is consistent evidence supporting the three factor structure of the STAB as well as evidence for the internal consistency reliability of the STAB scales.

We also found consistent support for the criterion-related validity of the STAB. We first examined associations between the STAB and a related measure, the ESM, in a college student sample, and then sought to extend these findings to a high-risk clinical sample. Results revealed that, as compared with other STAB scales, the STAB physical aggression scale evidenced an especially strong association with the ESM Physical Aggression scale and significantly smaller associations with all other ESM scales. Similarly, the STAB social aggression scale demonstrated a particularly strong association with the ESM Relational Aggression scale and less substantial associations with all other ESM scales (although the latter were only significantly smaller in sample 2). Finally, the STAB rule-breaking scale was strongly and largely uniquely associated with ESM Theft, Fraud, Rebelliousness, Destructive Aggression, and to a lesser extent, Honesty.

We also evaluated associations with two frequently used conceptualizations of personality (the Big Three and the Big Five) across two samples. STAB social aggression was uniquely associated with NEM/Neuroticism in both samples. STAB physical aggression, by contrast, was positively associated with NEM/Neuroticism, and was negatively associated with CON and Agreeableness. Finally, STAB rule-breaking was associated with NEM/Neuroticism, Agreeableness, PEM, and Conscientiousness/CON. Thus, the various STAB scales appear to be associated with unique configurations of personality traits. Moreover, consistent with prior research [Burt and Donnellan, 2008], only rule-breaking was consistently associated with impulsivity, whereas physical aggression appears to have a stronger link with affective dysregulation. When combined with the ESM findings detailed above, this pattern of results collectively provides compelling evidence of convergent and discriminant validity for the STAB.

Next, the STAB scales demonstrated the expected associations with participant demographics. Sex was negatively associated with physical aggression and rule-breaking, such that men reported higher levels of these particular behaviors than did women. By contrast, there was no evidence for sex differences for social aggression. The latter finding buttresses prior reports suggesting that the prevalence of social aggression does not vary across sex [Forrest et al., 2005], but is not consistent with other research indicating that social aggression is more common in girls as compared to boys [Crick and Zahn-Waxler, 2003]. Future research should further explore the

role of sex in social aggression. Age was associated with all three scales in the expected direction, such that all three forms of antisocial behavior were more common in younger participants than older participants.

Finally, we evaluated whether the STAB demonstrated expected mean differences across the various sample types and clinical treatment groups. The adjudicated men reported higher levels of physical aggression and rule-breaking on the STAB as compared with college students (Cohen's  $d = 0.15\text{--}0.19$ ) and community adults (Cohen's  $d = 0.59\text{--}0.72$  past year,  $0.35\text{--}0.43$  in general), differences that persisted even when controlling for age effects. Similarly, male college students reported more STAB physical aggression and rule-breaking than the community adults (Cohen's  $d = 0.38\text{--}0.60$ ). Importantly, however, the increased prevalence in college students as opposed to community adults appears to be primarily a function of normative differences with age, as controlling for age eliminated (or in the case of women, reversed) these differences between groups. Social aggression, by contrast, was more common in adjudicated adults and college students than in community adults, across both men and women (Cohen's  $d = 0.59\text{--}0.84$ ), but was equivalent in college and adjudicated samples. In men, this difference persisted even when controlling for age. Our confidence in the validity of the STAB was further bolstered by the fact that the STAB scales detected differences in criminal convictions across clinical treatment groups. Specifically, members of the substance abuse treatment groups reported far fewer violent criminal convictions than those in the other groups (Cohen's  $d = 1.56$  and  $1.51$ ) and somewhat fewer overall criminal convictions (Cohen's  $d = 0.22$  and  $0.44$ ), differences that were detected by the STAB scales. In sum, these data suggest that the STAB is able to meaningfully detect differences in antisocial activity both within and across high-risk and normative samples. All in all, we believe that there is a good deal of initial support for the validity of the STAB.

### **Furthering the Construct Validity of Subtypes of Antisocial Behavior**

We believe that the STAB will be a useful research instrument when exploring the construct validity of different varieties of antisocial behavior. As noted in the Introduction, there is converging evidence that physical aggression, rule-breaking, and social aggression constitute meaningfully distinct, albeit

overlapping, components of the broader construct of antisocial behavior. These subtypes demonstrate different developmental trajectories, different demographic correlates, and personological underpinnings, and evidence important etiological distinctions. However, there is much work to be done to more firmly validate these constructs and ground them in the literature as a whole. For example, recent evidence indicates that associations with particular candidate genes vary across antisocial behavior subtypes [Burt and Mikolajewski, 2008], and that the magnitude of genetic and environmental influences varies across physical aggression and rule-breaking (i.e., genetic influences are more important for physical aggression whereas shared environmental influences are more important for rule-breaking). Given the latter findings, it is entirely possible that gene-environment interplay also varies across the subtypes. Indeed, because gene-environment interactions typically load on the genetic proportion of variance in standard twin modeling, the finding of higher genetic influences on physical aggression than on rule-breaking is circumstantially consistent with this possibility. Moreover, we know of no study exploring etiological distinctions across all three facets of antisocial behavior. It thus remains unclear how social aggression fits into this emerging literature.

Although these gaps in the literature are surprising given the possible implications of such differences, we suspect it is driven at least in part by the need to collect multiple or very long measures to assess physical aggression, rule-breaking, and social aggression (particularly since twin studies are known for the use of brief measures). The STAB would remedy this situation, thereby allowing future twin projects [e.g., Klump and Burt, 2006] to do this sort of work. Similarly, longitudinal work that examines differential outcomes for physical aggression, rule-breaking, and social aggression (e.g., conventional adult life versus prison) would augment the aforementioned work on etiological distinctions, serving to firmly cement these three subtypes of antisocial behavior within the literature. In short, the STAB may serve as an important tool for longitudinal and genetically informed studies (among others), making them easier and cheaper to conduct since the measure is relatively short and in the public domain.

### **Limitations and Conclusions**

There are several limitations of the current set of studies. The first is that we relied in part on

convenience samples of college students, as well as relatively small samples of adults on parole or probation and adults in the community. We thus do not have a good basis for developing norms that could be defended as representative of a targeted population. That said, rather than attempting to estimate mean levels in given populations, our express goal was to compare average levels across these sample types so as to provide evidence that the STAB could meaningful distinguish these groups. Second, we used late-adolescent and adult samples. Future work is needed to validate the STAB with younger participants. Next, additional work is needed to examine the convergence of the STAB scales across self- and informant reports of antisocial behavior. As it stands, we focused on mono-method strategies (i.e., self-reports with self-reports) to validate the STAB scales. Finally, there is a significant body of literature highlighting subtypes within physical aggression that are not assessed within the STAB: proactive (i.e., premeditated, instrumental physical aggression) and reactive (i.e., impulsive, affective physical aggression) [Barratt et al., 1997; Davidson et al., 2000]. Excellent measures of these two forms of physical aggression already exist [e.g., the Reactive-Proactive Aggression questionnaire; Raine et al., 2006], and thus we saw little need to include them here. Moreover, our goal was to develop a measure of dimensions within the broader construct of antisocial behavior (rather than making finer although no less important distinctions within the subdomain of physical aggression per se).

In conclusion, the present report suggests that the STAB is a promising self-report measure of physically aggressive, rule-breaking, and socially aggressive antisocial behaviors. It appears to have a stable factor structure, reliable scales, and convergent validity with other longer self-report measures of antisocial behavior. It also appears to be suitable for use with community, college, and adjudicated samples. Furthermore, the STAB differentiates various groups of offenders (i.e., violent vs. substance using), correlates with self-reports of criminal activity within an adjudicated sample, and demonstrates expected mean differences across normative and criminally active samples. All in all, these findings suggest that the STAB is a useful tool for researchers who are interested in studying the origins and correlates of these different forms of antisocial behavior with a quick and efficient assessment tool.

## APPENDIX: THE STAB

The following items describe a number of different behaviors. Please read each item and report how often you have done this using the following scale.

1	2	3	4	5
never	hardly ever	sometimes	frequently	nearly all the time

1. \_\_\_\_\_ Felt like hitting people
2. \_\_\_\_\_ Broke into a store, mall, or warehouse
3. \_\_\_\_\_ Blamed others
4. \_\_\_\_\_ Hit back when hit by others
5. \_\_\_\_\_ Broke the windows of an empty building
6. \_\_\_\_\_ Tried to hurt someone's feelings
7. \_\_\_\_\_ Got angry quickly
8. \_\_\_\_\_ Shoplifted things
9. \_\_\_\_\_ Made fun of someone behind their back
10. \_\_\_\_\_ Threatened others
11. \_\_\_\_\_ Littered public areas by smashing bottles, tipping trash cans, etc.
12. \_\_\_\_\_ Excluded someone from group activities when angry with him/her
13. \_\_\_\_\_ Had trouble controlling temper
14. \_\_\_\_\_ Stole a bicycle
15. \_\_\_\_\_ Gave someone the silent treatment when angry with him/her
16. \_\_\_\_\_ Hit others when provoked
17. \_\_\_\_\_ Stole property from school or work
18. \_\_\_\_\_ Revealed someone's secrets when angry with him/her
19. \_\_\_\_\_ Got into fights more than the average person
20. \_\_\_\_\_ Left home for an extended period of time without telling family/friends
21. \_\_\_\_\_ Intentionally damaged someone's reputation
22. \_\_\_\_\_ Swore or yelled at others
23. \_\_\_\_\_ Sold drugs, including marijuana
24. \_\_\_\_\_ Tried to turn others against someone when angry with him/her
25. \_\_\_\_\_ Got into physical fights
26. \_\_\_\_\_ Was suspended, expelled, or fired from school or work
27. \_\_\_\_\_ Called someone names behind his/her back
28. \_\_\_\_\_ Felt better after hitting
29. \_\_\_\_\_ Failed to pay debts
30. \_\_\_\_\_ Was rude towards others
31. \_\_\_\_\_ Had trouble keeping a job
32. \_\_\_\_\_ Made negative comments about other's appearance

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## Parental Attachment, Self-Esteem, and Antisocial Behaviors Among African American, European American, and Mexican American Adolescents

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This study examined the relation of mother and father attachment to self-esteem and self-reported involvement in antisocial behaviors among African American ( $n = 488$ ), European American ( $n = 661$ ), and Mexican American ( $n = 434$ ) high school students. The attachment dimensions of anxiety and avoidance were examined using self-report scales that were developed and validated with participants in the study. Findings indicated that adolescents from the 3 ethnic/racial groups did not differ greatly in their reported attachment to father and mother. Consistent with theoretical formulations, securely attached adolescents from the 3 ethnic groups had a more positive sense of self-esteem and reported less involvement in antisocial behaviors than their less securely attached peers.

The study of parental attachment and its relation to development and well-being among adolescents has received increasing attention in recent years (Lopez, 1995; Rice, 1990). Initial theoretical formulations defined attachment as a strong affective bond between the infant and the primary caregiver, usually the mother (Ainsworth, Blehar, Waters, & Wall, 1978; Bowlby, 1988). A supportive, encouraging, and cooperative parent (or caretaker) who is available as a source of support and help fosters the development of a secure parent-child attachment bond. This attachment bond, in turn, provides the child with a secure base from which to explore the environment and develop personal and interpersonal competencies (Bretherton, 1992). According to attachment theory, the early attachment-related experiences of the infant become internalized as working models of self and other. These working models include beliefs about one's worthiness and competence as well as expectations regarding the availability and likely responsiveness of significant others in one's life (Ainsworth, 1989). Researchers have extensively examined the nature and function of attachment in infancy and have documented the importance of secure attachments in childhood for later emotional adjustment, social competence, and self-esteem (Carlson & Sroufe, 1995; Cassidy, 1988; Suess, Grossman, & Sroufe, 1992).

Parents continue to influence their children's well-being in adolescence even though developmental changes are expected in

the nature of parental attachment as children mature (Ainsworth, 1989). Several authors have argued that the behavioral utilization of parental figures for support and proximity is not as important for adolescents as it is for younger children (Bretherton, 1985; Weiss, 1982). Instead, it is the adolescents' confidence in the availability and commitment of parental figures to them (i.e., their internal working models of the parental relationship) that remains most crucial for their psychological well-being. Consistent with this view, adolescents' reports of seeking parental support in positive and negative situations and proximity in threatening circumstances have been weakly associated with self-esteem, whereas the quality of the adolescents' affect toward the parents was positively related to their self-esteem (Greenberg, Seigal, & Leitch, 1983; Paterson, Pryor, & Field, 1995). In a narrative and meta-analytic review of the attachment literature, Rice (1990) concluded that among adolescents and young adults (primarily European American college students), measures of parental attachment were positively associated with measures of social competence, interpersonal functioning, self-esteem, general life satisfaction, and emotional adjustment.

Several authors have suggested that attachment theory may provide a framework to integrate theory and research findings related to personality development, family relations, and identity development into a useful synthesis that will enhance our understanding of psychological development and functioning across the life span (Lopez, 1995; Lopez & Brennan, 2000; Rice, 1990). More specifically, Lopez and Brennan (2000) proposed that attachment theory and related empirical work with adults "offers counseling psychology a compelling framework for understanding the healthy and effective self" (p. 283). However, most of the attachment-related research to date has been conducted with middle- to upper-middle-class European American populations, raising questions about the generalizability of the findings to other ethnic/racial and social class groups. It seems that to increase the usefulness of attachment theory as an integrative framework that helps us understand healthy psychological development, more

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studies are needed that examine parental attachment among ethnically and racially diverse populations.

In the context of the parent–adolescent relationship, attachment has been defined as an enduring affectionate bond that may be signaled by feelings of security, trust, good communication, and acceptance (Armsden & Greenberg, 1987). In their work with young children, Ainsworth et al. (1978) identified three major attachment types, described as secure, avoidant, and anxious–ambivalent. Discriminant analyses of the continuous scales used in rating the children's attachment behaviors in the “strange situation” studies indicated that these three attachment types could be conceptualized in terms of two dimensions: anxiety and avoidance. More recently, researchers have found that paper-and-pencil measures of attachment in adolescents and adults also assess individual differences along these two dimensions (for a review, see Brennan, Clark, & Shaver, 1998).

The purpose of this study was to examine the relation of mother and father attachment to self-esteem and involvement in antisocial behaviors among African American, European American, and Mexican American school-aged adolescents. Five aspects of attachment were assessed: two tapping anxiety and three tapping avoidance. Anxiety was assessed by the degree to which adolescents reported confusion about their feelings toward their parents (uncertainty) and reported that their parents attempted to induce anxiety about the adolescents' misbehaviors (instilling persistent anxiety). Avoidance was assessed by the degree to which adolescents distanced themselves from their parents' feelings (emotional separation), disagreed with statements presenting their parents in an idealized way (deidealization), and reported low levels of security in their relationships with them (security). These five aspects of attachment are similar to those used in other factor analytic studies (Brennan et al., 1998) that have yielded anxiety and avoidance factors. Although other or additional facets of anxiety and avoidance could have been selected, these measures were sufficient to assess anxiety and avoidance in the current study, as described in the Results section.

### Race, Ethnicity, and Attachment

According to Ainsworth (1989), the role of early attachment on later psychological development is a universal process that is applicable across cultural and individual experiences. However, some researchers have argued that the definition and measurement of parental attachment constructs may vary across ethnic/racial groups (LeVine & Miller, 1990; van IJzendoorn, 1990). Even though there is a growing recognition that there are important individual and subgroup differences, American ethnic/racial groups are described as holding different values and worldviews, particularly as they relate to family organization (McGoldrick, Giordano, & Pearce, 1996). African American and Mexican American families are generally described as more cohesive and interdependent than European American families (Falicov, 1996; Garcia-Prieto, 1996; Harrison, Wilson, Pine, Chan, & Buriel, 1990; Hines & Boyd-Franklin, 1996), whereas European American families are believed to endorse more individualistic worldviews than their ethnic minority counterparts (J. Giordano & McGoldrick, 1996).

Differences in values and family organization could imply variations across ethnic/racial groups in the strength of parent–adolescent attachment and in the importance of parental attach-

ment to adolescents' attitudes and behaviors. For example, it would be reasonable to expect that more cohesive and interdependent families would foster stronger parent–child attachment bonds than families where independence and individuality are more highly valued. On the other hand, because the importance of parental attachment is considered universal and because ethnic/racial minority groups in the United States are immersed to various degrees in the majority culture, it is also reasonable to expect no major differences in the nature and role of parent–child attachment bonds across ethnic/racial groups. Currently, there is not enough empirical evidence to provide support for any of these inferences.

The few studies that have examined the strength of parental attachment among ethnic/racial minority and majority youth have yielded mixed findings. Two studies examined parental bonds in terms of college students' recollections of their fathers' and mothers' care and involvement during the first 16 years of their lives and found no differences in these bonds between European American, African American, and Latino(a) students (Lopez, Melendez, & Rice, 2000; Rice, Cunningham, & Young, 1997). Similarly, no differences emerged in self-reports of current attachment and involvement with parents among African American and European American college students (Kenny & Perez, 1996) or among European American, African American, and Latino(a) school-aged adolescents (Smith & Krohn, 1995). However, elsewhere African American college students described their families as more encouraging of autonomy and intimacy than their European American and Mexican American peers (Kane & Erdman, 1998). Similarly, school-aged African American students reported higher levels of caring and trust in relation to parents than their European American peers (Cernkovich & Giordano, 1987; P. C. Giordano, Cernkovich, & De Maris, 1993).

### Self-Esteem, Antisocial Behavior, and Attachment

Self-esteem refers to self-judgments of personal worth and global feelings of competence and self-acceptance (Rosenberg, 1965). Studies with adolescents have found that low levels of self-esteem are associated with negative outcomes, including substance abuse, depressive mood, dissatisfaction with life, and lack of general well-being (Baldwin et al., 1989; Dekovic, 1999; Stacy, Sussman, Dent, Burton, & Flay, 1992). As discussed earlier, a positive, trusting relationship with parents is expected to facilitate the development of an internalized view of self as capable and lovable. Several studies with primarily European American populations have reported that secure attachment to mother or father or to both parents is positively associated with school-aged adolescents' self-esteem (Armsden & Greenberg, 1987; Kenny, Lomax, Brabeck, & Fife, 1998; Noom, Dekovic, & Meeus, 1999; Papini & Roggman, 1992; Paterson et al., 1995). No studies were found that examined the relation of attachment to self-esteem among African American or Hispanic adolescents. Research findings regarding the relative importance of maternal versus paternal attachment to self-esteem are mixed. In several studies, either attachment to mothers (Hoffman, Ushipz, & Levy-Shiff, 1988) or attachment to fathers (Gecas & Schwalbe, 1986; LeCroy, 1988) emerged as more central to self-esteem. However, other studies have found that attachment to both parents is similarly predictive of self-esteem (Noom et al., 1999; Papini & Roggman, 1992; Paterson et al., 1995).

Antisocial behaviors among adolescents include aggressive behavior, stealing, lying, vandalism, and involvement with drugs. A positive bonding with parents seems to serve as a protective factor regarding adolescent involvement in these negative behaviors (Dryfoos, 1990). It is believed that adolescents who have a strong affective bond with their parents are more likely than their less attached peers to accept parental rules and regulations and to consider the parents' reactions when the temptation to commit an antisocial act presents itself (Marcus & Betzer, 1996; Weber, Miracle, & Skehan, 1995). In contrast, a lack of secure attachment may engender anger and hostility toward parents, reducing the parents' leverage over the adolescents' behavior (Allen, Moore, Kupermine, & Bell, 1998).

Studies with both European American and ethnic/racial minority school-aged adolescents have reported that secure attachment to mother or father or to both parents is negatively associated with conduct problems (Grant et al., 2000; Marcus & Betzer, 1996; Raja, McGee, & Stanton, 1992) and with self-reported involvement in antisocial behaviors (Dekovic, 1999; Jackson & Foshee, 1998; Kenny et al., 1998; Marcus & Betzer, 1996). The relative importance of mother and father attachment in relation to antisocial behavior has been examined primarily among European American adolescents and has yielded mixed findings. Some studies have found that attachment to both father and mother is similarly related to lower levels of antisocial behaviors (Noom et al., 1999), whereas in other studies only attachment to father appeared to serve such protective function (Grant et al., 2000; Weber et al., 1995). Other findings indicated that the relative importance of father and mother attachment seemed to depend on the adolescents' gender (Jackson & Foshee, 1998; Marcus & Betzer, 1996). In a study with middle school students, involvement in antisocial behaviors was associated only with father attachment for boys and with both father and mother attachment for girls (Marcus & Betzer, 1996). Among high school students, the association of father and mother responsiveness with self-reported involvement in violent behaviors was stronger for females than for males (Jackson & Foshee, 1998).

### The Present Study

The purpose of this study was twofold: (a) to examine the relation of two aspects of parental attachment, father and mother

avoidance and anxiety, to self-esteem and self-reported involvement in antisocial behaviors among European American, African American, and Mexican American high school students and (b) to examine to what extent the relation of parental attachment to self-esteem and antisocial behavior was moderated by ethnicity. A review of the theoretical and empirical literature does not provide a strong basis from which to generate hypotheses regarding differences across ethnic/racial groups in the strength of parent-child attachment bonds or in the relation of parental attachment to well-being. Therefore, in the present study we tested for, but did not predict, differences in parental attachment or in the relation of attachment to self-esteem and antisocial behaviors among participants.

### Method

#### Participants

Participants in this study were 1,583 high school students from six high schools in a large metropolitan school district in the South. Of all of the African American, European American, and Mexican American students who completed questionnaires (1,837), only those who reported responding to the attachment questionnaires in reference to both a mother and a father figure and who indicated that their parental figures were family relations (mother, stepmother, grandmother, or aunt and father, stepfather, grandfather, or uncle) were retained for analyses. The ethnic composition of the participants was as follows: African American (488, 31% of sample), European American (661, 42%), and Mexican American (434, 27%). Students ranged in age from 13 to 19 ( $M = 15.8$ ,  $SD = 1.4$ ). In terms of school grade, 31% of the students were in 9th grade, 25% in 10th grade, 23% in 11th grade, and 21% in 12th grade. Seventy-six percent of the Mexican American students, 98% of the African American students, and 97% of the European American students reported being born in the United States. Participants completed the questionnaires in English. For analysis purposes, participants were randomly assigned to one of two groups: instrument development sample (Sample 1,  $n = 792$ ) or instrument validation and research questions sample (Sample 2,  $n = 791$ ). The demographic characteristics of participants in Samples 1 and 2 are described, by ethnic group, in Table 1.

#### Procedure

Participants randomly selected within their respective high schools received letters in their homeroom describing the study along with consent

Table 1  
*Demographic Characteristics of Participants by Ethnic Group*

Variable	African American				European American				Mexican American				Total			
	Sample 1		Sample 2		Sample 1		Sample 2		Sample 1		Sample 2		Sample 1		Sample 2	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Gender																
Male	85	34	72	30	144	44	149	45	78	36	85	39	307	39	306	39
Female	165	66	166	70	183	56	185	55	137	64	134	61	485	61	485	61
Social class																
Lower	47	19	48	18	26	8	13	4	81	38	83	38	154	19	144	18
Working	132	53	131	55	156	48	160	48	122	57	121	55	410	52	412	52
Middle	71	28	59	25	145	44	161	48	12	5	15	7	228	29	235	30
Total	250	32	238	30	327	41	334	42	215	27	219	28	792	100	791	100

Note. Sample 1 was used for instrument development, and Sample 2 was used for instrument validation and analyses of research questions.

forms to take home for their parent or guardian to sign. Students who returned signed consent forms picked up questionnaires from research assistants in the school cafeteria, completed them at a time and place convenient to them, and received \$10 for their participation upon returning the completed questionnaires to the same research assistants. Approximately 50% of the students who had been randomly selected for participation completed questionnaires. This participation rate is typical of those in school-based survey studies in predominantly low-income metropolitan school districts where negative consent procedures are not used (e.g., Allison et al., 1999; Brega & Coleman, 1999; Gillock & Reyes, 1999).

### Instruments

As part of a larger study on adolescent development, students completed a background information form and several measures of parent-adolescent relations and adolescent behavior. The major focus of the study was to identify patterns and correlates of adolescent drinking behavior in a tri-ethnic sample—topics that will be examined in other publications (e.g., Stewart & Power, 2002). Of interest in the present analyses were several of the demographic variables and the measures of attachment, self-esteem, and antisocial behavior.

**Demographics.** Students were asked to indicate their gender, age, and ethnic background; to provide information regarding their mother and/or father figure's occupation and education; and to indicate whether their mother and/or father figure was currently living with them. Following the recommendations of Mueller and Parcel (1981), we classified parental occupation using Duncan's (1961) six major occupational status categories: homemaking; unskilled labor; operative, service work; skilled and technical trades; clerical and retail sales; and professional and small business ownership. Mother and father figure occupations were classified separately, and then a set of decision rules was used to assign each participating adolescent to a social class level. Specifically, a parent figure in a professional occupation was classified as middle class; a parent figure in clerical work/retail sales or a skilled trade was classified as working class; and a parent figure in an unskilled occupation or who was unemployed was classified as lower class. Parent figure education was used in combination with occupation for the two remaining occupational categories (technicians/artists and operative/service workers), as these occupations include individuals from a range of social classes (Hollingshead & Redlich, 1958; Laosa, 1982). Technicians/artists who had a college degree were classified as middle class, whereas those without a college degree were classified as working class. Operative/service workers were classified as working class if they had a high school diploma (or a general equivalency diploma) and as lower class if they did not. The highest socioeconomic status category of a parent figure that was currently living with the adolescent was used to assign that participant to a particular social class. If the adolescent reported that the family was currently receiving welfare or food stamps, he or she was automatically classified as lower class. This procedure resulted in a sample that was classified as 19% lower class, 52% working class, and 29% middle class (see Table 1).

**Attachment.** Students completed 38 items regarding mother and father attachment (19 items for each parent). Attachment items came from three sources: the Inventory of Parent and Peer Attachments (Armsden & Greenberg, 1987), the Emotional Autonomy Scale (Steinberg & Silverberg, 1986), and the Children's Report of Parental Behavior Inventory (Schaefer, 1965). Because many of the existing adult attachment inventories were developed with samples of college students (including the Armsden & Greenberg, 1987, measure), the wording of many of the items appeared to be too complex for the diverse population of students in our high school sample. This was confirmed in focus groups in the participating high schools. Therefore, rather than use an existing instrument, we chose to develop our own measures, starting with items from existing questionnaires and then modifying the wording on the basis of pilot work in the schools.

The final set of items measured two dimensions of attachment: avoidance and anxiety (these analyses are described in the Results section). Avoidance refers to the degree to which adolescents distance themselves

from their parents—cognitively, emotionally, and behaviorally—and was assessed in this study with three subscales: Deidealization, Emotional Separation, and Security. All items in these subscales were worded in such a way that students high in avoidance would disagree with the statements. Therefore, scores on these items were reversed before they were averaged together to calculate the avoidance score. Example items (worded for fathers) include "My father is the perfect father" (for Deidealization), "I really get involved with my father's feelings" (for Emotional Separation), and "My father and I are close" (for Security). Adolescents who disagreed with these and similar statements scored high on avoidance. Anxiety refers to the degree to which adolescents report anxiety or discomfort in their relationships with their parents. This dimension was assessed in this study with two subscales: Uncertainty and Instilling Persistent Anxiety. Example items include "I am confused about how I feel toward my father" (for Uncertainty) and "My father thinks and talks about my misbehavior long after it's over" (for Instilling Persistent Anxiety). Respondents rated each item on a 7-point scale (1 = *never*, 7 = *always*). Item scores in each scale were added and averaged to yield two attachment scores for father and mother, respectively.

**Self-esteem.** The seven items of the Rosenberg Self-Esteem Scale (Rosenberg, 1965) that had been included in a previous study with adolescents (Mortimer, Finch, Shanahan, & Ryu, 1990) were used in this study to assess general feelings of worth and satisfaction with self. The Rosenberg Self-Esteem Scale has been widely used with adolescents and has demonstrated high internal consistency estimates in previous studies (with Cronbach's alphas ranging from .83 to .88; e.g., Dekovic, 1999; Paterson et al., 1995; Scheier, Carver, & Bridges, 1994). For this study, students indicated their degree of agreement with three positively (e.g., "I feel that I have a number of good qualities") and three negatively (e.g., "At times I think that I am no good at all") worded statements, using a 7-point response scale ranging from 1 (*strongly agree*) to 7 (*strongly disagree*). After reversing the scores of the negatively worded items, item scores were added and averaged to yield an overall self-esteem score, with higher values representing a more positive view of self.

**Antisocial behaviors.** Ten items in the questionnaire asked students how often during the past year they had enacted negative behaviors in five areas: aggression, stealing, lying, vandalism, and drugs. Students were presented with a 6-point response scale that included the following options: 1 = *never*, 2 = *once*, 3 = *twice*, 4 = *3–4 times*, 5 = *5–10 times*, and 6 = *11 or more times*. This scale was adapted from a 12-item self-report instrument developed by Jessor and Jessor (1977). Item scores were added and averaged to yield an overall antisocial behavior score, with higher values representing a higher level of self-reported involvement in antisocial behaviors.

### Analyses

Participants in the study were divided in two groups, and the data from one of the subgroups (Sample 1) were used to develop the measure of parental attachment. This measure assessed two dimensions of attachment: avoidance and anxiety. Confirmatory factor analyses on the data for Sample 1 were conducted on the attachment subscales, separately for father and mother. We used the other half of the sample (Sample 2) to validate the attachment measure and to examine the association of parental attachment with self-esteem and self-reported involvement in antisocial behavior. To validate the measure, we repeated the confirmatory factor analysis of the attachment subscales using the data from Sample 2. Multivariate analyses of variance (MANOVAs) were conducted to examine the effects of adolescents' gender, ethnicity, and social class on the attachment measures as well as on self-esteem and antisocial behaviors. Finally, hierarchical multiple regression analyses were used to examine the independent effects of two aspects of father and mother attachment (avoidance and anxiety) on adolescents' self-esteem and self-reported involvement in antisocial behaviors. The interaction terms of the attachment variables by ethnic/racial groups were included in the last step of the regressions to examine the effects of ethnic/racial group membership on the association of parental

attachment with self-esteem and antisocial behaviors. The MANOVAs and regression analyses were conducted on the data from Sample 2. Because of the number of analyses conducted and the large number of participants in the study, the more conservative alpha of .01 was used to identify statistically significant differences.

## Results

### *Demographic Characteristics of Participants*

Information regarding students' gender and social class is displayed, by ethnic group, in Table 1. Even though the high schools for the study were selected to yield a sample with relatively equal numbers of African American, European American, and Mexican American students across social classes, results of a chi-square analysis showed that for both samples the distribution of social class varied significantly with ethnicity: for Sample 1,  $\chi^2(4, N = 792) = 128.85, p < .001$ ; for Sample 2,  $\chi^2(4, N = 791) = 165.6, p < .001$ . As may be observed in Table 1, compared with the other two groups, Mexican American students were overrepresented among the lower class whereas European American students were overrepresented among the middle class and underrepresented among the lower class.

Information regarding students' father and mother figure (biological parent vs. nonbiological parent) and the living arrangement of the parental figure (lives with adolescent or not) is displayed, by ethnic group, in Table 2. Results of a chi-square analysis also showed that in both samples the distribution of father figures varied significantly with ethnicity: for Sample 1,  $\chi^2(2, N = 792) = 23.04, p < .001$ ; for Sample 2,  $\chi^2(2, N = 791) = 21.28, p < .001$ . African American students were less likely than members of the two other ethnic groups to complete the questionnaire on their biological father (see Table 2). The distribution of mother figures did not vary significantly with ethnicity. Less than 8% of students in each ethnic group completed the questionnaire on someone besides their biological mother. In both samples, the proportion of students who lived with their father figures varied significantly with ethnicity: for Sample 1,  $\chi^2(2, N = 792) = 67.27, p < .001$ ; for Sample 2,  $\chi^2(2, N = 791) = 47.80, p < .001$ . African American students were less likely than members of the other ethnic groups to report living with their father figures, whereas Mexican American students represented the largest proportion of

adolescents living with their father figures (see Table 2). The proportion of students who reported living with their mother figures (ranging from 92% to 96%) did not vary significantly with ethnicity.

### *Factor Analyses of the Attachment Scales*

As described above, the sample was randomly divided in half, and two confirmatory factor analyses were conducted on each sample: one for mothers and one for fathers. In these analyses, the 19 attachment items were assigned to five latent constructs corresponding to the five attachment subscales, and these subscales were assigned to the two higher level, second-order factors: Avoidance and Anxiety. The model that was tested is presented in Figure 1. Presented in Table 3 are the fit statistics for both the instrument development and the validation and analysis samples.

As shown in Table 3, the data for the instrument development sample (Sample 1) showed a good fit to the hypothesized model for mother attachments. Although the chi-square was significant, the chi-square divided by the degrees of freedom was well below the suggested cutoff of 5.0, and both the goodness-of-fit index (GFI) and the root-mean-square error of approximation (RMSEA) indicated good fit. The factor loadings for the second-order Mother Avoidance factor were .98 for security, .90 for deidealization, and .77 for emotional separation. Factor loadings for the second-order Mother Anxiety factor were .99 for uncertainty and .49 for instilling persistent anxiety. Factor loadings for the individual questionnaire items ranged from .58 to .89, with a mean of .78. The avoidance and the anxiety latent constructs were positively correlated with one another ( $r = .46$ ).

For the mother attachment model, the fit statistics for the validation and analysis sample were very similar to those for the instrument development sample. However, one additional path had to be added to the model to yield an admissible solution: a path from the Anxiety second-order factor to mother security. The size of this loading was negligible (.17). The remaining factor loadings were like those in the instrument development sample. For the Mother Avoidance factor they were .90 for security, .91 for deidealization, and .74 for emotional separation; for the Mother Anxiety factor they were .74 for uncertainty and .66 for instilling persistent anxiety. Individual questionnaire item loadings ranged from .61 to

Table 2  
*Characteristics of Attachment Figure by Ethnic Group*

Attachment figure characteristic	African American				European American				Mexican American				Total			
	Sample 1		Sample 2		Sample 1		Sample 2		Sample 1		Sample 2		Sample 1		Sample 2	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Father																
Biological	177	71	173	73	274	84	283	85	187	87	193	88	638	81	649	82
Nonbiological	138	29	65	27	53	16	51	15	28	13	26	12	154	19	142	18
Mother																
Biological	241	96	220	92	312	95	322	97	208	97	216	99	761	96	758	96
Nonbiological	9	4	18	8	15	5	12	36	7	13	3	1	31	4	33	4
Figure living with adolescent																
Father	137	55	148	62	252	77	274	82	188	87	191	87	577	73	613	77
Mother	234	94	222	93	301	92	315	94	207	96	211	96	743	94	748	95

Note. Sample 1 was used for instrument development, and Sample 2 was used for instrument validation and analyses of research questions.

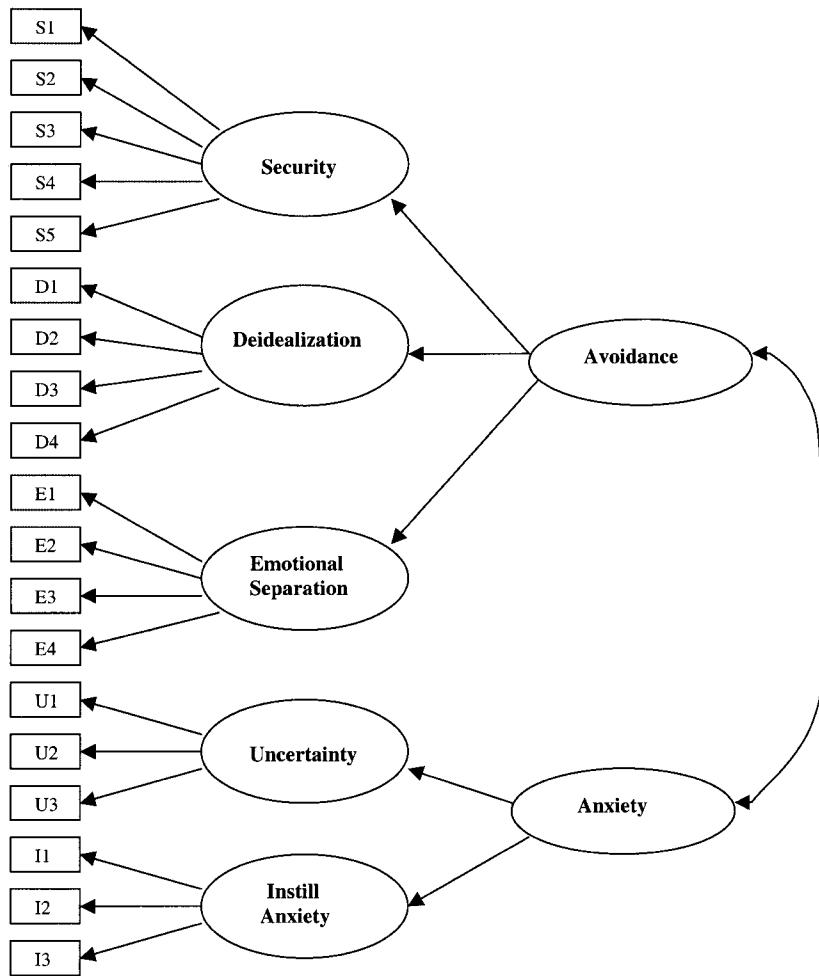


Figure 1. Measurement model of Father and Mother Avoidance and Anxiety Scales.

.88, with a mean of .79. The correlation between the Avoidance and Anxiety factors was .47.

To yield an admissible solution for fathers, an additional path had to be added in the instrument development sample: from the anxiety latent construct to emotional separation (.31). Once this path was added, the fit statistics were very similar to those of mothers for both the instrument development and the validation and analysis samples (see Table 3). In the validation and analysis sample, the path from the Father Anxiety factor to emotional separation was .25. The factor loadings for the Father Avoidance factor were as follows (with validation and analysis sample values

in parentheses): .97 (.96) for security, .92 (.90) for deidealization, and .93 (.91) for emotional separation; for the Father Anxiety factor they were .92 (.92) for uncertainty and .45 (.50) for anxiety. Factor loadings for the individual items were similar in the two samples, ranging from .57 to .91 with a mean of .77 in the instrument development sample, and ranging from .58 to .88 with a mean of .78 in the validation and analysis sample. The correlations between the latent avoidance and anxiety constructs were .50 and .52 in the two samples, respectively.

Because the fit was good for all four models and because all of the items showed high loadings on their respective factors, all 19

Table 3  
Fit Statistics for Mother and Father Models for Both the Instrument Development and the Validation and Analysis Samples

Parent	Instrument development						Validation and analysis					
	$\chi^2$	df	p	$\chi^2/df$	GFI	RMSEA	$\chi^2$	df	p	$\chi^2/df$	GFI	RMSEA
Father	462.4 <sup>a</sup>	145	.001	3.2	.94	.053	432.0 <sup>a</sup>	145	.001	3.0	.94	.051
Mother	428.8	146	.001	2.9	.94	.050	425.5 <sup>a</sup>	145	.001	2.9	.94	.050

Note. GFI = goodness-of-fit index; RMSEA = root-mean-square error of approximation.

<sup>a</sup>One additional path added to yield admissible solution (see text).

items were used in the analyses to follow—13 items were used to calculate the avoidance scores and 6 items to calculate the anxiety scores. Unit weighting was used. Although three of the four analyses required that an additional path be added to yield an admissible solution (without these paths, one of the latent constructs had a negative variance), the loadings for these paths were much lower than those for the other paths, so these paths were not used in assigning items to factors. Coefficient alphas were computed separately for the three ethnicities to determine whether the scales were equally reliable across all three ethnic groups. These values are presented in Table 4.

It is clear from Table 4 that the father and mother avoidance scores had equally high levels of reliability across both samples and across all three ethnicities (values ranged from .92 to .94). The mother and father anxiety scores, however, showed lower levels of reliability overall (possibly because of the smaller number of items making up this score), and reliability varied by ethnicity, with values for European Americans in both samples slightly higher than those for minority adolescents. All values, however, were .74 or higher, showing good reliability of the Father and Mother Anxiety Scale in all three ethnic groups.

#### *Factor Analyses of the Self-Esteem and Antisocial Behavior Scales*

Confirmatory factor analyses conducted separately for the instrument development (Sample 1) and validation and analysis (Sample 2) samples identified one Self-Esteem factor made up of six of the seven self-esteem items included in the questionnaire: for Sample 1,  $\chi^2(8, 792) = 32.81, p < .001, \chi^2/df = 4.10, GFI = .99, RMSEA = .06$ ; for Sample 2,  $\chi^2(8, 791) = 20.34, p < .01, \chi^2/df = 2.54, GFI = .99, RMSEA = .04$ . For Sample 1, the factor loadings ranged from .65 to .88, with a mean factor loading of .73. For Sample 2, the factor loadings ranged from .56 to .90, with a mean factor loading of .78. Cronbach's alphas for scores of participants in this study were as follows (with alphas for the validation and analysis samples in parentheses): .71 (.76) for African American students, .85 (.84) for European American students, .82 (.84) for Mexican American students, and .80 (.81) for the ethnic groups combined.

Confirmatory factor analyses on the antisocial behavior items conducted separately for the instrument development (Sample 1)

and validation and analysis (Sample 2) samples yielded a single second-order Antisocial factor, with pairs of items tapping five facets of antisocial behavior (aggression, stealing, lying, vandalism, and drug use): for Sample 1,  $\chi^2(30, 792) = 155.49, p < .001, \chi^2/df = 5.18, GFI = .96, RMSEA = .07$ ; for Sample 2,  $\chi^2(30, 791) = 91.41, p < .001, \chi^2/df = 3.05, GFI = .98, RMSEA = .05$ . For Sample 1, the factor loadings ranged from .65 to .88, with a mean factor loading of .73. For Sample 2, the factor loadings ranged from .56 to .90, with a mean factor loading of .78. Cronbach's alphas for participants' scores in the antisocial behavior measure were the same for the three ethnic groups in both Sample 1 and Sample 2: .83 for African American students, .85 for European American students, .81 for Mexican American students, and .83 for the ethnic groups combined.

Table 5 includes the correlations between the attachment, self-esteem, and antisocial behaviors measures by ethnic group for the validation and analysis sample. Examination of the table reveals that with one exception, the correlations between the mother and father attachment variables and self-esteem and antisocial behaviors were moderate, ranging from .14 to .42. The correlation of father avoidance and self-reported involvement in antisocial behaviors was not statistically significant for African Americans. As expected, mother and father avoidance and anxiety scores were negatively related to self-esteem and positively related to self-reported involvement in antisocial behaviors.

#### *Gender, Social Class, and Ethnic Differences in Measures of Attachment*

A three-way multivariate analysis of covariance (MANCOVA) was conducted to examine the effects of adolescents' gender, ethnicity, and social class simultaneously on the mother and father attachment variables. These analyses were conducted only with the validation and analysis sample. A general linear models program was used for the analyses, and all of the significance test results reported are for Type III sums of squares (tests of the independent effects of the variables). Previous studies have indicated that adolescent-parent relationships tend to be more difficult with nonbiological than with biological parents and in separated rather than in intact families (Bray & Berger, 1993; Hetherington & Clingempeel, 1992; Lanz, Iafrate, Rosnati, & Scabini, 1999; Macoby, Buchanan, Mnookin, & Dornsbusch, 1993). Also, prelimi-

**Table 4**  
*Coefficient Alphas Calculated Separately by Ethnic Group for Both the Instrument Development and the Validation and Analysis Samples*

Parent and ethnic group	Instrument development		Validation and analysis	
	Avoidance	Anxiety	Avoidance	Anxiety
<b>Fathers</b>				
African American	.94	.77	.94	.78
European American	.93	.81	.94	.83
Mexican American	.93	.77	.93	.74
Ethnicities combined	.93	.78	.94	.79
<b>Mothers</b>				
African American	.93	.79	.93	.81
European American	.92	.87	.94	.87
Mexican American	.92	.81	.93	.81
Ethnicities combined	.92	.83	.93	.83

**Table 5**  
*Correlations Between Measures of Attachment, Self-Esteem, and Antisocial Behavior for the Validation and Analysis Sample*

Measure	European American/African American						Mexican American					
	1	2	3	4	5	6	1	2	3	4	5	6
1. Father avoidance	—	.12	<b>.52</b>	.02	-.22	.09	—					
2. Father anxiety	<b>.43</b>	—	.08	<b>.26</b>	-.15	<b>.17</b>	<b>.32</b>	—				
3. Mother avoidance	<b>.69</b>	<b>.27</b>	—	<b>.32</b>	<b>-.29</b>	<b>.25</b>	.65	<b>.21</b>	—			
4. Mother anxiety	.21	<b>.42</b>	<b>.44</b>	—	-.17	.14	.12	<b>.42</b>	<b>.29</b>	—		
5. Self-esteem	-.28	-.30	-.37	<b>-.29</b>	—	-.26	-.37	-.24	-.42	<b>-.25</b>	—	
6. Antisocial behavior	<b>.24</b>	<b>.20</b>	<b>.29</b>	<b>.33</b>	<b>-.16</b>	—	.21	<b>.24</b>	<b>.25</b>	<b>.42</b>	<b>-.22</b>	—

*Note.* Correlations below the diagonal belong to European American and above the diagonal to African American students. Coefficients in bold are statistically significant; bold coefficients equal to or greater than .18 are significant at  $p < .001$ , the others at  $p < .01$ .

nary chi-square analyses reported earlier indicated that both the distribution of father figures and the proportion of students who lived with their father figures varied by ethnicity. For these reasons, the identity of the parent figure variable (biological or nonbiological parent) and the parental living arrangement variable (lives with or does not live with adolescent) were included as control variables in the MANCOVA. Box's test indicated that equal variances of the dependent variables across groups could not be assumed,  $F(160, 11873.61) = 1.66, p < .001$ ; therefore Pillai's trace was used as the test statistic (Mertler & Vanatta, 2001). Results displayed in Table 6 indicate that there were statistically significant differences in the combined parental attachment variables according to three of the control variables: father figure (biological vs. nonbiological father) and father and mother living arrangements (with vs. away from adolescent). There were also ethnic differences in regard to parental attachment. Gender and social class differences were not statistically significant. None of the two-way or three-way interactions of gender, ethnicity, and social class were statistically significant.

The MANCOVA was followed with four ANCOVAs examining the effects of ethnicity on each parental attachment variable. The two control variables (biological vs. nonbiological parental figure and whether the parent figure lived with the adolescent)

were included in these analyses. Examination of the independent effects of the control variables shown in Table 7 revealed that, for both mother and father, adolescents completing the questionnaires on a biological parent reported less avoidance (father,  $M = 3.51$ ; mother,  $M = 3.20$ ) than did adolescents completing the instruments on a nonbiological parent (father,  $M = 4.35$ ; mother,  $M = 4.10$ ). Similarly, adolescents who reported living with their parental figure reported less avoidance (father,  $M = 3.50$ ; mother,  $M = 3.21$ ) than adolescents not living with their parental figure (father,  $M = 4.04$ ; mother,  $M = 3.82$ ). None of the two control variables was associated with father or mother anxiety. Ethnicity effects were statistically significant only for mother avoidance (see Table 7). Post hoc Bonferroni's test showed that Mexican American students scored lower on mother avoidance than the other two groups, who did not differ from each other. In all cases, the multivariate effect sizes were very small. Means and standard deviations for participants' scores in the mother and father attachment scales are displayed, by ethnic group, in Table 8.

#### *Gender, Ethnic, and Social Class Differences in Measures of Self-Esteem and Antisocial Behavior*

A three-way MANOVA was conducted on the data of the validation and analysis sample to examine the effects of adolescents' gender, ethnicity, and social class simultaneously on self-esteem and antisocial behavior. A general linear model was used for the analyses, and all of the significance test results reported are for Type III sums of squares (tests of independent effects of variables). Box's test indicated that equal variances of the dependent variables across groups could not be assumed,  $F(51, 5005) = 2.26, p < .001$ ; therefore Pillai's trace was used as the test statistic (Mertler & Vanatta, 2001). Results indicated that, with respect to self-esteem and antisocial behavior, there were statistically significant differences only for gender: Pillai's trace = .023,  $F(2, 772) = 9.11, p < .001$ , multivariate  $\eta^2 = .023$ . Social class and ethnic group differences were not statistically significant. None of the two-way or three-way interactions of gender, ethnicity, and social class were statistically significant. ANOVA results revealed a statistically significant difference in gender for antisocial behaviors,  $F(1, 789) = 33.64, p < .001, \eta^2 = .04$ , but not for self-esteem. As expected, boys ( $M = 1.88, SD = 0.90$ ) reported higher involvement in antisocial behaviors than girls ( $M = 1.29, SD = 0.62$ ). In all cases, the multivariate effect sizes were small. Means and standard deviations for participants' scores in self-

**Table 6**  
*Multivariate Analysis of Covariance for Father and Mother Avoidance and Attachment by Gender, Ethnic Group, and Social Class, Controlling for Characteristics of the Mother and Father Figures*

Source	dfs	Pillai's			
		trace	F	p	$\eta^2$
Gender	4, 764	.01	0.93	.44	.005
Ethnic group	4, 1530	.03	2.63*	.01	.01
Social class	8, 1530	.01	1.38	.20	.007
Covariate					
Father figure	4, 764	.04	9.01**	.001	.04
Mother figure	4, 764	.01	2.94	.02	.01
Father live	4, 764	.02	3.28*	.01	.02
Mother live	4, 764	.02	4.76**	.001	.02

*Note.* This analysis was conducted with the validation and analysis sample. The two-way and three-way interactions of gender, ethnicity, and social class were not statistically significant. Father live = adolescent lives with father; mother live = adolescent lives with mother.

\* $p < .01$ . \*\* $p < .001$ .

**Table 7**  
*Analysis of Covariance for Parental Attachment Variables by Ethnicity, Controlling for Characteristics of the Parent Figure*

Source	<i>df</i>	Avoidance					Anxiety				
		<i>MS</i>	<i>F</i>	<i>p</i>	$\eta^2$	<i>df</i>	<i>MS</i>	<i>F</i>	<i>p</i>	$\eta^2$	
Father											
Ethnicity	2	3.29	1.76	.17	.004	2	0.63	0.38	.18	.004	
Father figure	1	63.93	34.12**	.001	.042	1	0.55	0.33	.57	.001	
Father live	1	14.90	7.95*	.01	.04	1	3.05	1.82	.18	.002	
Error	784	1.87				784	1.67				
Mother											
Ethnicity	2	8.29	6.34*	.01	.02	2	1.33	0.72	.48	.002	
Mother figure	1	17.44	13.33**	.001	.02	1	2.03	1.10	.29	.001	
Mother live	1	10.39	7.94*	.01	.01	1	5.92	3.22	.07	.004	
Error	786	1.31				786	1.84				

Note. Father live = adolescent lives with father; mother live = adolescent lives with mother.

\**p* < .01. \*\**p* < .001.

esteem and antisocial behavior are displayed, by ethnic group, in Table 8.

### Regression Analyses

Two hierarchical regression analyses were conducted on the data from the validation and analysis sample to examine the independent effects of the four attachment dimensions—mother/father avoidance and mother/father anxiety—on each of the criterion variables (self-esteem and antisocial behavior). On each regression, the demographic variables of parental attachment figure (biological vs. nonbiological parent), attachment figures' living arrangements (lives with adolescent or not), ethnicity (coded as two dummy variables: Mexican American and African American), social class, and gender were entered as a block in the first step to control for their effects. For these analyses, social class was coded as a numerical variable (1 = *lower class*, 2 = *working class*, and 3 = *middle class*). The four parental attachment variables were entered simultaneously in the second step. In the third step, interaction terms of the attachment variables and ethnicity were entered to examine whether the models were similar across the three ethnic groups.

The increment in  $R^2$  in the third step (where the interactions of parental attachment by ethnicity were entered) was not statistically significant for either self-esteem or antisocial behavior. However, the  $R^2$  and the change in  $R^2$  for the two-step model were statistically significant for both self-esteem ( $R^2 = .18$ ,  $\Delta R^2 = .15$ ,  $p < .001$ ) and antisocial behavior ( $R^2 = .16$ ,  $\Delta R^2 = .10$ ,  $p < .001$ ). Inspection of the beta coefficients indicated that for self-esteem the statistically significant predictors were ethnicity (African American), social class, and two of the four parental attachment variables: father anxiety and mother avoidance. Gender and the two mother attachment variables emerged as significant predictors for antisocial behavior (values of the beta coefficients are included in Table 9). The sign of the beta coefficients indicated that being African American was associated with higher self-esteem and that being male was associated with higher self-reported involvement in antisocial behaviors. In terms of parental attachment, results indicated that when controlling for relevant demographic variables, only the mother attachment variables contributed unique variance to students' reported involvement in antisocial behaviors. Both father and mother attachment contributed unique variance to students' self-esteem. As would be expected, higher levels of

**Table 8**  
*Means and Standard Deviations of Attachment, Self-Esteem, and Antisocial Behavior Measures by Ethnic Group*

Measure	African American			European American			Mexican American		
	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>	<i>n</i>	<i>M</i>	<i>SD</i>
Father avoidance	237	3.91	1.54	334	3.62	1.35	218	3.45	1.34
Father anxiety	237	2.77	1.33	334	2.90	1.33	218	2.84	1.19
Mother avoidance	238	3.39	1.27	334	3.32	1.12	219	2.99	1.09
Mother anxiety	238	2.94	1.45	334	2.80	1.33	219	2.86	1.29
Self-esteem	238	5.49	1.19	334	5.09	1.22	219	5.15	1.28
Antisocial behavior	486	1.63	0.73	334	1.76	0.83	219	1.64	0.68

Note. The range of possible scores for antisocial behavior was 1 to 6; for all other measures, it was 1 to 7. In all cases, higher-scores indicate a higher level of the variable.

Table 9  
*Hierarchical Regression Analyses Summary for Parental Attachment Variables Predicting Self-Esteem and Antisocial Behavior*

Step/predictor measures	Self-esteem			Antisocial behavior		
	$\beta$	$R^2$	$\Delta R^2$	$\beta$	$R^2$	$\Delta R^2$
1. Demographic variables		.03	.03*		.06	.06**
Father figure	-.01		-.05			
Father live	-.001		-.004			
Mother figure	.03		-.04			
Mother live	.01		-.03			
Mexican American	.01		.01			
African American	.17**		-.07			
Social class	.03*		.06			
Gender	-.02		-.16**			
2. Father avoidance	-.10	.18	.15**	.06	.16	.10**
Father anxiety	-.13**			.07		
Mother avoidance	-.20**			.14**		
Mother anxiety	-.10			.14**		

Note. The  $\Delta R^2$  for Step 3, which included the Ethnicity  $\times$  Parental Attachment interaction, was not statistically significant for self-esteem or antisocial behavior.

\* $p < .01$ . \*\* $p < .001$ .

mother avoidance and anxiety were associated with higher self-reported involvement in antisocial behaviors. Higher levels of father avoidance and mother anxiety were associated with lower levels of self-esteem.

## Discussion

Consistent with previous work in parental attachment among adolescents and adults (Brennan et al., 1998), two dimensions of parental attachment were identified: avoidance and anxiety. Avoidance refers to adolescents' desire for emotional separation from parents and lack of security and positive affect in the parent-child relationship. Anxiety captured feelings of anxiety and discomfort in the parent-child relationship. Findings revealed no social class differences and only one ethnic difference in these two dimensions of parental attachment. Mexican American adolescents showed lower levels of mother avoidance than the African American and the European American adolescents, who did not differ from each other. This finding may result from the importance of the emotional relationship with the mother in traditional Mexican American families (Falicov, 1996).

Boys and girls did not differ in their reported levels of mother and father attachment, as measured by both avoidance and anxiety. This is consistent with previous findings indicating that boys and girls report similar levels of parental attachment security (Greenberg et al., 1983; Kenny, Moilanen, Lomax, & Brabeck, 1993; Raja et al., 1992). Ethnic group differences emerged only in relation to mother avoidance, and the magnitude of these differences was small. These findings imply that despite possible differences in values and worldviews among ethnically diverse families, African American, European American, and Mexican American adolescents in this study did not seem to vary in the strength of their attachments to their fathers and mothers. Previous studies also have found that African American, European American, and Latino(a) college students (Lopez et al., 2000; Rice et al.,

1997) and high school aged youth (Smith & Krohn, 1995) report similar levels of attachment and involvement with their parents.

The living arrangement and the identity of the parental figure were associated with differences in parental avoidance but not in parental anxiety. For both fathers and mothers, adolescents reported less avoidance toward biological than nonbiological parental figures. Similarly, adolescents who lived with their parental figure reported lower levels of parental avoidance than adolescents who did not live with their mother or father. These findings are consistent with studies that have examined parent-child relationships in intact and nonintact families. Children tend to report better communication with and less detachment from biological parents as compared with stepparents (Bray & Berger, 1993; Hetherington & Clingempeel, 1992; Lanz et al., 1999). Similarly, in divorced families, adolescents tend to be closer to the parent they live with on a regular basis than to the noncustodial parent (Maccoby et al., 1993).

Two major findings emerged regarding the association of parental attachment with adolescents' self-esteem and self-reported involvement in antisocial behaviors. First, when controlling for social class and other demographic variables, we found no major ethnic differences in the association of mother and father attachment with self-esteem and self-reported involvement in antisocial behaviors among this group of adolescents. Second, attachment to both father and mother contributed unique variance to self-esteem; however, only attachment to mother was associated with antisocial behaviors. Higher levels of mother avoidance and higher levels of father anxiety were associated with lower self-esteem. Students who reported higher levels of mother avoidance and anxiety also reported higher levels of involvement in antisocial behaviors. Studies comparing the relative importance of maternal and paternal attachment in relation to adolescents' attitudes and behaviors have yielded mixed outcomes. Some studies have found that attachment to both parents is similarly related to self-esteem (Noom et al., 1999; Papini & Roggman, 1992; Paterson et al., 1995) and involvement in antisocial behaviors (Noom et al., 1999). In other cases, either maternal attachment (Hoffman et al., 1988) or paternal attachment (Gecas & Schwalbe, 1986; Grant et al., 2000; LeCroy, 1988; Weber et al., 1995) has emerged as the stronger predictor. The present findings suggest that both mother attachment and father attachment make independent contributions to adolescents' self-esteem. However, in the presence of mother attachment, neither father avoidance nor anxiety contributed unique variance to adolescents' self-reported involvement in antisocial behaviors.

These findings must be considered within the limitations of the study. Of the students randomly selected to participate in the study, only 50% actually participated. This self-selection process probably resulted in an undersampling of students who frequently missed school, had negative relationships with their parents, or engaged in high levels of antisocial behaviors. Because of the correlational nature of the study, we cannot conclude that the quality of the adolescent attachment to mother and father has a positive influence on self-esteem and lack of engagement in antisocial behaviors. It is also possible that well-adjusted adolescents feel better about their relationship with their parents and that this positive perception of parents simply reflects the adolescents' adjustment rather than contributes to it.

These limitations notwithstanding, findings from the study indicate that, consistent with theoretical formulations, securely at-

tached adolescents from diverse ethnic/racial groups had a more positive sense of self-esteem and reported less involvement in antisocial behaviors than their less securely attached peers. These findings suggest that security in the parent-child relationship is important for adolescents from diverse American ethnic/racial groups, even if the families differ in terms of values and family organization. Therefore, in working with diverse adolescents who present self-esteem issues and behavioral problems, counselors will do well to explore parent-child attachment issues. It is important for counselors to remember that even though the behaviors used by families from diverse ethnic and racial backgrounds to foster and signal secure attachments might differ, the presence of a secure parent-adolescent bond seems to be associated with positive outcomes across groups. Findings from current research indicate that secure attachment organizations among late adolescents and young adults also are associated with positive outcomes, including lack of depression, anxiety, and worry (Vivona, 2000), confidence in pursuing career-related tasks (O'Brien, Friedman, Tipton, & Linn, 2000), and effective coping with conflict in romantic relationships (Creasey & Hesson-McInnis, 2001). It seems important to extend the study of adult attachment in these areas to late adolescents and young adults who are ethnic minorities.

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# Childhood Antisocial Behavior and Adolescent Alcohol Use Disorders

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**Antisocial behaviors (e.g., aggression toward people and animals, destruction of property, deceitfulness, theft, and serious rule violations) and related mental disorders (i.e., conduct disorder and oppositional defiant disorder) during childhood predict alcohol use disorders (AUDs) during adolescence. This sequence of disorders may reflect developmentally specific forms of deficits in the ability to control behavior. Therefore, childhood antisocial behaviors and adolescent AUDs may share common genetic and environmental influences. A comprehensive conceptual model may clarify the relationship between childhood antisocial behaviors and adolescent AUDs. A better understanding of this relationship is essential for advancing research into the causes of both behaviors and for developing prevention programs and treatment for adolescents with these problems. Prevention programs targeting childhood antisocial behaviors have met with some success. Clinical interventions for adolescents with AUDs may be improved by focusing evaluation and treatment planning on antisocial behavior.** KEY WORDS: comorbidity; childhood behavioral problem; antisocial behavior; adolescent; AODD (alcohol and other drug dependence); alcoholic beverage; conduct disorder; disinhibition; genetic linkage; risk factors; prevention; patient assessment; psychosocial treatment method; literature review

Childhood antisocial behaviors are a central element in the developmental pathway leading to adolescent alcohol abuse or dependence. Theories and empirical observations indicate that childhood antisocial behaviors increase the risk for alcohol use disorders (AUDs). In its most severe forms, childhood antisocial behavior can lead to diagnoses of conduct disorder (CD) or oppositional defiant disorder (ODD). Particularly for children meeting the criteria for CD, childhood antisocial behaviors predict early initiation of alcohol use, adolescent alcohol-related problems, and the onset of AUDs (Cadoret et al. 1995; Clark et al. 1998a, 1999). (Throughout this review, the term

“childhood” will refer to age 12 and younger, and “adolescence” will refer to ages 13 through 18.) Understanding the nature of the relationship between antisocial behaviors and AUDs is essential in planning interventions designed to prevent or ameliorate both types of behaviors or disorders.

This article reviews antisocial behaviors and related mental disorders commonly found in children and adolescents and describes the relationship between antisocial behaviors and alcohol problems. The article then presents a conceptual model for explaining this relationship, including genetic and environmental factors that may play a role in the process. Finally, the article summarizes the

implications of the relationship between antisocial behaviors and AUDs for understanding the etiology of AUDs, for developing effective methods to prevent alcohol problems, and for evaluating and treating adolescents with AUDs.

## DEFINITIONS OF ANTISOCIAL BEHAVIOR AND RELATED DISORDERS

### *Behaviors and Diagnoses*

Antisocial behaviors are any acts that violate social rules and the basic rights of others. They include conduct intended to injure people or damage property,

illegal behavior, and defiance of generally accepted rules and authority, such as truancy from school. These antisocial behaviors exist along a severity continuum. When childhood antisocial behaviors exceed certain defined thresholds—the diagnostic criteria specified in the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (DSM-IV) (American Psychiatric Association 1994)—the child is considered to have CD or ODD. Together with attention deficit hyperactivity disorder (ADHD), these two disorders are classified as “disruptive behavior disorders” in the DSM-IV.

**Conduct Disorder (CD).** Antisocial behaviors represented in the DSM-IV diagnostic criteria for CD include aggression toward people and animals, destruction of property, deceitfulness, theft, and other serious social rule violations (see textbox, below). A diagnosis of CD also requires a persistent behavior pattern in which 3 or more of a total of 15 behaviors occur over a 12-month period. The DSM-IV specifies childhood-onset and adolescent-onset types of CD and different degrees of severity of the disorder.

**Oppositional Defiant Disorder (ODD).** ODD is characterized by negativistic, hostile, and defiant behaviors, such as losing one's temper, arguing, defying

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rules, deliberately annoying others, blaming others for one's behavior, and displaying anger or vindictiveness (see textbox, p. 111). In addition, a diagnosis of ODD according to the DSM-IV criteria requires a pattern of behavior lasting at least 6 months in which 4 or more of a total of 8 behaviors are exhibited. A diagnosis of CD supercedes ODD—that is, if a child meets the criteria for both CD and ODD, he or she will be diagnosed with CD.

### *Dimensions of Antisocial Behavior*

Diagnoses summarize a constellation of characteristics as the presence or absence of a disorder. Although diagnostic classifications of such antisocial behaviors as CD and ODD have both practical and scientific utility, one can also conceptualize these behaviors as occurring along multiple dimensions. Relevant dimensions include the categories of behaviors required for a diagnosis of

CD, such as aggression and deceitfulness. One can also distinguish between overt antisocial behaviors, such as fighting, and covert antisocial behaviors, such as theft without confronting the victim (Loeber et al. 2000). The extent to which such dimensions correspond to the diagnostic classifications specified in DSM-IV is a matter of some debate. On the one hand, the available empirical literature indicates that the DSM-IV distinction between ODD and CD is clinically useful for children in general (Loeber et al. 2000) and for adolescents with AUDs in particular (Moss and Lynch 2001). On the other hand, these syndromes are multidimensional, and some features overlap between CD and ODD (i.e., are diagnostically ambiguous) (Hartman et al. 2001). For CD, overt antisocial behaviors may be meaningfully distinguished from covert antisocial behaviors (Loeber et al. 2000).

Developmental considerations are also important for understanding the

## DIAGNOSTIC CRITERIA FOR CONDUCT DISORDER

Conduct disorder is diagnosed if a persistent pattern of behavior involving three or more of the following behaviors is present over a 12-month period.

### Aggression toward people and animals

- Often bullies, threatens, or intimidates others
- Often initiates physical fights
- Has used a weapon that can cause serious physical harm to others
- Has been physically cruel to people
- Has been physically cruel to animals
- Has stolen while confronting a victim
- Has forced someone into sexual activity

### Destruction of property

- Has deliberately set fires with the intention of causing serious damage
- Has deliberately destroyed the property of others

### Deceitfulness or theft

- Has broken into someone else's house, building, or car
- Often lies to obtain goods or favors or to avoid obligations
- Has stolen items of nontrivial value without confronting a victim

### Serious violations of rules

- Often stays out at night despite parental prohibitions, beginning before age 13
- Has run away from home overnight at least twice while living in parental or parental surrogate home
- Often truant from school, beginning before age 13

SOURCE: Adapted from the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (American Psychiatric Association 1994).

## DIAGNOSTIC CRITERIA FOR OPPOSITIONAL DEFIDENT DISORDER

Oppositional defiant disorder is diagnosed if a pattern of behavior involving four or more of these criteria is present for at least 6 months.

- Often loses temper
- Often argues with adults
- Often actively defies or refuses to comply with adults' requests or rules
- Often deliberately annoys people
- Often blames others for his or her mistakes or behavior
- Is often touchy or easily annoyed by others
- Is often angry or resentful
- Is often spiteful or vindictive

SOURCE: Adapted from the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition* (American Psychiatric Association 1994).

implications of particular antisocial behaviors for predicting outcomes. For example, the early emergence of aggressive behaviors tends to be accompanied by ODD (Loeber et al. 2000) and to predict later CD (Côté et al. 2001).

### *Developmental Continuity and Specificity*

Serious antisocial behaviors, including severe forms of ODD and CD, have remarkable developmental stability in boys and girls—that is, these behaviors persist throughout various stages of childhood and adolescence. Mild or moderate forms of the disorders, however, are considerably less stable (Loeber et al. 2000). Antisocial behaviors also tend to be consistent across social settings, such as school and home (Dishion et al. 1995). Although the propensity for serious antisocial behaviors is quite stable across the lifespan, the manifestations of this propensity vary according to developmental stages. This concept has been termed “heterotypic continuity” (Moffitt 1993). For example, antisocial behavior that manifests as irritability and impulsivity in young children may manifest as criminal behavior once these children reach adulthood.

The significance of specific childhood antisocial behaviors also depends, in part, on the timing of their appearance. For example, CD that develops early in life is often preceded by ODD (Loeber et al. 2000), suggesting that ODD

behaviors that develop early can predict early onset CD. An earlier age of onset of CD has been hypothesized to indicate more severe antisocial characteristics, although to date empirical support for this hypothesis exists only for boys (Loeber et al. 2000).

The extent to which antisocial behaviors persist across multiple developmental periods also may be an important distinguishing feature (Moffitt 1993). For example, in some people such behaviors occur during childhood, adolescence, and adulthood (i.e., are “life-course persistent”), whereas in other people they are evident only in one developmental stage. This developmental distinction may be useful in understanding the relationship between antisocial behavior and AUDs. Correlations among various antisocial behaviors over time have led to the theory that a general tendency toward psychological dysregulation may underlie many forms of childhood and adolescent psychopathology, including alcohol and other drug use disorders (Tarter et al. 1999).

### ANTISOCIAL BEHAVIORS PREDICT ALCOHOL PROBLEMS

Prospective, longitudinal studies (i.e., studies that followed participants over several years) of children who initially did not exhibit behavior problems have provided clear evidence that childhood antisocial behaviors predict adolescent

alcohol involvement and AUDs. Thus, childhood manifestations of deficits in the ability to control behavior (i.e., behavioral undercontrol), including CD and ODD, predict the initiation of regular alcohol use in early adolescence (Clark et al. 1998a) and the onset of alcohol-related problems (Clark et al. 1999) and AUDs (Caspi et al. 1996; Rydelius 1981) during adolescence. ADHD may be less relevant because it did not predict AUDs in some studies (Mannuzza et al. 1998). In other studies, ADHD did predict adolescent alcohol and drug problems; however, that association may have been attributable to CD co-occurring in the children with ADHD (Clark et al. 1999). Finally, children of parents with alcohol and other drug use disorders (i.e., high-risk children) have increased rates of antisocial behaviors. Childhood antisocial behavior, such as noncompliance with parental directives in the toddler years (Eiden et al. 2001), and CD and ODD in the school-age years (Clark et al. 1997a) are more common in children at high risk for alcohol and other drug use disorders.

Based on these observations, it is clear that childhood antisocial behavior precedes and predicts adolescent AUDs. Consequently, a conceptual model is needed to guide further investigation into the causal relationships between both types of behaviors. Such a model is presented in the following section.

### *A Conceptual Model*

Conceptual approaches from several traditions have proven useful for developing theories about the relationship between childhood antisocial behaviors and adolescent AUDs. The model presented here, and described in more detail in Clark and Winters (in press), represents an integrated conceptual model and measurement approach that allows researchers to consider the multiple causes and effects shaping this relationship. This model is informed by prior theories (Zucker et al. 1995; Tarter et al. 1999), assessment methodologies (Clark et al. 2001), and research (Clark et al. 1999) in this area. The model combines two approaches:

- *The multifactorial model of complex traits.* This model assumes that individual differences in observable characteristics—in this case, antisocial behaviors and AUDs—are determined by variations in the combined influences of multiple genes and environmental factors (Lander and Schork 1994; Vanyukov and Tarter 2000).
- *The theoretical framework of developmental psychopathology.* This framework emphasizes specific methodological approaches and conceptual issues by contrasting normal and atypical development. It also takes into consideration that the effects of risk factors may vary across developmental stages (Cicchetti and Cohen 1995).

This model, as well as conceptualizations from several other traditions, hypothesizes that childhood antisocial behaviors and adolescent AUD have common causes. Several mechanisms may underlie these common causes. First, both antisocial behaviors and AUDs may be manifestations of a fundamental deficiency in the person's ability to control or regulate his or her behavior (Tarter et al. 1999). Second, the observed relationship between antisocial behaviors and AUDs may reflect the presence of common genetic factors and/or environmental influences. These mechanisms, which are not mutually exclusive and can both be included within the proposed comprehensive model, are discussed in more detail in the following sections.

### ***The Dysregulation Hypothesis***

A common underlying factor—namely, a tendency toward poor behavioral regulation—may predispose some people to both childhood antisocial behaviors and AUDs (Cadoret et al. 1995). Behavioral undercontrol (also referred to as “behavioral dysregulation” and “ disinhibition”) is characterized by deficits in the planning and execution of goal-directed behavior, and is manifested by aggressive, antisocial, and impulsive behavior (Martin et al. 2000), all of which predict problematic alcohol use (Caspi et al. 1996). Behavioral under-

control also has been hypothesized to underlie the observed associations among childhood CD, alcohol and other drug use disorders, and adult antisocial personality disorders.

During a person's development, the ability to regulate and control behaviors and emotions emerges at the same time that a brain region called the prefrontal cortex matures. Accordingly, researchers have hypothesized that the neurobiological functions that modulate thoughts (i.e., cognition), the emotions associated with those thoughts (i.e., affect), and behavior are located in the prefrontal cortex (Spear 2000). Consistent with this hypothesis, neuroimaging findings indicate that abnormalities in the structure of the prefrontal cortex are associated with severe antisocial behavior (Raine et al. 2000). The rate with which certain brain circuits involving the prefrontal cortex mature may be an important mechanism through which genetic factors influence psychopathological manifestations (Todd et al. 1995).

### ***Genetic Influences***

***Behavior Genetics.*** Researchers have begun to investigate the extent to which similarities in antisocial behavior and AUDs among relatives result from genetic inheritance (i.e., shared genes) or environmental factors. Studies in this area have provided convincing evidence that genetic factors contribute substantially to individual variations in both antisocial behavior and AUDs (Tarter et al. 1999). Some studies have also suggested that the high correlations between ODD and CD symptoms can be attributed to genetic similarity (Eaves et al. 2000). The characteristic features of behavioral undercontrol are highly susceptible to genetic influence, and common genetic factors may account for the associations between antisocial behaviors and drug use (Young et al. 2000). To explore the role of genetic factors in the intergenerational transmission of antisocial behavior, Cadoret and colleagues (1995) studied adopted children and their biological and adoptive parents. They found evidence for a genetically transmitted pathway leading from antisocial personality disorder and drug use disorders

in the biological parent to CD in the offspring and, subsequently, drug use disorders and antisocial personality disorder in the offspring.

Other studies found that the correlation between childhood antisocial behavior and adult drug use disorders is more strongly influenced by genetic factors than is the correlation between adult antisocial behaviors and drug use disorders (Grove et al. 1990). This observation reinforces the notion that childhood characteristics are of fundamental importance for the development of adult behaviors. The relationship between childhood antisocial behavior and the later development of AUDs may be the result of common genetic influences (Waldman and Slutske 2000).

***Molecular Genetics.*** In general, variations in the structure of certain genes (i.e., genetic polymorphisms) account for the inheritance of individual differences in behavior. Although extensive evidence has established that heritable factors are a major influence in the development of AUDs, researchers have not yet been able to identify the mechanisms leading to the development of AUDs and the specific genes involved. One candidate that has been implicated in AUDs is a brain signaling system called the dopamine neurotransmitter system. Individual differences in this system are likely to influence the extent to which a person experiences alcohol's effects as pleasant and therefore wants to consume more alcohol (i.e., the extent to which a person experiences drinking as positively reinforcing). Variations in the level of reinforcement obviously can influence a person's risk for alcohol and other drug use disorders. Accordingly, researchers have begun to study associations between genetic polymorphisms influencing dopamine and other brain signaling systems on the one hand, and the risk for AUDs on the other hand (Vanyukov and Tarter 2000). These associations may provide insights into the genetic, biochemical, and neurobiological mechanisms underlying AUDs and may also reveal the nature of the relationship between AUDs and antisocial behaviors (Vanyukov et al. 2000).

### *Environmental Influences*

Several environmental factors have been found to increase the risk for antisocial behavior as well as AUDs in adolescents. These influences include problematic family functioning, such as low levels of parental monitoring and inconsistent disciplinary practices (Clark et al. 1998*b*), as well as childhood maltreatment (Clark et al. 1997*b*). The developmental psychopathology framework described earlier suggests that specific environmental factors may be particularly influential during critical developmental periods. For example, paternal drug use disorders may have differential effects depending on a child's stage of development. In a study examining psychopathology in a sample of high-risk boys (Moss et al. 1997), boys whose fathers overcame drug use disorders prior to the child's school-age period were similar to a control group of boys whose fathers had no drug use disorders. Conversely, boys whose fathers had continuing drug use disorders exhibited significant psychopathology.

Parents' drug use and other pathology may affect the development of their offspring through several mechanisms. For example, parental drug use and other pathology may directly influence parenting behaviors. In addition, the effects of parental pathology may be indirect. Thus, parental mental disorders may act as barriers impeding their children's access to adequate mental health treatment, which in turn may increase the children's likelihood of developing AUDs in adolescence (Cornelius et al. 2001).

Environmental influences invariably interact with genetic factors to determine a person's risk for certain disorders. The dynamic interaction of genetic and environmental influences with certain behaviors over the course of development is particularly complex and therefore difficult to analyze (Tarter et al. 1999). For example, for AUDs to develop, alcohol availability in the environment (e.g., from family or friends) is a necessary but not sufficient condition. An adolescent who chooses peers who use alcohol and other drugs may be more frequently exposed to alcohol than is an adolescent with a different peer

group. When combined with a genetic predisposition to alcohol dependence, the adolescent's selection of deviant peers and consequent high exposure to alcohol may result in the development of AUDs. Such interactions are ideally taken into consideration when studying the relationship between childhood antisocial behaviors and AUDs.

### **IMPLICATIONS FOR PREVENTION, EVALUATION, AND TREATMENT**

A causal model explaining the association between childhood antisocial behaviors and the development of AUDs during adolescence, if it can be validated, has implications for the prevention, evaluation, and treatment of those behaviors. For example, early intervention for antisocial behaviors might reduce the risk of developing an AUD, and treatment for AUDs might be more effective if it also addressed behavioral undercontrol. These possible implications are reviewed in the following sections.

#### *Prevention*

A potentially effective strategy to prevent the development of AUDs involves using interventions designed to reduce childhood characteristics that predict adolescent AUDs, such as childhood antisocial behavior. Several research programs have been investigating this approach, and early reports have shown promising results. For example, Linking the Interests of Family and Teachers (LIFT) is an elementary-school prevention program that uses behavior modification with children on the playground, provides social and problem-solving skills training to children in the classroom, and offers parenting skills training to their parents (Eddy et al. 2000). When the children receiving the LIFT intervention and a group of control children were reevaluated 3 years after the intervention, the LIFT program was found to delay the time to first regular alcohol use, first marijuana use, and first police arrest. Other similar projects are in progress (e.g., Ialongo et al. 2001). Researchers also have identified effec-

tive interventions for childhood CD (Sheldrick et al. 2001), which may reduce the risk for adolescent AUDs.

#### *Evaluation*

A comprehensive assessment, including a systematic evaluation of the patient's history of antisocial behaviors and drug use disorders, is the foundation for effective treatment planning for adolescents with these problems. Too often, clinical assessments lack this foundation. For example, clinical assessment strategies are typically unstructured and may lead to inaccurate diagnoses (Clark et al. 1995). Systematic diagnostic interviews provide for a more thorough assessment with greater reliability and validity and have been advocated for both clinical evaluations and research (Clark et al. 1999). Moreover, additional domains should be included in such comprehensive assessments, including parent-adolescent relationships, peer characteristics, school functioning, and health. Clark and Winters (in press) have proposed assessment strategies that are designed to provide the comprehensive and developmentally appropriate information that is necessary for clinical interventions, prevention, and related research.

It is also important to recognize that AUDs have risk factors and consequences that manifest differently at various developmental stages. Assessment of relationships among various behaviors over time requires specialized measurement approaches called "diachronic assessment" strategies (Clark et al. 2001). Recently developed statistical techniques that can provide more realistic summaries of growth and development (e.g., Muthén and Muthén 2000) allow optimal statistical modeling of data obtained with such assessment approaches. The use of diachronic assessment strategies in combination with such innovative statistical modeling techniques can allow insights into the relationships among problem behaviors such as antisocial behavior and AUDs.

#### *Treatment*

Although achieving abstinence from alcohol is the optimal treatment goal

for patients with AUDs, adolescents participating in conventional alcoholism treatments have high relapse rates (Cornelius et al. in press). Several clinical studies have indicated that co-occurring CD predicts particularly poor outcomes among adolescents receiving treatment for alcohol and other drug problems (Brown et al. 1996; Crowley et al. 1998; Kaminer et al. 1992). Accordingly, programs for adolescents with AUDs may need to include interventions designed to reduce antisocial behaviors.

Several treatment approaches specifically target CD. Psychosocial interventions with standardized methods and documented effectiveness include training parents in child management techniques and teaching children prosocial responses to interpersonal conflicts (Sheldrick et al. 2001). Stimulant medications, such as methylphenidate (Ritalin®) may also improve CD (Klein et al. 1997). The extent to which such psychosocial and pharmacological treatments for CD also improve the outcome of adolescents with coexisting CD and AUDs requires further research.

For patients with co-occurring antisocial behaviors and AUDs, behavioral treatments may be more effective when the interventions target multiple domains, including the individual, family, and peers. Interventions using this strategy, such as the Multisystemic Treatment approach, have been shown to improve outcome compared with less intensive approaches. For example, in a clinical adolescent sample, the Multisystemic Treatment approach reduced both drug use and antisocial behavior (Henggeler et al. 1998).

## FUTURE DIRECTIONS

Although researchers and clinicians have long recognized the relationship between childhood antisocial behavior and adolescent AUDs, a need remains for further research into the mechanisms underlying this relationship, as well as for prevention and treatment research. For example, treatment studies need to define the cost-effectiveness of interventions and determine how treatment gains made in supervised settings (i.e.,

clinical studies) can be transferred to real-life settings (e.g., home and school). Moreover, the potential benefits of simultaneously treating antisocial behavior and AUDs must be elucidated further. Future studies also must consider gender differences more thoroughly, because although antisocial behaviors and AUDs are more common in males,

*Although achieving abstinence from alcohol is the optimal treatment goal for patients with AUDs, adolescents participating in conventional alcoholism treatments have high relapse rates.*

females with these characteristics may have more problematic outcomes (Loeber et al. 2000). Finally, as researchers more clearly identify the genetic and environmental influences on childhood antisocial behaviors and adolescent AUDs, they also need to further examine the effects of environmental influences on the persistence of these behaviors.

Treatment programs simultaneously addressing multiple domains represent an ideal and necessary approach for some adolescents with AUDs. The high costs of such comprehensive programs, however, limit their application. Furthermore, many adolescents with AUDs may have acceptable outcomes with conventional, less intensive interventions (Maisto et al. 2001). Therefore, researchers and clinicians must develop more extensive empirical data to serve as a basis for making specific treatment recommendations in order to increase the likelihood that policymakers and payers (e.g., insurance companies) accept the increased costs associated with more comprehensive services. And although the cost of providing intensive interventions for adolescents with AUDs is considerable, the societal cost of neglecting

these highly problematic adolescents is even greater (Scott et al. 2001).

Substantial challenges remain in understanding the relationship between childhood antisocial behavior and adolescent AUDs. Both antisocial behaviors and AUDs are complex problems with multiple contributing factors. Consequently, genetic, family, epidemiological, and clinical studies are needed to define clinically meaningful patient subgroups, identify children at highest risk for AUDs, and inform more effective prevention and treatment efforts. ■

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# Childhood Origins of Antisocial Behavior

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The major early risk factors for antisocial behavior include impulsiveness, low intelligence and low school achievement, poor parental supervision, child physical abuse, punitive or erratic parental discipline, cold parental attitude, parental conflict, disrupted families, antisocial parents, large family size, low family income, antisocial peers, high delinquency-rate schools, and high crime neighborhoods. The causal mechanisms linking these risk factors with antisocial outcomes are less well established, and the 'ICAP' theory is proposed to explain these. The major implications for intervention are that programs targeting these key risk factors should be implemented, especially multiple-component community-based programs. Copyright © 2005 John Wiley & Sons, Ltd.

In order to summarize childhood origins of anti-social behavior, this paper will review early risk factors for Conduct Disorder (CD) and juvenile delinquency. There is considerable continuity in antisocial behavior from childhood to adolescence and adulthood. Lee Robins (e.g. 1986) has consistently shown how a constellation of indicators of childhood and adolescent antisocial behavior predicts a constellation of indicators of adult antisocial behavior. The childhood/adolescent indicators include illegal acts such as stealing and vandalism, resistance to authority, physical aggression, impulsiveness, precocious drinking and sexual behavior, running away from home, truanting from school, lying, and cruelty to animals. The adult indicators include crime and violence, excessive drinking and drug-taking, a poor employment record, marital break-ups, child neglect, reckless driving, and failure to pay debts.

Robins has consistently argued that the number of childhood/adolescent indicators of antisocial behavior predicts the number of adult indicators, rather than any specific childhood symptom pre-

dicting a specific adult symptom (see, e.g., Robins & Ratcliff, 1978). Hence, antisocial behavior is versatile rather than specialized. In the large-scale U.S. Epidemiological Catchment Area program, the average number of adult antisocial symptoms (at age 18 or over) increased steadily with the number of conduct problems before age 15 (Robins, Tipp, & Przybeck, 1991, p. 267). Whereas 27% of males with four or five childhood symptoms met the criterion for adult antisocial personality (four or more adult symptoms), this was true of 49% of males with six or more childhood symptoms.

There are numerous surveys showing that CD in childhood and adolescence predicts adult anti-social personality disorder. For example, in an Inner London Study, Zoccolillo, Pickles, Quinton and Rutter (1992) found that almost half of the males with three or more CD symptoms at age 9–12 showed persistent antisocial behavior after age 18 and fulfilled the criteria for adult antisocial personality disorder (see also Loeber, Green, and Lahey, 2003; Offord & Bennett, 1994; Rey, Morris-Yates, Singh, Andrews, & Stewart, 1995; Storm-Mathisen & Vaglum, 1994).

Similarly, numerous studies show that juvenile delinquency predicts adult crime and that offending is versatile rather than specialized (Farrington, 1997; Piquero, Farrington, & Blumstein, 2003). This paper refers particularly to results obtained in the

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Cambridge Study in Delinquent Development, which is a prospective longitudinal survey of 411 South London males from age 8 to age 48 (Farrington, 1995, 2003b). In the Cambridge Study, 73% of those convicted as juveniles (age 10–16) were reconvicted at age 17–24, and 45% were reconvicted at age 25–32 (Farrington, 1992a). Furthermore, the significant continuity between offending in one age range and offending in a later age range held for self-reports as well as official convictions (Farrington, 1989).

Since childhood CD and juvenile delinquency are early manifestations of adult antisocial behavior, this paper focusses on risk factors for CD and delinquency. Because of limitations of space, this paper will be very selective in concentrating on the most important findings obtained in the highest quality studies; for extensive book-length reviews of these topics, see Connor (2002), Hill and Maughan (2001), and Rutter, Giller, and Hagell (1998). There will be a particular focus on risk factors discovered in prospective longitudinal surveys; for summaries of these surveys see a chapter by Kalb, Farrington, and Loeber (2001), and for reviews of risk factors see a chapter by Hawkins et al. (1998). Most research has been carried out with males, but studies of females are included where applicable (see, e.g., Moffitt, Caspi, Rutter & Silva, 2001). While the main thrust of the paper is to review risk factors, a theory will be presented that attempts to explain why early risk factors predict antisocial behavior.

## RISK FACTORS

Longitudinal data are required to establish the time ordering of risk factors and antisocial behavior. It is extremely difficult in correlational or cross-sectional studies to draw valid conclusions about cause and effect. Because of the difficulty of establishing causal effects of factors that vary only between individuals (e.g. gender and ethnicity), and because such factors have no practical implications for intervention (e.g., it is not practicable to change males into females), variables that cannot be modified will not be reviewed here. Their effects on antisocial behavior are usually explained by reference to other, modifiable, factors. For example, gender differences in antisocial behavior have been explained on the basis of different socialization methods used by parents with boys and girls, or different opportunities for offending of males and females. Because of limitations of space, protective

factors (see, e.g., Masten & Reed, 2002) and biological factors (see, e.g., Rowe, 2002) are not reviewed here.

## Temperament and Personality

Personality traits such as sociability or impulsiveness describe broad predispositions to respond in certain ways, and temperament is basically the childhood equivalent of personality. The modern study of child temperament began with the New York longitudinal study of Chess and Thomas (1984). Children in their first five years of life were rated on temperamental dimensions by their parents, and these dimensions were combined into three broad categories of easy, difficult and 'slow to warm up' temperament. Having a difficult temperament at age 3–4 (frequent irritability, low amenability and adaptability, irregular habits) predicted poor psychiatric adjustment at age 17–24.

Unfortunately, it was not very clear exactly what a 'difficult' temperament meant in practice, and there was the danger of tautological conclusions (e.g. because the criteria for difficult temperament and Oppositional Defiant Disorder were overlapping). Later researchers have used more specific dimensions of temperament. For example, Kagan (1989) in Boston classified children as inhibited (shy or fearful) or uninhibited at age 21 months, and found that they remained significantly stable on this classification up to age 7 years. Furthermore, the uninhibited children at age 21 months significantly tended to be identified as aggressive at age 13 years, according to self- and parent reports (Schwartz, Snidman, & Kagan, 1996).

Important results on the link between childhood temperament and later offending have been obtained in the Dunedin longitudinal study in New Zealand (Caspi, 2000). Temperament at age 3 years was rated by observing the child's behavior during a testing session. The most important dimension of temperament was being under-controlled (restless and impulsive with poor attention), and this predicted aggression, self-reported delinquency and convictions at age 18–21.

Studies using classic personality inventories such as the MMPI and CPI (Wilson & Herrnstein, 1985, pp. 186–198) often seem to produce essentially tautological results, such as that delinquents are low on socialization. The Eysenck personality questionnaire has yielded more promising results (Eysenck, 1996). In the Cambridge Study, those high on both Extraversion and Neuroticism tended

to be juvenile self-reported delinquents, adult official offenders and adult self-reported offenders, but not juvenile official delinquents (Farrington, Biron, & LeBlanc, 1982). Furthermore, these relationships held independently of other variables such as low family income, low intelligence, and poor parental child-rearing behavior. However, when individual items of the personality questionnaire were studied, it was clear that the significant relationships were caused by the items measuring impulsiveness (e.g. doing things quickly without stopping to think).

### ***Impulsiveness***

Impulsiveness is the most crucial personality dimension that predicts antisocial behavior (Lipsey & Derzon, 1998). Unfortunately, there are a bewildering number of constructs referring to a poor ability to control behavior. These include impulsiveness, hyperactivity, restlessness, clumsiness, not considering consequences before acting, a poor ability to plan ahead, short time horizons, low self-control, sensation-seeking, risk-taking and a poor ability to delay gratification.

Many studies show that hyperactivity predicts later offending. In the Copenhagen Perinatal Project, hyperactivity (restlessness and poor concentration) at age 11–13 significantly predicted arrests for violence up to age 22, especially among boys experiencing delivery complications (Brennan, Mednick, & Mednick, 1993). Similarly, in the Orebro longitudinal study in Sweden, hyperactivity at age 13 predicted police-recorded violence up to age 26. The highest rate of violence was among males with both motor restlessness and concentration difficulties (15%), compared with three per cent of the remainder (Klintenberg, Andersson, Magnusson, & Stattin, 1993).

In the Cambridge Study, boys nominated by teachers as lacking in concentration or restless, those nominated by parents, peers, or teachers as the most daring or taking most risks, and those who were the most impulsive on psychomotor tests at age 8–10 all tended to become offenders later in life. Daring, poor concentration, and restlessness all predicted both official convictions and self-reported delinquency, and daring was consistently one of the best independent predictors (Farrington, 1992c). Interestingly, Farrington, Loeber, and van Kammen (1990) found that hyperactivity predicted juvenile offending independently of conduct problems. Lynam (1996)

proposed that boys with both hyperactivity and CD were most at risk of chronic offending and psychopathy, and presented evidence in favor of this hypothesis from the Pittsburgh Youth Study (Lynam, 1998).

The most extensive research on different measures of impulsiveness was carried out in the Pittsburgh Youth Study by White et al. (1994). The measures that were most strongly related to self-reported delinquency at ages 10 and 13 were teacher-rated impulsiveness (e.g. acts without thinking), self-reported impulsiveness, self-reported undercontrol (e.g. unable to delay gratification), motor restlessness (from videotaped observations), and psychomotor impulsiveness (on the Trail Making Test). Generally, the verbal behavior rating tests produced stronger relationships with offending than the psychomotor performance tests, suggesting that cognitive impulsiveness was more relevant than behavioral impulsiveness (based on test performance). Future time perception and delay of gratification tests were only weakly related to self-reported delinquency. Lynam and Moffitt (1995) concluded that low IQ and impulsiveness were independent risk factors for delinquency.

### ***Low IQ and Low Educational Achievement***

Low IQ and low school achievement are important predictors of CD, delinquency and adolescent anti-social behavior (Moffitt, 1993). In an English epidemiological study of 13-year-old twins, low IQ of the child predicted conduct problems independently of social class and of the IQ of parents (Goodman, Simonoff, & Stevenson, 1995). Low school achievement was a strong correlate of CD in the Pittsburgh Youth Study (Loeber, Farrington, Stouthamer-Loeber, & van Kammen, 1998a). In both the Ontario Child Health Study (Offord, Boyle, & Racine, 1989) and the New York State longitudinal study (Velez, Johnson, & Cohen, 1989), failing a grade predicted CD. Underachievement, defined according to a discrepancy between IQ and school achievement, is also characteristic of CD children, as Frick et al. (1991) reported in the Developmental Trends Study.

Low IQ measured in the first few years of life predicts later delinquency. In a prospective longitudinal survey of about 120 Stockholm males, low IQ measured at age 3 significantly predicted officially recorded offending up to age 30 (Stattin & Klackenberg-Larsson, 1993). Frequent offenders (with four or more offenses) had an average IQ of

88 at age 3, whereas non-offenders had an average IQ of 101. All of these results held up after controlling for social class. Similarly, low IQ at age 4 predicted arrests up to age 27 in the Perry preschool project (Schweinhart, Barnes, & Weikart, 1993) and court delinquency up to age 17 in the Collaborative Perinatal Project (Lipsitt, Buka, & Lipsitt, 1990).

In the Cambridge Study, twice as many of the boys scoring 90 or less on a nonverbal IQ test (Raven's Progressive Matrices) at age 8–10 were convicted as juveniles as of the remainder (West & Farrington, 1973). However, it was difficult to disentangle low IQ from low school achievement, because they were highly intercorrelated and both predicted delinquency. Low nonverbal IQ predicted juvenile self-reported delinquency to almost exactly the same degree as juvenile convictions (Farrington, 1992c), suggesting that the link between low IQ and delinquency was not caused by the less intelligent boys having a greater probability of being caught. Also, low IQ and low school achievement predicted offending independently of other variables such as low family income and large family size (Farrington, 1990).

Low IQ may lead to delinquency through the intervening factor of school failure. The association between school failure and delinquency has been demonstrated repeatedly in longitudinal surveys. In the Pittsburgh Youth Study, Lynam, Moffitt, and Stouthamer-Loeber (1993) concluded that low verbal IQ led to school failure and subsequently to self-reported delinquency, but only for African-American boys. Another plausible explanatory factor underlying the link between low IQ and delinquency is the ability to manipulate abstract concepts. Children who are poor at this tend to do badly in IQ tests and in school achievement, and they also tend to commit offenses, mainly because of their poor ability to foresee the consequences of their offending. Delinquents often do better on nonverbal performance IQ tests, such as object assembly and block design, than on verbal IQ tests (Moffitt, 1993), suggesting that they find it easier to deal with concrete objects than with abstract concepts. Similarly, Rogeness (1994) concluded that CD children had deficits in verbal IQ but not in performance IQ.

Impulsiveness, attention problems, low IQ, and low school achievement could all be linked to deficits in the executive functions of the brain, located in the frontal lobes. These executive functions include sustaining attention and concentration, abstract reasoning, concept formation, goal formulation, anticipation and planning, program-

ming and initiation of purposive sequences of motor behavior, effective self-monitoring and self-awareness of behavior, and inhibition of inappropriate or impulsive behaviors (Moffitt & Henry, 1991). Interestingly, in the Montreal longitudinal-experimental study, a measure of executive functioning based on cognitive-neuropsychological tests at age 14 was the strongest neuropsychological discriminator of violent and non-violent boys (Seguin, Pihl, Harden, Tremblay, & Boulerice, 1995). This relationship held independently of a measure of family adversity (based on parental age at first birth, parental education level, broken family and low SES).

### ***Child Rearing and Child Abuse***

In the Pittsburgh Youth Study, poor parental supervision was an important risk factor for CD (Loeber et al., 1998a). Poor maternal supervision and low persistence in discipline predicted CD in the Developmental Trends Study (Frick et al., 1992), but not independently of parental Antisocial Personality Disorder. Rothbaum and Weisz (1994) carried out a meta-analysis and concluded that parental reinforcement, parental reasoning, parental punishments, and parental responsiveness to the child were all related to externalizing child behavior.

Of all child rearing factors, poor parental supervision is the strongest and most replicable predictor of delinquency (Smith & Stern, 1997), and harsh or punitive discipline (involving physical punishment) is also an important predictor (Haapasalo & Pokela, 1999). The classic longitudinal studies by McCord (1979) in Boston and by Robins (1979) in St. Louis show that poor parental supervision, harsh discipline and a rejecting attitude all predict delinquency. Similar results were obtained in the Cambridge Study. Harsh or erratic parental discipline, cruel, passive or neglecting parental attitudes and poor parental supervision, all measured at age 8, all predicted later juvenile convictions and self-reported delinquency (West & Farrington, 1973). Generally, the presence of any of these adverse family background features doubled the risk of a later juvenile conviction.

There seems to be significant intergenerational transmission of aggressive and violent behavior from parents to children, as Widom (1989) found in a study of abused children in Indianapolis. Children who were physically abused up to age 11 were particularly likely to become violent offenders in the next 15 years (Maxfield & Widom, 1996).

Similarly, in the Rochester Youth Development Study, Smith and Thornberry (1995) showed that recorded child maltreatment under age 12 predicted self-reported violence between ages 14 and 18, independently of gender, ethnicity, SES and family structure. The extensive review by Malinosky-Rummell and Hansen (1993) confirms that being physically abused as a child predicts later violent and nonviolent offending.

Possible causal mechanisms linking childhood victimization and adolescent antisocial behaviors have been reviewed by Widom (1994). First, childhood victimization may have immediate but long-lasting consequences (e.g. shaking may cause brain injury). Second, childhood victimization may cause bodily changes (e.g. desensitization to pain) that encourage later aggression. Third, child abuse may lead to impulsive or dissociative coping styles that, in turn, lead to poor problem-solving skills or poor school performance. Fourth, victimization may cause changes in self-esteem or in social information-processing patterns that encourage later aggression. Fifth, child abuse may lead to changed family environments (e.g. being placed in foster care) that have deleterious effects. Sixth, juvenile justice practices may label victims, isolate them from prosocial peers, and encourage them to associate with delinquent peers.

### **Parental Conflict and Disrupted Families**

There is no doubt that parental conflict and inter-parental violence predict adolescent antisocial behavior, as the meta-analysis of Buehler et al. (1997) shows. Also, parental conflict is related to childhood externalizing behavior, irrespective of whether the information about both comes from parents or children (Jenkins & Smith, 1991). In the Pittsburgh Youth Study, CD boys tended to have parents who had unhappy relationships (Loeber et al., 1998a). Parental conflict also predicts delinquency (West & Farrington, 1973).

Parental separation and single-parent families predict CD children. In the Christchurch Study in New Zealand, separations from parents in the first five years of a child's life (especially) predicted CD at age 15 (Fergusson, Horwood, & Lynskey, 1994). In the New York State longitudinal study, CD was predicted by parental divorce, but far more strongly by having a never-married lone mother (Velez et al., 1989). In the Ontario Child Health Study, coming from a single-parent family predicted CD, but this was highly related to poverty

and dependence on welfare benefits (Blum, Boyle, & Offord, 1988).

In the Dunedin Study in New Zealand, boys from single-parent families disproportionately tended to be convicted: 28% of violent offenders were from single-parent families, compared with 17% of nonviolent offenders and 9% of unconvicted boys (Henry, Caspi, Moffitt, & Silva, 1996). Based on analyses of four surveys (including the Cambridge Study), Morash and Rucker (1989) concluded that the combination of teenage child-bearing and a single-parent female-headed household was especially conducive to the development of offending in children. Later analyses of the Cambridge Study showed that teenage child-bearing combined with a large number of children particularly predicted offending by the children (Nagin, Pogarsky, & Farrington, 1997).

Many studies show that broken homes or disrupted families predict delinquency (Wells & Rankin, 1991). In the Newcastle (England) Thousand-Family Study, Kolvin, Miller, Fleeting, and Kolvin (1988) reported that marital disruption (divorce or separation) in a boy's first five years predicted his later convictions up to age 32. Similarly, in the Dunedin study in New Zealand, Henry, Moffitt, Robins, Earls, and Silva (1993) found that children who were exposed to parental discord and many changes of the primary caretaker tended to become antisocial and delinquent.

Most studies of broken homes have focussed on the loss of the father rather than the mother, simply because the loss of a father is much more common. McCord (1982) in Boston carried out an interesting study of the relationship between homes broken by loss of the natural father and later serious offending of the children. She found that the prevalence of offending was high for boys reared in broken homes without affectionate mothers (62%) and for those reared in united homes characterized by parental conflict (52%), irrespective of whether they had affectionate mothers. The prevalence of offending was low for those reared in united homes without conflict (26%) and—importantly—equally low for boys from broken homes with affectionate mothers (22%). These results suggest that it is not so much the broken home which is criminogenic as the parental conflict which often causes it, and that a loving mother might in some sense be able to compensate for the loss of a father.

In the Cambridge Study, both permanent and temporary separations from a biological parent before age 10 (usually from the father) predicted convictions and self-reported delinquency, provid-

ing that they were not caused by death or hospitalization (Farrington, 1992c). However, homes broken at an early age (under age 5) were not unusually criminogenic (West & Farrington, 1973). Separation before age 10 predicted both juvenile and adult convictions (Farrington, 1992b) and predicted convictions up to age 32 independently of all other factors such as low family income or poor school attainment (Farrington, 1993).

Explanations of the relationship between disrupted families and delinquency fall into three major classes. Trauma theories suggest that the loss of a parent has a damaging effect on a child, most commonly because of the effect on attachment to the parent. Life course theories focus on separation as a sequence of stressful experiences, and on the effects of multiple stressors such as parental conflict, parental loss, reduced economic circumstances, changes in parent figures and poor child-rearing methods. Selection theories argue that disrupted families produce delinquent children because of pre-existing differences from other families in risk factors such as parental conflict, criminal or antisocial parents, low family income or poor child-rearing methods.

Hypotheses derived from the three theories were tested in the Cambridge Study (Juby & Farrington, 2001). While boys from broken homes (permanently disrupted families) were more delinquent than boys from intact homes, they were not more delinquent than boys from intact high conflict families. Overall, the most important factor was the post-disruption trajectory. Boys who remained with their mother after the separation had the same delinquency rate as boys from intact low conflict families. Boys who remained with their father, with relatives or with others (e.g. foster parents) had high delinquency rates. It was concluded that the results favored life course theories rather than trauma or selection theories.

### *Antisocial Parents*

It is clear that antisocial parents tend to have anti-social children (Lipsey & Derzon, 1998). In the Developmental Trends Study, parental APD was the best predictor of childhood CD (Frick et al., 1992) and parental substance use was an important predictor of the onset of CD (Loeber, Green, Keenan, & Lahey, 1995). Similarly, in the New York State longitudinal study, parental APD was a strong predictor of externalizing child behavior (Cohen, Brook, Cohen, Velez, & Garcia, 1990). In

the Pittsburgh Youth Study, parents with behavior problems and substance use problems tended to have CD boys (Loeber et al., 1998a).

In their classic longitudinal studies, McCord (1977) and Robins, West, and Herjanic (1975) showed that criminal parents tended to have delinquent sons. In the Cambridge Study, the concentration of offending in a small number of families was remarkable. Fewer than six per cent of the families were responsible for half of the criminal convictions of all members (fathers, mothers, sons, and daughters) of all 400 families (Farrington, Barnes, & Lambert, 1996). Having a convicted mother, father, brother or sister significantly predicted a boy's own convictions. Same-sex relationships were stronger than opposite-sex relationships, and older siblings were stronger predictors than younger siblings. Furthermore, convicted parents and delinquent siblings were related to a boy's self-reported as well as official offending (Farrington, 1979). CD symptoms also tend to be concentrated in families, as shown in the Ontario Child Health Study (Satzmari, Boyle, & Offord, 1993).

Similar results were obtained in the Pittsburgh Youth Study. Arrests of fathers, mothers, brothers, sisters, uncles, aunts, grandfathers and grandmothers all predicted the boy's own delinquency (Farrington, Jolliffe, Loeber, Stouthamer-Loeber, & Kalb, 2001). The most important relative was the father; arrests of the father predicted the boy's delinquency independently of all other arrested relatives. Only eight per cent of families accounted for 43% of arrested family members.

Farrington et al. (2001) reviewed six different explanations for why offending and antisocial behavior were concentrated in families and transmitted from one generation to the next. First, there may be intergenerational continuities in exposure to multiple risk factors such as poverty, disrupted families and living in deprived neighborhoods. Second, assortative mating (the tendency of anti-social females to choose antisocial males as partners) facilitates the intergenerational transmission of offending. Third, family members may influence each other (e.g. older siblings may encourage younger ones to be antisocial). Fourth, the effect of a criminal parent on a child's offending may be mediated by environmental mechanisms such as poor parental supervision and inconsistent discipline. Fifth, intergenerational transmission may be mediated by genetic mechanisms. Sixth, there may be labelling and police bias against known criminal families.

### **Large Families**

Many studies show that large families predict delinquency (Fischer, 1984). For example, in the UK National Survey of Health and Development, Wadsworth (1979) found that the percentage of boys who were officially delinquent increased from nine per cent for families containing one child to 24% for families containing four or more children. The Newsons in their Nottingham study also concluded that large family size was one of the most important predictors of delinquency (Newson, Newson, & Adams, 1993).

In the Cambridge Study, if a boy had four or more siblings by his tenth birthday, this doubled his risk of being convicted as a juvenile (West & Farrington, 1973). Large family size predicted self-reported delinquency as well as convictions (Farrington, 1979), and adult as well as juvenile convictions (Farrington, 1992b). Also, large family size was the most important independent predictor of convictions up to age 32 in a logistic regression analysis (Farrington, 1993). Large family size was similarly important in the Cambridge and Pittsburgh studies, even though families were on average smaller in Pittsburgh in the 1990s than in London in the 1960s (Farrington & Loeber, 1999).

Brownfield and Sorenson (1994) reviewed several possible explanations for the link between large families and delinquency, including those focussing on features of the parents (e.g. criminal parents, teenage parents), those focussing on parenting (e.g. poor supervision, disrupted families) and those focussing on socioeconomic deprivation or family stress. Another interesting theory suggested that the key factor was birth order: large families include more later-born children, who tend to be more delinquent. Based on an analysis of self-reported delinquency in a Seattle survey, they concluded that the most plausible intervening causal mechanism was exposure to delinquent siblings. In the Cambridge Study, co-offending by brothers was surprisingly common; about 20% of boys who had brothers close to them in age were convicted for a crime committed with their brother (Reiss & Farrington, 1991, p. 386).

### **Socioeconomic Factors**

It is clear that antisocial children disproportionately come from low SES families. In the Ontario Child Health Study, CD children tended to come from low income families, with unemployed parents, living in subsidized housing and dependent on

welfare benefits (Offord, Alder, & Boyle, 1986). In the New York State longitudinal study, low SES, low family income and low parental education predicted CD children (Velez et al., 1989). In the Developmental Trends Study low SES predicted the onset of CD (Loeber et al., 1995), and in the Pittsburgh Youth Study family dependence on welfare benefits was characteristic of CD boys (Loeber et al., 1998a).

Low SES is a less consistent predictor of delinquency. However, a lot depends on whether it is measured by income and housing or by occupational prestige. In the Cambridge Study, low family income and poor housing predicted official and self-reported, juvenile and adult delinquency, but low parental occupational prestige predicted only self-reported delinquency (Farrington, 1992b, 1992c). Several researchers have suggested that the link between a low SES family and adolescent anti-social behavior is mediated by family socialization practices. For example, Dodge, Pettit, and Bates (1994) found that about half of the effect of SES on peer-rated aggression and teacher-rated externalizing problems was accounted for by family socialization.

### **Peer, School and Community Influences**

It is well established that having delinquent friends is an important predictor of delinquency (Lipsey & Derzon, 1998). What is less clear is how far anti-social peers encourage and facilitate adolescent antisocial behavior, or whether it is merely that 'birds of a feather flock together'. Delinquents may have delinquent friends because of co-offending, which is particularly common under age 21 (Reiss & Farrington, 1991). However, based on structural equation modelling in the Oregon Youth Study, Patterson, Capaldi, and Bank (1991) concluded that having delinquent friends predicted delinquency. Also, Elliott and Menard (1996) in the US National Youth Survey concluded that delinquent friends influenced an adolescent's own delinquency and that the reverse was also true: more delinquent adolescents were more likely to have delinquent friends. In the Pittsburgh Youth Study, Keenan, Loeber, Zhang, Stouthamer-Loeber, and van Kammen (1995) discovered that having antisocial friends predicted the later onset of a boy's anti-social behavior.

It is also well established that delinquents disproportionately attend high delinquency rate schools, which have high levels of distrust between

teachers and students, low commitment to the school by students and unclear and inconsistently enforced rules (Graham, 1988). In the Cambridge Study, attending a high delinquency-rate school at age 11 significantly predicted a boy's own delinquency (Farrington, 1992c). However, what is less clear is how far the schools themselves influence antisocial behavior, by their organization, climate and practices, and how far the concentration of offenders in certain schools is mainly a function of their intakes. In the Cambridge Study, most of the variation between schools in their delinquency rates could be explained by differences in their intakes of troublesome boys at age 11 (Farrington, 1972). However, reviews of American research show that schools with clear, fair and consistently enforced rules tend to have low rates of student misbehavior (Gottfredson, 2001; Herrenkohl, Hawkins, Chung, Hill & Battin-Pearson, 2001).

It is clear that offenders disproportionately live in inner-city areas characterized by physical deterioration, neighborhood disorganization, and high residential mobility (Shaw & McKay, 1969). However, again, it is difficult to determine how far the areas themselves influence antisocial behavior and how far it is merely the case that antisocial people tend to live in deprived areas (e.g. because of their poverty or public housing allocation policies). Interestingly, both neighborhood researchers such as Gottfredson, McNeil, and Gottfredson (1991) and developmental researchers such as Rutter (1981) have concluded that neighborhoods have only indirect effects on antisocial behavior via their effects on individuals and families. However, Sampson, Raudenbush and Earls (1997) argued that a low degree of 'collective efficacy' in a neighborhood (a low degree of informal social control) caused high crime rates.

## THE ICAP THEORY

Figure 1 shows the key elements of the theory I have proposed to explain all the findings reviewed here on early risk factors for antisocial behavior (see Farrington, 2003a). The theory was primarily designed to explain offending by lower class males. I have called it the 'integrated cognitive antisocial potential' (ICAP) theory. It integrates ideas from many other theories, including strain, control, learning, labelling and rational choice approaches (Cullen & Agnew, 2003); its key construct is antisocial potential (AP) and it assumes

that the translation from antisocial potential to antisocial behavior depends on cognitive (thinking and decision-making) processes that consider opportunities and victims. Figure 1 is deliberately simplified in order to show the key elements of the ICAP theory on one sheet of paper; for example, it does not show how the processes operate differently for onset compared with desistance or at different ages.

The key construct underlying offending is antisocial potential (AP), which refers to the potential to commit antisocial acts. Long-term persisting between-individual differences in AP are distinguished from short-term within-individual variations in AP. Long-term AP depends on impulsiveness, on strain, modelling and socialization processes and on life events, while short-term variations in AP depend on motivating and situational factors.

Regarding long-term AP, people can be ordered on a continuum from low to high. The distribution of AP in the population at any age is highly skewed; relatively few people have relatively high levels of AP. People with high AP are more likely to commit many different types of antisocial act including different types of offense. Hence, offending and antisocial behavior are versatile, not specialized. The relative ordering of people on AP (long-term between-individual variation) tends to be consistent over time, but absolute levels of AP vary with age, peaking in the teenage years, because of changes within individuals in the factors that influence long-term AP (e.g. from childhood to adolescence, the increasing importance of peers and decreasing importance of parents).

Following strain theory, the main energizing factors that potentially lead to high long-term AP are desires for material goods, status among intimates, excitement and sexual satisfaction. However, these motivations only lead to high AP if antisocial methods of satisfying them are habitually chosen. Antisocial methods tend to be chosen by people who find it difficult to satisfy their needs legitimately, such as people with low income, unemployed people and those who fail at school. However, the methods chosen also depend on physical capabilities and behavioral skills; for example, a 5-year-old would have difficulty stealing a car. For simplicity, energizing and directing processes and capabilities are shown in one box in Figure 1.

Long-term AP also depends on attachment and socialization processes. AP will be low if parents

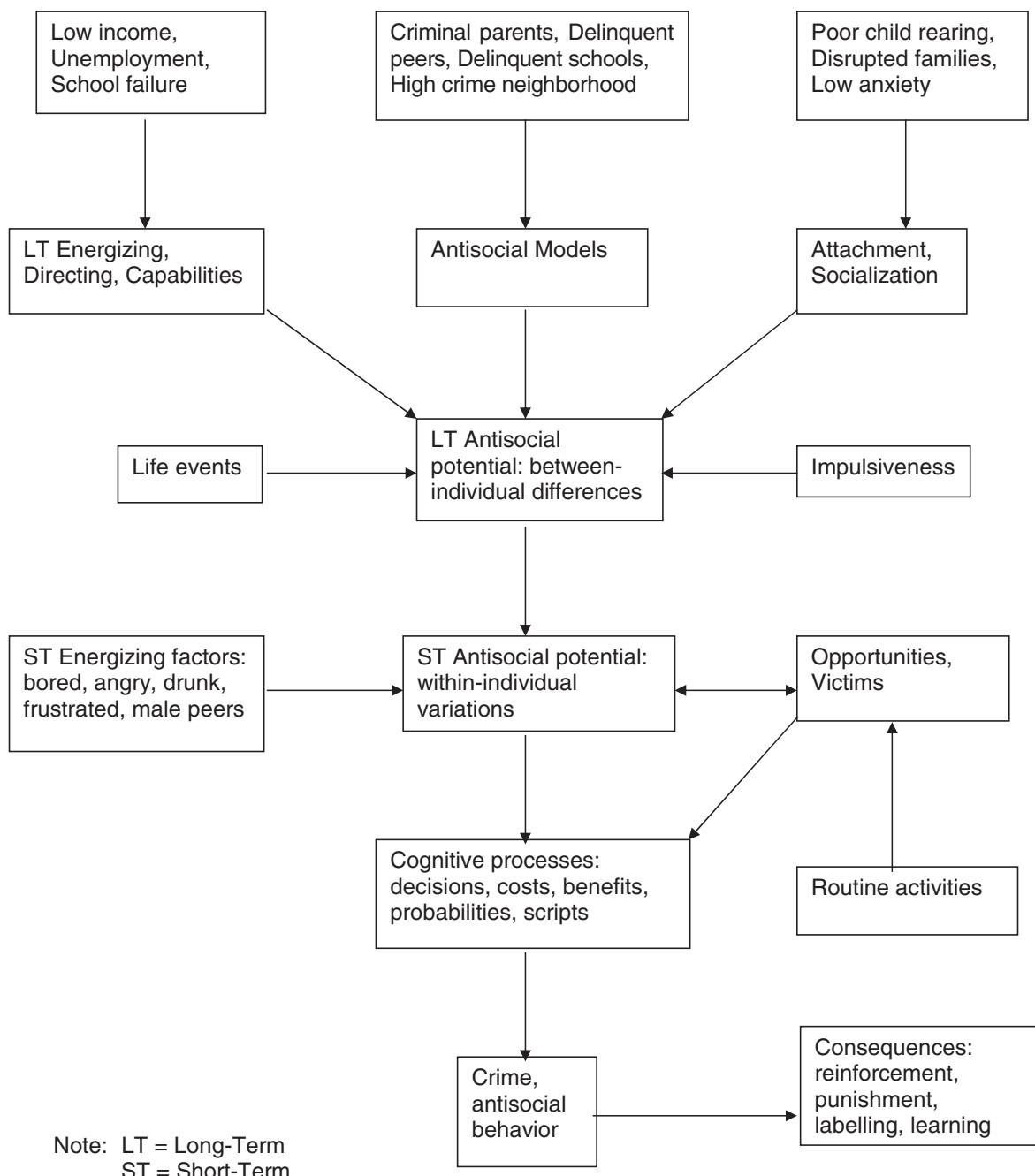


Figure 1. The integrated cognitive antisocial potential (ICAP) theory

consistently and contingently reward good behavior and punish bad behavior. (Withdrawal of love may be a more effective method of socialization than hitting children.) Children with low anxiety

will be less well socialized, because they care less about parental punishment. AP will be high if children are not attached to (prosocial) parents, for example if parents are cold and rejecting.

Disrupted families (broken homes) may impair both attachment and socialization processes.

Long-term AP will also be high if people are exposed to and influenced by antisocial models, such as criminal parents, delinquent siblings and delinquent peers, for example in high crime schools and neighborhoods. Long-term AP will also be high for impulsive people, because they tend to act without thinking about the consequences. Also, life events affect AP; it decreases after people get married or move out of high crime areas, and it increases after separation from a partner (Farrington & West, 1995).

According to the ICAP theory, the commission of offenses and other types of antisocial act depends on the interaction between the individual (with his immediate level of AP) and the social environment (especially criminal opportunities and victims). Short-term AP varies within individuals according to short-term energizing factors such as being bored, angry, drunk or frustrated or being encouraged by male peers. Criminal opportunities and the availability of victims depend on routine activities. Encountering a tempting opportunity or victim may cause a short-term increase in AP, just as a short-term increase in AP may motivate a person to seek out criminal opportunities and victims.

Whether a person with a certain level of AP commits a crime in a given situation depends on cognitive processes, including considering the subjective benefits, costs and probabilities of the different outcomes and stored behavioral repertoires or scripts (based on previous experiences). The subjective benefits and costs include immediate situational factors such as the material goods that can be stolen and the likelihood and consequences of being caught by the police. They also include social factors such as likely disapproval by parents or female partners, and encouragement or reinforcement from peers. In general, people tend to make decisions that seem rational to them, but those with low levels of AP will not commit offenses even when (on the basis of subjective expected utilities) it appears rational to do so. Equally, high short-term levels of AP (e.g. caused by anger or drunkenness) may induce people to commit offenses when it is not rational for them to do so.

The consequences of offending may, as a result of a learning process, lead to changes in long-term AP and in future cognitive decision-making processes. This is especially likely if the consequences are reinforcing (e.g. gaining material goods or peer approval) or punishing (e.g. receiving legal sanctions or parental disapproval). Also,

if the consequences involve labelling or stigmatizing the offender, this may make it more difficult for him to achieve his aims legally, and hence may lead to an increase in AP (Farrington, 1977).

## CONCLUSIONS

A great deal is known about the key risk factors for antisocial behavior, which include impulsiveness, low IQ and low school achievement, poor parental supervision, child physical abuse, punitive or erratic parental discipline, cold parental attitude, parental conflict, disrupted families, antisocial parents, large family size, low family income, anti-social peers, high delinquency-rate schools and high crime neighborhoods. However, the causal mechanisms linking these risk factors with anti-social outcomes are less well established. Larger developmental theories designed to explain all the results, such as the ICAP theory, need to be formulated and tested (Lahey, Moffitt, & Caspi, 2003). More research is needed on risk factors for persistence or escalation of antisocial behavior. How far risk factors are the same for males and females, for different ethnic groups, or at different ages needs to be investigated. More cross-cultural comparisons of risk factors, and more studies of protective factors, are needed.

The comorbidity and versatility of antisocial behavior poses a major challenge to understanding. It is important to investigate how far all results are driven by a minority of multiple problem adolescents or chronic delinquents. Often, multiple risk factors lead to multiple problem boys (Loeber, Farrington, Southamer-Loeber, & van Kammen, 1998b). How far any given risk factor generally predicts a variety of different outcomes (as opposed to specifically predicting one or two outcomes) and how far each outcome is generally predicted by a variety of different risk factors (as opposed to being specifically predicted by only one or two risk factors) is unclear. An increasing number of risk factors seems to lead to an increasing probability of antisocial outcomes, almost irrespective of the particular risk factors included in the prediction measure, but more research is needed on this.

The results summarized here have clear implications for intervention (Farrington, 2002). The main idea of risk-focussed prevention is to identify key risk factors for antisocial behavior and implement prevention methods designed to counteract them.

For example, cognitive-behavioral skill training programs should be implemented to tackle impulsiveness; pre-school intellectual enrichment programs should be implemented to enhance cognitive abilities and school attainment and parent training and parent education programs should be implemented to tackle poor child rearing and poor parental supervision. One of the best ways of achieving risk-focussed prevention is through multiple-component community-based programs including successful interventions, such as *Communities That Care* (Hawkins & Catalano, 1992).

In some ways, the versatility of antisocial behavior is good news for intervention researchers. If a particular risk factor predicts a variety of outcomes, tackling that risk factor may have many benefits in reducing a variety of social problems. More research is needed on the causes of antisocial behavior so that interventions can be more narrowly targeted on risk factors that have causal effects. Ideally, more prospective longitudinal studies are needed to investigate risk factors and causes, and more randomized experiments are needed to evaluate the effectiveness of intervention programs.

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## **Children with social and emotional difficulties need support from a range of professionals: Preparing professions for integrated working**

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Inclusive education for all children means that teachers are increasingly faced with challenges in managing children with social, emotional and behavioural difficulties (SEBD) whose complex needs span a number of professional disciplines, some of which sit outside of education. However, whilst it is recognised that children with SEBD require management and support across a range of professions that include education, health, social and youth services, there is little done to prepare teaching staff for working across professional and organisational boundaries. The evidence of poor communication and team working amongst professions has led to policy changes and guidelines calling for greater coordination in the delivery of services for children and young people. This paper considers how education and training needs to prepare students with the knowledge and skills for collaborative working through interprofessional education (IPE), and draws on adult learning theory and activity theory to frame its direction. In doing so, it demonstrates a model for IPE that can be used to engage students from different disciplines to gain insight into the understanding of the wider issues of SEBD and the roles and responsibilities of the other professions involved. The model is one that enables students to consider the impact the role of others has on their own role, and to reflect on how their role impacts on the role of others.

**Keywords:** Inclusive education, social, emotional and behavioural difficulties, interprofessional education, collaborative working

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### **Interdisciplinary challenges**

It is suggested that 20% of children in the UK will have a mental health problem at some time in their development, with 10% experiencing these problems to a level that represents a clinically recognizable mental health disorder (BMA, 2006). These children may have low achievement, (Farrell et al., 2000; Smith &

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Cooper, 1996), and problems in the classroom including inattentiveness, hyperactivity and aggression. This, plus the associated relationship between social and emotional difficulties and school failure, crime, prostitution and long term mental problems (Colman *et al.*, 2009), has fuelled the focus for prevention and intervention to be high on the Governments agenda for improvement in mental health services for children and young people (DfCSF, 2007; DCfS, 2008). To achieve improvements, integrated services and partnership working are at the centre of prevention, intervention and the management of children and young people, (DfES, 2005, 2006, 2007; DoH, 2004; NIHCE, 2008). In the UK, an attempt to shape the integration of services for children is set out in the document ‘Targeted Mental Health in Schools’ (DfES, 2008). The document calls for joined up services across local authorities, Primary Care Trust’s, the 3<sup>rd</sup> sector, and the Children and adult mental health services (CAMHS), to provide extended services in schools by the year 2010. The aim of these changes was to create community hubs where organisations of health and social services could be co-located alongside schools. The assumption is that by bringing services together in this way it will create a haven for collaborative working, where mental health promotion, referral, assessment and intervention can be shared. However, locating services together does not in itself ensure collaborative working.

In a study which looked at child exclusion, Burton *et al.*, (2009), identified variations amongst professionals working together on shared issues, and found that due to their different perceptions of required provision, children continued to be excluded from education. A similar concern with multiagency working was raised in the 2008 National CAMHS Review (DoH, 2008), which explored the progress of integrated services since 2004. The Review found that the different disciplines were working from different policy directives. For example, guidance on ways of working within the Local authorities were guided by the ‘Every Child Matters’ agenda (DfES, 2004), whilst professions within the Health Services were taking guidance from the National Service Framework (DoE, 2004). This meant that the focus was on policy outcomes, rather than on the process of delivery for achieving integrated services. Cooper, (2010) reminds us of the importance of policy for children and young people with SEBD focusing on the fulfillment of the child’s individual needs. However, it is the way policy is interpreted and implemented that appears to be causing variation (Goodman & Burton, 2010), to the way children receive support, (Burton, *et al.*, 2009), and to the structural arrangements in place to provide support to children with SEBD (Dyson *et al.*, 2004). It is this type of inconsistency that policy seeks to change as it encourages greater integration and cohesiveness, yet interpretation and implementation remain a problem. However, according to Edwards (2009), the problem is less about variation in interpretation and more to do with organisational structures failing to accommodate policy. Edwards (2009) suggests that practitioners and their relevant organisational strategies are failing to keep pace with adjusting their practice in relation to children and young people, and points to people and organisations needing to adopt a more robust and flexible approach in respond to the children and young people.

The message emerging is that there needs to be more coherence and effective functioning at the organisational level as well as at the practitioner level; with greater synergy occurring between services. For this to occur there needs to be greater flexibility in working, but also better communication between individuals and across organisations. There also needs to be an understanding and appreciation of the roles and responsibilities of other professions (DoH, 2008). It seems that despite legislative directives for integrated services for children with SEBD, and the development of multidisciplinary children's units across health, education and social sectors, achieving collaborative working remains a challenge (Williams & Sullivan, 2010).

### **How to achieve collaborative working**

Collaborative practice is acknowledged as being most effective when it is organised around the needs of the individual, and takes into account the way in which local services are delivered (WHO, 2010). However, as described above there are a number of other factors that need to be considered at an organisational level. Questions that organisations might ask of themselves are;

- Does our organisation support opportunities for shared decision making, and routine team meetings?
- Do we have in place a structured information system with clear work process?
- Do we have a clear communication strategy and a conflict resolution policy?

Whilst organisations need to be clear about policy and how this will be processed and implemented (Burton et al., 2009), Leadbetter et al., (2007) propose the use of a theoretical framework to provide structure, and to guide intervention and understanding. Activity theory provides both a framework and an approach that can encompass the complex ideas and domains posed in multi-agency working (Leadbetter et al., 2007), emphasising the multiplicity of variables involved (Taylor et al., 2008). Activity theory, according to Engeström (2001) enables domains to be linked up the linking up of domains taking into account context and historical factors; as well as community and the division of labour, and the interaction between the various elements. It is suggested that by understanding the relationships between the different elements in an activity system; especially the contradictions and tensions, then measures can be taken to resolve them (Leadbetter et al., 2007).

The use of activity theory in complex cases, as with integrated children's services (Taylor et al., 2008), provides a focus and framework for multi-agency working (Leadbetter et al., 2007). Whilst theory needs to underpin integrated services and collaborative working, it is necessary to apply theory to how professionals are prepared to engage in the delivery of these services. It is the role of education and training programmes to prepare students to learn with, from and about each other (Barr, 2005). These mechanisms of engagement form the principles for inter-professional education (IPE), a learning experience which is used to

prepare professionals for collaborative working. The Centre for the Advancement in Interprofessional Education (CAIPE, 2002) makes a distinction between multi-professional education and inter-professional education. The former is characterised by ‘occasions when two or more professions learn side by side for whatever reason’, and the latter by ‘occasions when two or more professions learn from, and about, each other to improve collaboration and quality of care’. Carpenter and Dickinson (2008) suggest that two major themes need to underpin inter-professional education; the promotion of teamwork, and professions’ understanding the knowledge and values, functions and expertise of other professions. According to Schon, (1983), it is only when each of the professions within a team can value the creation of ‘shared knowledge’, will integration of any explicit knowledge along with intuitive & tacit knowledge, be applied in open dialogue. According to Williams and Sullivan (2010), it is the valuing of the open dialogue that facilitates the sharing of knowledge across professions, a process that generates new knowledge that drives collaboration. It is essential therefore that the professions responsible for the collective management of children with SEBD have the required understanding and skills to appreciate the work and knowledge of others within the multidisciplinary team, so that open dialogue can take place. Carpenter & Dickinson, (2008) suggest that adult learning theory, where learners engage in dialogue through experiential reflection underpins most curriculums involved in preparing learners in learning to work together. Adult learning enables learners to apply experiences to meanings (Knowles, 1985) which in turn encourage greater explanation of roles and responsibilities; a process that enables inter-professional learning to be achieved in practice (Carpenter & Dickinson, 2008).

According to Wenger et al., (2002), it is having opportunities for regular interaction that enables professions to learn together how to improve something, and the type of learning environment that can highlight the complexity and individual needs of children with SEBD. It is the focus of the learning experience, as well as the process that is important for engaging students, and this no different for interprofessional education. According to Engeström (2001), it is the learning that takes place when practitioners from different professions and organisations work collaboratively in the planning of an activity that enables learning to be expanded and contradiction resolved. Creating the opportunity for students to debate and interact is crucial for deepening understanding between different professional groups. Equally crucial is for the focus of an event to give meaning to the collaborative partnership.

### **Preparing teachers for collaborative working**

Whilst it is recognised that working with children with social and emotional difficulties is challenging, ‘teacher education in England [has] no mandatory specialist training component for working with [these] students’ (Goodman & Burton, 2010, p. 224), a concern also raised by (Hodkinson, 2009). Whilst there is no specialist training specific to SEBD, the multidisciplinary nature of this condition requires teachers to engage in interprofessional education (Goodman & Burton, 2010). Cooper (2010) justifies the need for educational placements for teachers to be situated where they will gain experience in positive social emotional and educational engagement. Equally such placements could be interprofessional. Although it may be general

custom for teaching practice to occur within a classroom, the multidisciplinary needs of children with SEBD necessitate placements occur across the broader community of education, health and social services; creating opportunities for interprofessional education. It is in situations such as this that learning hubs are formed, and where the principles of social learning theory can be applied. Here learning occurs within relationships and social participation offering opportunities for dialogue to be exchanged over issues that are of common concern. It is within such environments that students become aware of their roles and that of others, and where shared knowledge and skills necessary for achieving a common aim form interprofessional education.

### **A model for interprofessional education in practice**

The paper now draws on the authors experience of introducing an interprofessional education model within the Faculty of Health and Social Care and the Hull York Medical School at the University of Hull. Three aims underpin the interprofessional education activity:

- develop profession-specific skills and competencies to deal with clients with complex needs;
- enhance team-working skills through working in an inter-professional environment; and
- develop understanding of the roles and competencies of the other professions as distinct from their own.

We use case based learning to achieve the aims, and the model is used with students from the health disciplines, but its framework and process is applicable for use with a broader range of professions, including students in the teaching profession. The model was thought appropriate because it lends itself to learning in practice, where students already work with complex cases, requiring input from other disciplines. Despite the presence of other professions, student placement is largely uni-professional, where the focus is on achieving profession specific learning outcomes. We wanted to encourage students to learn with, from and about other disciplines (Barr, 2005) within their clinical placements, but also to maintain the focus of their learning on topics that were relevant to their professional development. We drew on the principles of Adult learning theory (Knowles, 1985) and Activity Theory (Engeström, 2001) to prepare learners for collaborative working, using case based learning as the catalyst from which to engage dialogue across professions. In doing so we sought to emphasise to students the multiplicity of variables described by Taylor et al., (2008) in dealing with complex situations and cases, and raise their awareness of the importance in addressing contradiction and tension that surrounds integrated services (Leadbetter, et al., 2007).

To achieve this learning experience we introduced case learning, a student led activity emerging from the care of a client that the student is involved with, but that requires input from multiple disciplines to achieve a shared goal. The process of this learning activity requires students to engage in dialogue with others in order to understand how their roles impact on the care and management of that client. The process requires students to reflect on their own specific skills and competences around the case, in addition to exploring and understanding the skills of the other professions involved and to identify where complementary working

benefits the client. Although the learning process is self directed, it is facilitated by the use of a template which students complete to form a case discussion with their educational supervisor. The case template originated from colleagues at Nottingham University, UK, (CIEL, 2009), which we have adapted. The template is shaped with broad headings in each section. Section 1, consists of four statements and section 2 is related to reflection.

Students are introduced to interprofessional education in the form of case learning in years two and three of the curriculum, with an introduction session in year one which focuses on the theory and rationale for collaborative working, and the role inter-professional education plays in achieving this. In addition, inter-professional workshops are provided for educational supervisors whose role is to support the students learning experience during their placements. Students need to complete four IPE cases per year, and these then serve as case discussions with their educational supervisors, where the work is formatively assessed. In addition, the students understanding of team working in complex cases forms a summative assessment in the form of an essay at the end of the academic year.

**Table 1: A hypothetical example of what a completed template might look like from a student teacher**

**1. Consider the case from your own perspective and that of others**

**A. Briefly describe the context of the case. What other professions are involved in the care/support of this patient?**

This case is about a child that I am teaching who has difficulty in sustaining attention and whose behavior becomes aggressive for what appears to be a minor disruption, for example if asked to sit quietly or to stop annoying the child next to him. At other times he seems withdrawn and avoids eye contact, unless he initiates the interaction. However at other times he concentrates well, all be it for short periods of time.

The educational psychologist came to see him, but this was done in an office on a one to one and I do not know the outcome of the session. There is support within the class, but the teaching assistant is reluctant to deal with this child as she feels unprepared to deal with any outbursts. On one occasion we had a supply teacher and the whole week was chaotic; mainly because this child acted up and the teacher refused to acknowledge his presence preferring instead to ignore negative behavior. In the end he was removed from the class and his mother was asked to take him home.

**B. What did this case teach you about the role of others in the multidisciplinary team?  
Relate this to knowledge, skills and beliefs**

My role is to support the teacher as I am in my training, but I felt that we as professionals have let the child down, but also let the mother down. How must it look to a parent to say that we can't support or provide an education to her child? One thing I learnt was that I don't really know what the educational psychologist does, could this be a person that can help me learn to deal with a child's aggression? I was surprised at how much knowledge and skill the teaching support staff has and I learnt a lot by asking the child questions and watching what they do to engage a child in a task that is reluctant to do the work. In this case I observed that the parent was not involved in any way with the decision making, and I wondered if we could have understood the child a bit more if the parent was invited to talk with us as I think their experience in dealing with this child might be important, we or they may not be managing but if we are all clear about what course of action to take this might ultimately help the child to cope with his aggression.

**C. What did this case teach you about your own role within the multidisciplinary team?  
Relate this to knowledge, skills and beliefs**

I don't feel that I am a member of a team; we all work toward the education of the child but independently. I believe it would be useful for more multidisciplinary team meetings, they might be time consuming but I think they would help build my knowledge. I do think there is a lot of overlap across the professions, in addition to the child being at the centre of what we are trying to achieve.

**D. In considering your own knowledge and skills of the case what gaps/areas for exploring with others were identified?**

There is quite a bit of repetition in supporting this child. The role of support might mean different things to different people, and maybe we are all doing things differently. I want to understand how I can develop skills that not only support the child but support the parent and the special needs coordinator as their job impacts on what I need to do when support for the child is no longer required. I also don't really understand at what point we seek the support of external agencies, such as the social worker or how we negotiate and process this support.

2. *Reflect on the differences and similarities of other members of the multidisciplinary team and the way they support each other and the patient.*

**2A. How has your learning been enhanced? Relate this to the skills, knowledge, and understanding you will transfer to future practice**

My experience in this placement has given the opportunity to see the importance of working with other professions to support the child with SEBD but I am concerned that most support is given separately. It would have been better if the professions could work more closely together, but also that parents were more involved. I looked at the school policy documents on managing children with SEBD as I was hoping to understand the protocol for communication and referral to other organisations, but this was not clear. Other placements might be different, so I shall explore this again. I believe it is important for teachers to have guidance on how to deal with difficult children as even children who may not show signs of SEBD and therefore fall into this category, may at some period experience emotional difficulties and we need to know how to deal with this and who to contact.

3. *Completed templates: Ask your educational supervisor to sign/date your completed case prior to discussion*

## **Implementing inter-professional education**

At the beginning of this paper discussion centered on achieving collaborative working, and the need for organizations to consider the way policy and practice for integrated services for children and young people is interpreted and implemented. It is suggested that in addition to organizations needing to give consideration to the way services are structured and provided, education and training needs to prepare the workforce for collaborative working. The paper reports on one approach used to apply interprofessional activity in practice, and although this particular paper does not focus on the evaluation of the student's experience, suggestions are made in Table 2 on issues that need to be considered as part of the process of introducing interprofessional education into the undergraduate curriculum.

**Table 2: Key factors to consider**

- ◆ Partnership working between faculties and work placements services to form a shared vision
- ◆ Strategic Plan for achieving the IPE objectives
- ◆ Ambassadors identified for IPE who will work across organisational and professional boundaries
- ◆ Inform and empower educators who support learners
- ◆ Preparation of learners – clear rationale for IPE
- ◆ An ethos of self-directed learning and facilitation of learning
- ◆ Embed IPE into the curriculum – (not a bolt on extra)
- ◆ Ownership of IPE by the Faculty (s) – not an individual
- ◆ Assessment and Evaluation to be clearly mapped to training programme

## **Conclusion**

Integrated services for children with social and emotional behavioural difficulties demands collaborative working from different disciplines, therefore education and training programmes need to ensure that they adequately prepare learners for working across professional and organizational boundaries. The model of inter-professional learning discussed within this paper, is applicable for use with a range of professional disciplines at different academic levels. What is attractive about this model is that it reflects real life experiences of dealing with evolving and complex situations that occur in the everyday life for professions and their clients. It is this evolving experience that learners can use to reflect on, building on their professional knowledge and acknowledging the input from other professions to achieve shared goals.

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# The Effects of Child Abuse and Exposure to Domestic Violence on Adolescent Internalizing and Externalizing Behavior Problems

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**Abstract** This study examines the effects of child abuse and domestic violence exposure in childhood on adolescent internalizing and externalizing behaviors. Data for this analysis are from the Lehigh Longitudinal Study, a prospective study of 457 youth addressing outcomes of family violence and resilience in individuals and families. Results show that child abuse, domestic violence, and both in combination (i.e., dual exposure) increase a child's risk for internalizing and externalizing outcomes in adolescence. When accounting for risk factors associated with additional stressors in the family and surrounding environment, only those children with dual exposure had an elevated risk of the tested outcomes compared to non-exposed youth. However, while there were some observable differences in the prediction of outcomes for children with dual exposure compared to those with single exposure (i.e., abuse only or exposure to domestic violence only), these difference were not statistically significant. Analyses showed that the effects of exposure for boys and girls are statistically comparable.

**Keywords** Family violence · Intimate partner violence · Child maltreatment · Adolescent development · Children's adjustment

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## Introduction

Every year an estimated 3.3 million to 10 million children are exposed to domestic violence in their home (Carlson 1984; Straus 1992). Studies investigating the prevalence of child abuse find that almost 900,000 children are classified as maltreated by parents and other caretakers (United States Department of Health and Human Services [USDHHS] 2006). Furthermore, different forms of family violence often co-occur, suggesting that many children who witness domestic violence have also directly experienced child abuse (Appel and Holden 1998; Edleson 2001; Tajima 2004). Numerous studies have demonstrated that children exposed to domestic violence and/or child abuse are more likely to experience a wide range of adverse psychosocial and behavioral outcomes (T. Herrenkohl et al. 2008; Sternberg et al. 2006; Wolfe et al. 2003). Researchers have posited what they call a “double whammy” or dual exposure effect, in which children exposed to both child abuse and domestic violence fare worse with respect to later outcomes than do those exposed only to one form of violence (Herrenkohl et al. 2008; Hughes et al. 1989). Studies investigating dual exposure have produced mixed results, suggesting the need for further investigation. For example, some studies have found that children doubly exposed to abuse and domestic violence have worse outcomes than others (Hughes et al. 1989; Sternberg et al. 2006), whereas others find no elevated effect of dual exposure (Sternberg et al. 1993).

This investigation aims to strengthen research on the unique and combined effects of exposure to child abuse and domestic violence on psychosocial outcomes in adolescence. The study also seeks to examine whether gender interacts with abuse and domestic violence exposure in the prediction of youth outcomes.

## Relation between Child Abuse and Adverse Psychosocial Outcomes

Numerous studies have demonstrated that experiencing child abuse can lead to a range of internalizing and externalizing behavior problems. For example, research has shown that abused children can exhibit a variety of psychological problems, including anxiety and depression (McLeer et al. 1994; McLeer et al. 1998). The effects of being abused persist into adolescence; teens who were abused as children are more likely to experience depression and other internalizing problems (Fergusson et al. 1996; Widom 2000; Wolfe 1999; Wolfe et al. 2001). Teens who were abused as children are also more likely to exhibit externalizing behavior problems, such as delinquency and violence perpetration (Fergusson et al. 1996; Fergusson and Lynskey 1997; Hawkins et al. 1998; R. Herrenkohl et al. 1997; McCabe et al. 2005; Smith and Thornberry 1995; Widom 2000; Wolfe 1999).

## Relation Between Domestic Violence Exposure and Adverse Psychosocial Outcomes

Exposure to domestic violence in childhood has been linked to a similar set of outcomes, including low self-esteem, social withdrawal, depression, and anxiety (Edleson 1999; Fantuzzo et al. 1997; Graham-Bermann 1998; Hughes 1988; Licher and McCloskey 2004; Litrownik et al. 2003; McCloskey et al. 1995; McCloskey and Licher 2003; Moffitt and Caspi 2003; Sudermann and Jaffe 1997); and aggression, violence, and delinquency (Herrera and McCloskey 2001; Licher and McCloskey 2004; Litrownik et al. 2003; McCloskey and Licher 2003; Sudermann and Jaffe 1997). In a recent meta-analysis of studies that examined the relationship between domestic violence exposure in childhood and adolescent internalizing and externalizing behaviors, Evans et al. (2008) found significant mean-weighted effect sizes of .48 (SE=.04) for internalizing behaviors and .47 (SE=.05) for externalizing behaviors, indicating moderate associations between exposure and both outcomes.

## Evidence of a “Double Whammy” Effect

Several studies have investigated the dual exposure hypothesis. Hughes (1988) found that children who were direct victims of abuse and exposed to domestic violence had higher externalizing and internalizing scores than did those who only witnessed domestic violence (DV). However, Sternberg et al. (1993) report contrasting findings. Theirs was a study of 110 children, 8–12 years of age. Analyses compared children who: (a) were direct victims of child abuse only; (b) had been exposed to domestic

violence only; and (c) were victims of both abuse and domestic violence exposure. The study also included a no-violence comparison group. Results showed that children in the no-violence comparison group reported lower levels of depression and internalizing and externalizing behaviors than those in any of the three violence exposure groups. However, those who were doubly exposed to child abuse and domestic violence were no more likely than the children in the abuse-only or DV-only groups to experience these outcomes.

Sternberg et al. (2006) conducted what they describe as a mega-analysis in which they pooled raw data on age, gender, behavior problems, and violence exposure from 15 studies, resulting in a dataset of 1,870 subjects ages 4–14 years. They used regression analyses to investigate unique and combined effects of child abuse and domestic violence on externalizing and internalizing behaviors, measured by the Child Behavior Check List (Achenbach 1991a). The authors found that the children who were dually exposed to child abuse and domestic violence were consistently at higher risk for internalizing problems than child abuse victims, domestic violence witnesses, and those who had not been exposed. In fact, they found that abused witnesses were 187% more likely to have internalizing problems than those in a no-violence control group, 117% more likely than child abuse victims, and 38% more likely than witnesses of domestic violence. Children ages 4 years and 9 years of age who were doubly exposed to abuse and domestic violence also were at higher risk for externalizing behavior, although this dual exposure effect did not hold for children who were 10–14 years of age.

Although these studies provide some evidence of an additive effect on outcomes of abuse and domestic violence exposure, patterns in the data are not uniform and there is a need for longitudinal analyses that extend into later adolescence. Analyses need also to account for other co-existing risk factors.

## Gender Differences

Support is mixed with respect to gender differences in effects of witnessing domestic violence, being the direct victim of abuse, or both. Kitzmann et al. (2003) conducted a meta-analysis using 118 studies of psychosocial outcomes related to domestic violence exposure. The authors found comparable effect sizes for boys and girls, and no evidence of gender-by-outcome interactions. Wolfe et al. (2003) also conducted a meta-analysis using 41 studies on effects of exposure to domestic violence and came to similar conclusions.

However, other studies have found that gender moderates the effects of violence exposure. For example, Evans et al. (2008) reported that effect sizes of externalizing

behavior problems were significantly higher for boys exposed to domestic violence than for girls also exposed. Other studies have shown boys to be at higher risk of externalizing problems in adolescence after being abused in childhood (Graham-Bermann and Hughes 2003; Widom 1998). Another study, however, found that girls exposed to domestic violence were at higher risk than boys for both externalizing and internalizing behaviors, including depression (Sternberg et al. 1993). Heyman and Slep (2002) investigated both fathers and mothers and found an association between childhood exposure to violence and later abuse of their children. For mothers, only exposure to multiple forms of violence during childhood was associated with an increased risk of abuse toward their children.

Given the mixed and sometimes contrasting findings on gender differences in exposure effects, there is a need for more well-designed studies on the issue (Herrenkohl et al. 2008; Widom 1998). We examine gender as a potential moderator in the current study.

## Objectives and Rationale

In summary, the current study examines several outcomes in adolescence with known links to child adversity—a range of internalizing and externalizing behaviors, depression, and delinquency. We hypothesize that: (1) violence exposure will increase a child's risk for these outcomes, and (2) youth exposed to both child abuse and domestic violence will show an elevated risk for these outcomes over either type of abuse alone. Finally, we explore the role of gender as a possible moderator of childhood exposure on later outcomes in adolescence. The gender-balanced sample and longitudinal design of the current study allow tests of developmental relationships that are not possible in studies with cross-sectional data or in studies with only one gender.

## Method

### Sample

Data are from the Lehigh Longitudinal Study, a prospective study of children and families begun in the 1970s to examine developmental consequences of child maltreatment. Participants were recruited from several settings in a two-county area of Pennsylvania: child welfare abuse and protective service programs, Head Start classrooms, day care programs, and private (middle income) nursery school programs. Three waves of data were collected at key developmental points for children (preschool, school age, and adolescence), and a fourth adult wave of the study is now underway.

An initial assessment of children and their families was completed in 1976–1977, when children were of preschool age.<sup>1</sup> Children then ranged in age from 18 months to 6 years. The second wave of data collection occurred between 1980 and 1982, when the children were between 8 years and 11 years of age. The third assessment was completed in 1990–1991, when the children ranged from age 14 to 23 (average age: 18 years). In this assessment, 416 (91%) of the original sample of 457 children were reassessed. The full longitudinal sample includes 457 children from 297 families: 144 children from child welfare abuse programs, 105 from child welfare protective service programs, 70 from Head Start, 64 from day care programs, and 74 from nursery school programs. The present analyses are conducted using data from the 416 individuals assessed across all three waves of data collection.

The full sample contains 248 (54%) males and 209 females. One child was assessed in 52% ( $n=155$ ) of the families; two children were assessed in 43% ( $n=128$ ) of the families; three or four children were assessed in 5% ( $n=14$ ) of the families. The racial breakdown of the full sample is: 80.7% ( $n=369$ ) White, 11.2% ( $n=51$ ) more than one race, 5.3% ( $n=24$ ) Black or African American, 1.3% ( $n=6$ ) American Indian/Alaska Native, 0.2% ( $n=1$ ) Native Hawaiian or Other Pacific Islander, and 1.3% ( $n=6$ ) unknown. The ethnic composition is: 7.1% ( $n=33$ ) Hispanic or Latino, 91.5% ( $n=381$ ) Not Hispanic or Latino, and 1.3% ( $n=6$ ) unknown. These percentages were consistent with the makeup of the two-county area at the time the original sample was drawn. Eighty-six percent of children were, at the time of initial assessment, from two-parent households. Sixty-three percent of families had incomes below \$700 per month in 1976–1977.

Of the 416 participants assessed in adolescence, 229 (55.0%) are males, 81.5% ( $n=339$ ) are White, 11.7% ( $n=49$ ) are more than one race, 5.0% ( $n=21$ ) are Black or African American, 1.4% ( $n=6$ ) are American Indian/Alaska Native, and 0.2% ( $n=1$ ) is Native Hawaiian or Other Pacific Islander. By the time of the adolescent assessment, four participants had died: two children in the child welfare abuse group, one in the child welfare neglect group, and one child in the middle-income group. The percentage lost to attrition varied somewhat across groups: child welfare abuse (13.9%), child welfare neglect (10.5%), Head Start (7.1%), day care (4.7%), and middle income (8.1%), although these percentages overall did not differ significantly ( $\chi^2 > .05$ ). Further tests for comparability between attritors and non-attritors found no differences on other key

<sup>1</sup> The middle income nursery school group was added to the sample somewhat later, in 1979–1980, to increase the socioeconomic diversity of participants.

variables, including childhood SES, physically abusive discipline, and exposure to domestic violence.

Data for the preschool and school-age assessments are from interviews with parents. Interviewers collected information about a range of family and child variables, including parents' interpersonal violence and child disciplining practices. Data for the adolescent assessment are from face-to-face interviews and individually administered questionnaires with parents and youth. The adolescent youth survey provides information on parenting practices, youth behavior, youth psychological functioning, and youth school experiences. All phases of the study were reviewed and approved by the Institutional Review Board at Lehigh University. Consent and assent (for children and adolescents) was obtained from study participants during all waves of data collection.

## Measures

**Violence Exposure** The dichotomous child abuse variable used in this analysis consists of information gathered about severe physical disciplining from three different data sources: (a) official records of substantiated abuse cases; (b) mothers' reports (used prospectively) of their disciplining of their preschool and school-age children; and (c) adolescents' retrospective reports of those same discipline practices used by mothers (Herrenkohl et al. 2005). Severe physical disciplining was assessed with self-reports from mothers and adolescents and includes: biting a child; slapping so as to bruise a child; hitting a child with a stick, paddle or other hard object; or hitting a child with a strap, rope, or belt. Those who were disciplined with two or more severe physical discipline practices were considered to have been maltreated. A threshold of two or more incidents was set to eliminate isolated cases of severe physical discipline from an otherwise non-abusive parent. Individuals for whom there was agreement in the prospective parent report and retrospective adolescent report were added to those identified by official records as abuse victims. This procedure allows us to take advantage of the multiple sources of data available in the study. By requiring evidence of abuse on both the prospective and retrospective self-report measures before identifying a child as a victim of abuse, we lessen the potential measurement bias that can be introduced by using a single data source (Herrenkohl et al. 2005; Tajima et al. 2004). In addition, requiring cross-informant agreement increases the likelihood that violence exposure did occur. Although this may underestimate the number of exposed children by excluding cases for which abuse or DV exposure was identified by only one source, we can be more certain that those who are included are not falsely classified. This produced 174 subjects that had experienced child abuse (42% of the sample).

The dichotomous domestic violence exposure variable used here includes three types of moderately severe domestic violence behaviors by either parent: physical violence (hitting, punching, kicking), threats to do physical harm, and breaking things. The measure of domestic violence exposure combines reports from parents during the preschool assessment and adolescents' retrospective reports. Again, to take advantage of various data sources and to limit potential measurement error, we required agreement between prospective parent and retrospective adolescent self-reports. In cases where parental reports and adolescent reports differed in their responses about whether domestic violence behaviors had occurred, the case was coded conservatively (i.e., the participants were coded as not having been exposed), except in cases where information about domestic violence was missing in one source, in which case the existing data source was used as the only indicator of DV exposure. These procedures resulted in 197 cases classified as having witnessed domestic violence (47% of the analysis sample).

Using the dichotomous child abuse and domestic violence exposure variables, the sample was then split into four mutually exclusive groups: (a) no violence exposure group ( $n=134$ , 32% of sample), (b) child abuse only group ( $n=73$ , 18%), (c) domestic violence only group ( $n=96$ , 23%), and (d) a dual exposure group comprised of those children who were abused and exposed to domestic violence ( $n=101$ , 24%).

**Adolescent Psychosocial Functioning and Behavior** To assess adolescent psychosocial functioning and behavior, we used items from the Achenbach Youth Self Report (YSR) (Achenbach 1991b) completed by youth participants in the adolescent wave of the study. Subscales of the internalizing and externalizing composite scales were scored and used in the reported analyses. *Withdrawn* behavior includes seven items, such as shy/timid, would rather be alone, and secretive ( $M=4.24$ ,  $SD=2.42$ ;  $\alpha=.62$ ). *Somatic complaints* includes ten items, such as feeling overtired, stomach aches, and aches/pains ( $M=2.69$ ,  $SD=2.68$ ;  $\alpha=.74$ ). *Anxious/depressed* symptoms include 16 items, such as feels unloved, feels worthless, and nervous/tense ( $M=6.82$ ,  $SD=5.41$ ;  $\alpha=.87$ ). The *delinquent behavior* subscale includes 12 items, such as steals at home, sets fires, and lacks guilt ( $M=5.14$ ,  $SD=3.07$ ;  $\alpha=.70$ ). *Aggressive behavior* consists of 20 items, including argues, disobedient at school, and mean to others ( $M=10.11$ ,  $SD=5.85$ ;  $\alpha=.85$ ). The total *externalizing behavior* scale combines the delinquent and aggressive behavior subscales ( $M=15.25$ ,  $SD=8.18$ ). *Internalizing behavior* combines the withdrawn, somatic complaints, and anxious/depressed subscales ( $M=13.75$ ,  $SD=9.05$ ).

In addition to the YSR scales, we included two additional outcomes: the first is depressive symptoms measured by the Beck Depression Inventory (BDI) (Beck et al. 1979). The BDI combines scores on 21 items ( $M=10.65$ ,  $SD=7.99$ ). The second is a general measure of delinquency. *Delinquent acts* is a count of the number (out of 39 possible types) of delinquent acts self-reported by adolescents ( $M=10.84$ ,  $SD=7.73$ ). This scale was originally developed for the National Youth Survey and is widely used in studies of youth behavior and development (Elliott 1987). These final two outcomes were added to analyses so as not to rely exclusively on variables derived from a single standardized instrument and to allow cross-validation of results on two key constructs of interest: depression and delinquency.

**Covariates** *Gender* (0 = male, 1 = female; 55% of sample are male) was included as a control, and was also examined as a potential moderator of abuse and childhood exposure to domestic violence. To account for other predictors of internalizing and externalizing behaviors in youth, we developed a composite measure of risk factors (*parent personal problems* and *external constraints*) (Herrenkohl and Herrenkohl 2007). Race and age of youth were also included in the risk scale to capture demographics known to be associated with higher scores on our outcome constructs: *Parent personal problems* included responses to survey items about current stressors in the family, as reported by parents at the time. These included unfulfilled ambitions, lack of privacy, problems with people outside the family, health problems among family members, and loneliness (range of 0 to 9 with  $M=2.92$ ,  $SD=2.11$ ). *External constraints*, also derived from responses from parents on current stressors, includes items such as crime in the neighborhood, lack of home conveniences, physical remoteness, crowding in the home, and crowding in the neighborhood (range of 0 to 9, with  $M=1.85$ ,  $SD=1.71$ ).

As a preliminary step in the analysis, parent personal problems, external constraints, race, and age were entered simultaneously into a logistic regression model with any violence exposure (including domestic violence, child abuse, or both exposures) as the outcome. All four of these variables were found to be significantly predictive of violence exposure. The scores of the regression model then were used to calculate a total predicted probability value for each participant. Using this predicted risk composite score technique for regression adjustment allowed us to control parsimoniously for other variables related to child abuse and domestic violence (Bauer et al. 2006; D'Agostino 1998). The mean of this *predicted risk composite* was 0.64, with a  $SD=0.18$ .

## Analysis

Regression models were conducted using the MPlus structural modeling program (Muthén and Muthén 2004), which maximizes the case-wise likelihood of the model parameters and allows for nested data in hypothesized model. The violence exposure groups were entered as a set of dummy variables with gender entered simultaneously as a covariate. Models were run first without the risk composite, and then again with that measure added to determine whether relationships between violence exposure and the outcomes persisted after accounting for other known risk factors for the outcomes in question. Models were also run to test whether gender moderated the effect of violence exposure on the outcomes by adding interaction terms for gender and the violence exposure variables. None of the gender interaction terms were statistically significant, indicating that the models should be estimated, and assumed to be comparable, for boys and girls together. However, to account for possible gender differences in levels of the predictors and outcomes, gender was added as a free-standing covariate in the analyses.

## Results

### Examination of Effect of Violence Exposure on Later Outcomes

Table 1 shows the distribution of cases across the violence exposure groups (none, child abuse only, domestic violence only, and dual exposure) as well as the gender distribution of cases within the groups. Table 2 shows the means and standard deviations for each of the outcome variables for the full analyses sample, and for males and females separately.

As a first step, regression models were conducted to test whether violence exposure, represented by the three exposure groups, predicted the internalizing and externalizing outcome variables after accounting for gender. In these models, non-exposed youth served as the reference category to which those in the abuse, domestic violence, and dual exposure groups were compared (Table 3).

As shown in Table 3, gender was significantly predictive ( $p<.05$ ) of all the outcomes except for the BDI; although gender was only marginally significant ( $p<.10$ ) in the models for withdrawn behavior and aggressive behavior. Coefficients for gender in the models with the internalizing variables show that being female increases the risk for internalizing symptoms. For externalizing behaviors, the opposite appears true: males are at higher risk; although, for adolescent aggression, no gender effect was shown.

**Table 1** Number of cases in full sample, violence exposure groups, and gender sub-samples

	None	Child abuse	Domestic violence	Dual exposure	Total
<b>Male</b>	74	50	51	46	221
<b>Female</b>	60	23	45	55	183
<b>Total</b>	134	73	96	101	404

Results of Table 3 also show that each of the violence exposure groups (compared to those not exposed) is predictive of at least some of the outcomes after accounting for child gender. Child abuse only was predictive of higher scores on the withdrawn scale of the YSR, depression measured by the BDI, and delinquency. This variable was also marginally predictive of the YSR total internalizing scale, the anxious/depressed subscale of the YSR, and externalizing. DV exposure is significantly related to YSR withdrawn scores, BDI depression, and delinquency; DV exposure is marginally predictive of total internalizing behaviors and anxious/depressed symptoms. Compared to non-exposure, dual exposure in children is associated with all tested outcomes.

Results of Table 4 are for these same outcomes, with the composite risk score added to the models. Again, the objective was to test for exposure effects after accounting for gender and other known risk factors. Results suggest that the risk composite is predictive of YSR withdrawn behavior scores, higher scores on the BDI, and higher delinquency, as measured by the Elliott scale. Gender remained a significant predictor of many tested outcomes. In none of the models, after accounting for risks of the

composite measure, was abuse only or DV exposure only predictive of youth outcomes (when no violence exposure served as the reference category). Dual exposure, however, remained significantly predictive of all the externalizing outcomes and some internalizing behaviors: anxious/depressed and BDI depression. Dual exposure was also marginally significantly predictive of somatic complaints.

#### Evidence for the “Double Whammy” Effect

To examine whether dual exposure increases the risk of outcomes more than individual forms of exposure (Hypothesis 2), models were re-run with the dual exposure group as the reference to which youth in the abused only and domestic violence only groups were compared. Results suggest that only in models for depression (as measured by the BDI) and delinquency (Elliott) was child abuse only or domestic violence only significantly lower on the outcomes compared to dual exposure. Results of these models without and with the risk composite measure are shown in Table 5 (nonsignificant results are not shown). The results for delinquency show that domestic violence only is significantly lower than dual exposure before, but not after,

**Table 2** Mean and standard deviation of outcomes for the violence exposure groups and both genders

	None	Child abuse	Domestic violence	Dual exposure	Males	Females
<b>Internalizing, YSR</b>	11.82 (7.80)	13.81 (9.41)	14.29 (9.36)	15.99 (9.87)	12.43 (7.95)	15.35 (10.03)
<b>Withdrawn, YSR</b>	3.74 (2.35)	4.51 (2.69)	4.43 (2.35)	4.59 (2.38)	4.05 (2.39)	4.48 (2.43)
<b>Somatic complaints, YSR</b>	2.35 (2.43)	2.43 (2.68)	2.82 (2.79)	3.20 (2.91)	2.10 (2.20)	3.39 (3.03)
<b>Anxious/depressed, YSR</b>	5.73 (4.66)	6.86 (5.24)	7.04 (5.67)	8.20 (6.07)	6.28 (4.90)	7.48 (5.93)
<b>Depression, Beck</b>	8.38 (6.42)	10.67 (6.80)	10.68 (8.07)	13.74 (9.61)	10.29 (7.43)	11.08 (8.62)
<b>Externalizing, YSR</b>	13.55 (7.59)	15.72 (7.29)	15.34 (8.81)	17.09 (8.62)	16.11 (8.35)	14.22 (7.87)
<b>Delinquent behavior, YSR</b>	4.61 (2.85)	5.44 (2.91)	5.16 (3.43)	5.60 (3.08)	5.63 (3.20)	4.55 (2.81)
<b>Aggressive behavior, YSR</b>	8.94 (5.57)	10.28 (5.31)	10.18 (6.03)	11.49 (6.26)	10.48 (5.90)	9.67 (5.78)
<b>Delinquency, Elliot</b>	8.53 (6.93)	12.32 (6.81)	10.79 (7.84)	12.87 (8.68)	13.35 (8.12)	7.79 (5.98)

**Table 3** Regression models accounting for gender, compared to the no violence exposure group

	$\beta$	S.E.	p<		$\beta$	S.E.	p<
<b>Internalizing (YSR)</b>				<b>Externalizing (YSR)</b>			
Gender-female	2.78	0.9	***	Gender-female	-2.06	0.78	***
Child abuse	2.36	1.27	*	Child abuse	1.88	1.11	*
DV	2.35	1.23	*	DV	1.84	1.26	
Dual exposure	3.84	1.21	***	Dual exposure	3.71	1.11	#
Intercept	10.54	0.73	#	Intercept	14.47	0.82	#
<b>Withdrawn (YSR)</b>				<b>Delinquency (YSR)</b>			
Gender-female	0.43	0.24	*	Gender-female	-1.12	0.28	#
Child abuse	0.82	0.38	**	Child abuse	0.67	0.45	
DV	0.66	0.33	**	DV	0.58	0.48	
Dual exposure	0.8	0.31	***	Dual exposure	1.09	0.39	***
Intercept	3.54	0.22	#	Intercept	5.11	0.31	#
<b>Somatic complaints (YSR)</b>				<b>Aggression (YSR)</b>			
Gender-female	1.25	0.27	#	Gender-female	-0.95	0.58	*
Child abuse	0.27	0.36		Child abuse	1.2	0.81	
DV	0.43	0.34		DV	1.26	0.86	
Dual exposure	0.72	0.35	**	Dual exposure	2.61	0.82	***
Intercept	1.79	0.22	#	Intercept	9.37	0.59	#
<b>Anxious/depressed (YSR)</b>				<b>Delinquency (Elliot)</b>			
Gender-female	1.2	0.54	**	Gender-female	-5.74	0.72	#
Child abuse	1.28	0.72	*	Child abuse	2.95	1.07	***
DV	1.27	0.75	*	DV	2.37	0.94	**
Dual exposure	2.34	0.74	***	Dual exposure	4.83	1.07	#
Intercept	5.2	0.47	#	Intercept	11.13	0.74	#
<b>Depression (Beck)</b>							
Gender-female	0.5	0.79					
Child abuse	2.34	1.03	**				
DV	2.37	1.07	**				
Dual exposure	5.27	1.17	#				
Intercept	8.13	0.7	#				

\* $p<0.1$ , \*\* $p<.05$ , \*\*\* $p<.01$ , # $p<.001$

adding the risk composite measure to the model. For the BDI, dual exposure was significantly more strongly associated than abuse or domestic violence exposure before and after accounting for other risks.

## Discussion

As hypothesized, children exposed to violence (either child abuse, domestic violence, or both) had higher levels of externalizing and internalizing behavior problems in adolescence than those exposed to neither form of violence. Youths who had both witnessed domestic violence and had been direct victims of child abuse (i.e., dual exposure) were more consistently at risk for the entire range of internalizing and externalizing behavior problems investigated than those who experienced only one form of violence exposure. In fact, dual violence exposure was predictive of higher scores on all nine outcomes addressed in this study, while

experiencing child abuse alone or domestic violence alone was significantly predictive of only some of the outcomes. A direct comparison of dual and single exposures found that for two outcomes—delinquency and depression measured by the BDI—scores were higher for those with both abuse and domestic violence exposure. The effect of dual exposure on depression was maintained after accounting for other risks in the family and surrounding environment.

These models accounted for the effect of gender, which itself emerged as a strong main effect predictor of all outcomes except depression. Females scored higher than males on internalizing behaviors, whereas males scored higher on externalizing behaviors. However, gender did not appear to moderate the effects of exposure on the outcomes examined. This finding differs from that of the study by Sternberg et al. (1993), in which girls were found to be at increased risk for both internalizing and externalizing behavior problems. However, their study utilized a slightly younger sample, had a smaller number of study partic-

**Table 4** Regression models accounting for gender and risk composite measure, compared to the no violence exposure group

	$\beta$	S.E.	p<		$\beta$	S.E.	p<
<b>Internalizing (YSR)</b>				<b>Externalizing (YSR)</b>			
Predicted risk	0.09	3.05		Predicted risk	0.08	2.75	
Gender-female	0.16	0.89	***	Gender-female	-0.12	0.77	**
Child abuse	0.07	1.34		Child abuse	0.06	1.24	
DV	0.09	1.29		DV	0.08	1.34	
Dual exposure	0.15	1.32	**	Dual exposure	0.16	1.24	**
Intercept	0.87	1.85	***	Intercept	1.5	1.66	***
<b>Withdrawn (YSR)</b>				<b>Delinquency (YSR)</b>			
Predicted risk	0.18	0.75	***	Predicted risk	0.06	1	
Gender-female	0.1	0.23	**	Gender-female	-0.18	0.28	***
Child abuse	0.08	0.38		Child abuse	0.07	0.48	
DV	0.08	0.33		DV	0.07	0.5	
Dual exposure	0.07	0.32		Dual exposure	0.13	0.45	**
Intercept	2.11	0.48	***	Intercept	1.46	0.62	***
<b>Somatic complaints (YSR)</b>				<b>Aggression (YSR)</b>			
Predicted risk	-0.01	0.88		Predicted risk	0.08	1.98	
Gender-female	0.23	0.27	***	Gender-female	-0.07	0.57	
Child abuse	0.04	0.38		Child abuse	0.05	0.91	
DV	0.07	0.35		DV	0.07	0.93	
Dual exposure	0.12	0.39	*	Dual exposure	0.16	0.91	**
Intercept	0.7	0.56	***	Intercept	1.33	1.18	***
<b>Anxious/depressed (YSR)</b>				<b>Delinquency (Elliot)</b>			
Predicted risk	0.07	1.85		Predicted risk	0.21	2.08	***
Gender-female	0.11	0.54	**	Gender-female	-0.35	0.69	***
Child abuse	0.07	0.77		Child abuse	0.08	1.13	
DV	0.08	0.8		DV	0.08	0.96	
Dual exposure	0.15	0.81	**	Dual exposure	0.18	1.07	***
Intercept	0.72	1.15	***	Intercept	0.75	1.29	***
<b>Depression (Beck)</b>							
Predicted risk	0.12	2.34	**				
Gender-female	0.04	0.78					
Child abuse	0.07	1.06					
DV	0.09	1.14					
Dual exposure	0.23	1.22	***				
Intercept	0.61	1.46	***				

\* $p < 0.1$ , \*\* $p < .05$ , \*\*\* $p < .01$ ,  
# $p < .001$

ipants, and used different statistical procedures than those used here, making it difficult to compare results directly. Additionally, Evans et al. (2008) found that boys exposed to domestic violence were at a higher risk for externalizing behavior problems than were their female counterparts. However, several other reviews and primary research studies documented no evidence of gender moderation for outcomes similar to those we examined (Kitzmann et al. 2003; Sternberg et al. 2006; Wolfe et al. 2003). Because our sample contains youth who range in age during adolescence, findings of this study extend those presented earlier on gender differences.

Here, we investigated whether one or both forms of exposure predicted later outcomes after accounting for

other risk factors and demographics. Previous studies have shown that children who are abused and exposed to violence between caregivers are often exposed to a variety of other risk factors known to increase internalizing and externalizing behaviors in adolescence (Herrenkohl et al. 2008). However, rarely are these risk factors taken into account when investigating developmental outcomes related to family violence. Evidence from this study suggests that, while correlated risks account partially for the effects of violence exposure on several outcomes, for several internalizing and externalizing behaviors of adolescence, dual exposure (compared to no exposure) predicts higher frequency scores, whereas single forms of exposure (compared to no exposure) are not necessarily statistically

**Table 5** Regression models comparing to the dual exposure group ("double whammy" evidence)

	Delinquency (Elliot)			Depression (Beck)				
	$\beta$	S.E.	p<	$\beta$	S.E.	p<		
<b>Before adding risk covariate</b>			<b>Before adding risk covariate</b>					
Gender-female	-5.74	0.72	#	Gender-female	0.5	0.79		
Child abuse	-1.89	1.22		Child abuse	-2.94	1.29	**	
DV	-2.47	1.11	**	DV	-3	1.34	**	
None	-4.83	1.07	#	None	-5.27	1.17	#	
Intercept	15.96	1.01	#	Intercept	13.4	1.04	#	
<b>After adding risk covariate</b>			<b>After adding risk covariate</b>					
Predicted risk	9.06	2.08	#	Predicted risk	5.5	2.34	**	
Gender-female	-5.49	0.69	#	Gender-female	0.65	0.78		
Child abuse	-1.6	1.21		Child abuse	-2.75	1.29	**	
DV	-1.76	1.09		DV	-2.57	1.31	**	
None	-3.2	1.07	***	None	-4.29	1.22	#	
Intercept	8.99	1.9	#	Intercept	9.17	1.99	#	

\* $p<0.1$ , \*\* $p<.05$ , \*\*\* $p<.01$ , # $p<.001$

distinguishable. For depression, at least, as measured by the BDI, dual exposure is more strongly associated with the outcome than is abuse or DV exposure alone, after taking into account other risks.

While results of our study appear to show some limited evidence of a dual exposure effect (i.e., an elevation in risk associated with exposure to abuse and domestic violence together), our study also showed that for certain—arguably most—outcomes, single exposure and dual exposure are statistically indistinguishable. That is, while dual exposure appears to increase (from no exposure) the variety and/or frequency of certain adverse behaviors in adolescence, the extent of that increase is not consistently more than for single exposure (to abuse only or domestic violence only). Similar to our results, two studies conducted by Sternberg and colleagues failed to find consistent double whammy or dual exposure effects. In one study, these researchers found no dual exposure effects, even for depression (Sternberg et al. 1993). In another study, dual exposure effects appeared dependent on age and were not particularly evident for adolescents—the focus of our study (Sternberg et al. 2006). It is possible that as youth progress through the challenging developmental stages of adolescence, those exposed to multiple forms of violence are more likely to experience higher levels of depression. It is also possible that the effect of dual exposure associated with depression in particular would be accounted for by other variables not tested in our regression models. In any case, further research is clearly needed to determine whether a dual exposure effect truly is evident, whether effects change with development, and whether effects are somewhat or not at all dependent on gender.

Potential limitations of our study include a limited measure of domestic violence exposure, based on behaviors of a moderate variety. Our measure included only a small

number of domestic violence items for respondents to endorse, and the items measured moderately-severe behaviors such as hitting, pushing, kicking and threatening. However, the items we used are comparable to the way that domestic violence was operationalized in the National Violence Against Women Survey (Tjaden and Thoennes 2000) and National Family Violence Surveys (Straus and Gelles 1990). Further, these moderately severe acts have been found to co-occur with more severe acts of violence, including acts that lead to physical injury (Tajima 1999). We were also limited by our inability to determine precisely how often and over what period of time exposure occurred.

The study may also be limited by the method used to group and study exposure effects (e.g., group classifications with moderate group sizes). Even larger samples and other statistical techniques to account for within-category differences on tested outcomes may be needed to further investigate the complicated interplay of violence exposure and long-term outcomes.

A strength of our study is the combination of prospective parent reports and retrospective reports from adolescents about their experiences growing up. However, our procedure for combining the two data sources provides a conservative estimate of the number of children exposed to one or the other form of violence. Thus, analyses may underestimate the numbers of children in the three exposure groups. Even still, the percentage of children exposed to violence in this study is relatively high and consistent with findings of other studies, particularly those based on high-risk samples (Herrenkohl et al. 2008). Finally, while analyses account for important correlates of family violence, other covariates may exist. Further research may benefit from controlling for additional risk factors and demographic characteristics of children and their families,

such as early childhood behavior problems, housing transitions, social support, and socio-economic status.

## Conclusion

This study identified different patterns of relationships between violence exposure and internalizing and externalizing behavior outcomes. While all violence-exposed groups showed higher levels of the outcomes compared to the no-violence-exposure group, only those in the dual exposure group were at higher risk after accounting for other risk factors. While not a classic double whammy or dual exposure effect, this finding suggests there may be increased vulnerability for those children exposed to both domestic violence and child abuse. Evidence of a more typical double whammy effect emerged only for youth depression. Thus, perhaps the most important conclusion to be garnered from this study is that the relationship between violence exposure and later adolescent outcomes is more complicated than the literature would suggest. Results underscore the need to disentangle the unique and combined effects of child abuse and domestic violence exposure in children, and to examine these effects in the context of other known risk factors. Failure to account for dual violence exposure may lead researchers to overstate, or underestimate, the risk of later problems in youth associated with child abuse or domestic violence exposure alone.

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# Longitudinal Study on the Effects of Child Abuse and Children's Exposure to Domestic Violence, Parent–Child Attachments, and Antisocial Behavior in Adolescence

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## Abstract

This study examined the unique and combined effects of child abuse and children's exposure to domestic violence on later attachment to parents and antisocial behavior during adolescence. Analyses also investigated whether the interaction of exposure and low attachment predicted youth outcomes. Findings suggest that, although youth dually exposed to abuse and domestic violence were less attached to parents in adolescence than those who were not exposed, for those who were abused only and those who were exposed only to domestic violence, the relationship between exposure types and youth

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outcomes did not differ by level of attachment to parents. However, stronger bonds of attachment to parents in adolescence did appear to predict a lower risk of antisocial behavior independent of exposure status. Preventing child abuse and children's exposure to domestic violence could lessen the risk of antisocial behavior during adolescence, as could strengthening parent-child attachments in adolescence. However, strengthening attachments between parents and children after exposure may not be sufficient to counter the negative impact of earlier violence trauma in children.

### **Keywords**

attachment, child abuse, children exposed to domestic violence, domestic violence, youth violence

The U.S. Department of Health and Human Services (2009) reported that in 2007 an estimated 794,000 children were found to have been abused and neglected. The majority of these substantiated cases were for neglect, although a sizeable number of cases (10.8%) involved physical abuse. Girls and boys are at almost equal risk for child abuse according to the U.S. Department of Health and Human Services report: 51.5% of documented victims in 2007 were female and 48.2% were male. It is estimated that 1,760 children died in 2007 from child abuse or neglect, with an overall fatality rate of 2.35 per 100,000 children.

Children's exposure to domestic violence (also called intimate partner violence or IPV) is another public health concern, which, like abuse, is very costly and widespread (Gewirtz & Edleson, 2007; Herrenkohl, Sousa, Tajima, Herrenkohl, & Moylan, 2008; WHO, 2002). The United States Bureau of Justice found nonfatal IPV affected 1 in 320 households, with injuries occurring in just over half of all such cases (U.S. Department of Justice, 2001-2005a). In many households in which IPV occurs, children are present and often witness the physical injuries and emotional pain inflicted on adult victims. Others may not witness the violence directly but are well aware of violence in the home (Fantuzzo, Boruch, Beriama, Atkins, & Marcus, 1997). The U.S. Department of Justice reports that children were present in homes where IPV occurred in more than a third (35.2%) of all documented cases; in up to an additional 15.5% of cases, it was unknown if children were present, so the number is likely substantially higher. A conservative estimate is that over 200,000 children in the United States are exposed to domestic violence annually (U.S. Department of Justice, 2001-2005b). Other sources

indicate as many as 3 to 18 million children are exposed to IPV in some form (Tajima, Herrenkohl, Moylan, & Derr, *in press*).

Much has been published on the deleterious effects of child abuse, with established links to later delinquency in youth (Smith & Thornberry, 1995), aggression and violence (Maas, Herrenkohl, & Sousa, 2008; Stouthamer-Loeber, Loeber, Homish, & Wei, 2001), and many other health risk behaviors and emotional problems during adolescence (e.g., school dropout, substance use, sexual risk taking, teenage pregnancy, depression; Fergusson, Horwood, & Lynskey, 1996; Fergusson & Lynskey, 1997; Herrenkohl, Herrenkohl, Egolf, & Russo, 1998; Widom, 2000; Wolfe, 1999; Wolfe, Scott, Wekerle, & Pittman, 2001).

Although the effects on children of exposure to domestic violence have been less well studied than have those of abuse, findings suggest that domestic violence impacts children's development similarly (Edleson, 1999c; Fantuzzo et al., 1997; Graham-Bermann, 1998; Hughes, 1988; Lichter & McCloskey, 2004; Litrownik, Newton, Hunter, English, & Everson, 2003; McCloskey, Figueiredo, & Koss, 1995; McCloskey & Lichter, 2003; Moffitt & Caspi, 2003; Sudermann & Jaffe, 1997). As with child abuse, children's exposure to domestic violence can lead to short- and longer term outcomes of internalizing and externalizing behavior problems during adolescence, including delinquency, status offenses, and perpetration of violence (Curie, 2006; Ehrensaft et al., 2003; Herrenkohl et al., 2008).

Strong evidence indicates that physical child abuse and exposure to domestic violence often co-occur (Appel & Holden, 1998; Dong et al., 2004; Edleson, 1999b; Herrenkohl et al., 2008). Appel and Holden's (1998) review of research found rates of co-occurrence for abuse and domestic violence exposure in the range of 6% to 18% for community samples and about 40% for clinical samples.<sup>1</sup> In Edleson's (1999b) review of research, abuse and domestic violence exposure overlapped in 30% to 60% of all identified cases.

The extent of overlap in child abuse and children's exposure to domestic violence makes it difficult to determine whether their longitudinal effects on youth development are distinguishable. Even still, it is surprising how little research has tried to tease out their unique and combined effects, particularly given the range of adverse outcomes known to relate to these forms of early trauma. In addition, few studies have examined whether abuse and exposure to domestic violence affect boys and girls in the same ways, despite the interest in gender differences (Edleson, 1999a; Herrenkohl et al., 2008; Maughan & Cicchetti, 2002; Sternberg et al., 1993). Possible explanations for the slow progress on co-occurring forms of violence and gender differences are the lack of suitably designed studies (*i.e.*, gender-balanced and longitudinal),

poor or insufficient measurement of abuse or domestic violence exposure, and/or the absence of relevant theories and well-developed hypotheses. Yet, to advance knowledge and practice, it is important that research extend to these topics (McCloskey et al., 1995).

Wolfe, Crooks, Lee, McIntyre-Smith, and Jaffe's (2003) meta-analysis of studies on dual exposure found only four studies that adequately documented the developmental impact of dual exposure on children's later development and risk of internalizing and externalizing behaviors. Effect sizes given in this review suggest that children doubly exposed to abuse and domestic violence fare worse (i.e., are at higher risk) than are those not exposed or exposed only to abuse or domestic violence alone. Hughes and colleagues refer to this as a *double whammy* phenomenon (Hughes, Parkinson, & Vargo, 1989). However, some research has found little or no evidence of a double whammy or dual exposure effect. For example, Sternberg et al.'s (1993) study of the impacts of child abuse and domestic violence reported no greater risk of depression or problem behaviors among adolescents who had been abused and exposed to spouse abuse when compared to those with single exposures. Yet, as expected, children exposed to abuse alone or spouse abuse alone were at higher risk of later problems than were children with no history of family violence (Sternberg et al., 1993). In addition, Maughan and Cicchetti's (2002) examination of exposure to interadult violence and maltreatment found that, although maltreatment was predictive of poor behavior in children, neither interadult violence alone nor in combination with maltreatment resulted in a statistically significant increase of child behavior problems above those of nonexposed peers (Maughan & Cicchetti, 2002). Other studies provide mixed or contrasting findings (Cunningham, 2003; Feerick & Haugaard, 1999; Heyman & Slep, 2002; Shipman, Rossman, & West, 1999).

Whether children are resilient to the effects of child abuse and exposure to domestic violence is an issue of primary interest to researchers and practitioners in the child welfare field (Herrenkohl et al., 2008). The study of protective factors (factors that promote resilience and buffer risk in children exposed to violence) is crucial to understanding how children overcome or positively cope in the face of adversity (Masten, 2001). One consideration is whether children doubly exposed to abuse and domestic violence are measurably more vulnerable (i.e., are at higher risk) and less protected from the consequences of exposure when compared to those with single exposure (i.e., abuse or domestic violence). A hypothesis consistent with the double whammy/dual exposure idea is that children will suffer more emotional harm when they see, and simultaneously experience, abuse at the hands of a trusted adult—a compounding trauma of sorts that interferes with children's bonds

of attachment to primary caregivers and leads to later social and behavioral deficits (McCloskey et al., 1995). Indeed, research has shown that children who are exposed to violence in the home are generally less attached to and receive less support from their caregivers (Levendosky, Huth-Bocks, & Semel, 2002; Rikhye et al., 2008; Styron & Janoff Bulman, 1997) In a review of 13 studies on the impact of physical maltreatment and/or neglect of children on the quality of parent-child attachments, Morton and Browne (1998) reported that 76% of all maltreated infants were classified as being insecurely attached (Morton & Browne, 1998).

Bowlby's (1969) theory of attachment emphasizes the foundational role of healthy parent-child relationships and the importance of these relationships for children's healthy development over the long term (Bowlby, 1969). According to Bowlby and other attachment researchers, early (secure) attachments allow children to explore the surrounding environment, to learn skills of engagement, and to develop confidence in their own ability to thrive independent of others (Davies, 2004) Strong, secure attachments aid in the development of internal working models of the self and others that provide a young child with current and future relationship goals and expectancies. It was Ainsworth, Blehar, Waters, and Wall (1978) who developed a classification schema for measuring and studying the quality of attachment for infants and their caregivers. Initially, Ainsworth et al. described three attachment styles: secure, insecure avoidant, and insecure ambivalent (Ainsworth et al., 1978). Later, Main and Solomon (1986) added a fourth attachment style, disorganized/disoriented attachment, to account for the large number of children who did not fall neatly into Ainsworth's original categories (Main & Solomon, 1986).

Studies have shown very positive outcomes for children with secure attachments. In contrast, children with weak, avoidant, or unhealthy attachment styles typically do less well as they proceed through developmental stages (Bowlby, 1969; Herrenkohl et al., 2008, Rikhye, 2008; Styron & Janoff Bulman, 1997). Vando, Rhule-Louie, McMahon, and Spieker (2008) found that children with insecure attachments at age 1 were at higher risk of conduct problems in the first grade Using a sixth-grade sample, Eliot and Cornell (2009) found that insecure attachments were associated with aggressive attitudes and both self-reported and peer-nominated measures of bullying (Eliot & Cornell, 2009).

A majority of studies with maltreated samples have focused on attachment styles or qualities during infancy or early childhood. Few have examined parent-child attachment for vulnerable adolescents in relation to one or more hypothesized outcomes. Attachments in adolescence remain important and

are predictive of positive youth development (Aceves & Cookston, 2007; Allen, Moore, Kuperminc, & Bell, 1998; Simons, Paternite, & Shore, 2001). Attention to whether strong parent-child attachments provide some protection for youth who earlier experienced abuse and domestic violence in the home is important because attachments formed or carried into adolescence may offer stability at a point youth encounter other risk factors known to promote problem behaviors, such as delinquency and violence (Maas et al., 2008). For example, youth strongly attached or bonded to one or more parents may be less vulnerable to antisocial peer influences, which are known to predict youths' involvement in delinquency and violence during mid- and late adolescence (Catalano & Hawkins, 1996).

To study patterns of attachment for adolescents, Armsden and Greenberg (1987) developed the Inventory of Parent and Peer Attachment (IPPA), a 60-item questionnaire that assesses an adolescent's feelings of trust, communication, and alienation from a parent/caregiver. More trust and communication, and lower scores of alienation translate to stronger overall attachment, as measured by a single, composite measure (for peers and parents separately). In their study, Armsden and Greenberg found that adolescents more securely attached to their parents had higher scores of well-being, including self-esteem and life satisfaction. Insecure attachments to parents, in contrast, were linked to higher scores of adolescent depression, anxiety, and resentment/alienation (Armsden & Greenberg, 1987).

How abuse and children's exposure to domestic violence affect parent-child attachments during adolescence is unclear. Also unclear is the extent to which dual exposure in childhood weighs more heavily on these later attachments and whether parent-child attachments during adolescence are at all protective (from antisocial behavior for adolescents) for children who were abused and earlier exposed to violence in the home. There is limited evidence as well of the role of gender as a moderator of children's exposure to violence in relation to attachment and delinquency (Egeland, Yates, Appleyard, & van Dulmen, 2002; Morton & Browne, 1998; Styron & Janoff Bulman, 1997).

Our study examines the unique and combined effects of child abuse and children's exposure to domestic violence on parent-child attachments and antisocial behavior during adolescence, including violence perpetration, delinquency, and status offenses. We hypothesize that violence exposure will increase antisocial behavior in youth during adolescence. We also hypothesize that effects of exposure will be particularly strong for children who are doubly abused and exposed to domestic violence (dual exposure). Furthermore, we hypothesize that dually exposed children will be least

attached to their parents during adolescence and that lower parent-child attachments will increase antisocial behavior among children exposed to violence. Because so few studies have examined gender differences in outcomes of family violence, we examine gender as another possible moderator of exposure (Cullerton-Sen et al., 2008). Findings in this case are exploratory, with no particular hypothesis about which gender is likely to be more or less vulnerable to the effects of violence exposure. In sum, this study contributes to the research literature by investigating single and dual exposures in children, attachment during adolescence, and possible gender differences in the prediction of antisocial behavior.

## Method

### *Sample*

Data are from the Lehigh Longitudinal Study (Herrenkohl & Herrenkohl, 2007; Herrenkohl, Herrenkohl, Egolf, & Wu, 1991). The study began in 1976 with children who ranged in age from 18 months to 6 years (4 years of age on average). The average age of primary parent respondents (mainly mothers) was 28. This first wave of the study included 457 children and their parents (totaling 297 families) who were recruited from child welfare programs, Head Start centers, and child care programs in a two-county area of Pennsylvania. Agency staff referred the families from the child welfare programs; the remaining children were recruited from 13 Head Start centers, 12 day care programs, 2 programs for handicapped children, 3 Head Start programs, and 8 nursery school programs.<sup>2</sup> The counties were urban/suburban and rural. The original study sample ( $N = 457$ ) was 54% male. The race breakdown is as follows: 80.7% ( $n = 369$ ) White, 11.2% ( $n = 51$ ) more than one race, 5.3% ( $n = 24$ ) Black or African American, 1.3% ( $n = 6$ ) American Indian/Alaska Native, 1.3% ( $n = 6$ ) unknown, 0.2% ( $n = 1$ ) Native Hawaiian or Other Pacific Islander. At the initial assessment, 86% of the families were from two-parent households; 63% of families had incomes below US\$700 per month. Parents on average had completed 12 years of schooling.

A second wave of data collection commenced approximately 4 years later when children were in elementary school and were on average 8 years of age and parents were in their early 30s (average 33). A third assessment followed when children were adolescents, approximately 10 years after the school-age interview. At the time of the adolescent assessment, youth participants were, on average, 18 years of age. Approximately 91% of the original 457 child participants were reassessed in adolescence ( $n = 416$ ).

Tests of the equality of attrition across groups in the adolescent wave of the study showed the percentage lost to attrition varied somewhat: child welfare abuse (13.9%), child welfare neglect (10.5%), Head Start (7.1%), day care (4.7%), and middle income (8.1%), although these percentages overall did not differ significantly ( $\chi^2 > .05$ ). Further tests for comparability in attritors and nonattritors found no significant differences in childhood socioeconomic status (SES), physically abusive discipline used by parents, or childhood exposure to domestic violence. An assessment of the panel, now adults, is underway, although analyses here are limited to the first three waves of complete data.

## Measures

The dichotomous child abuse variable used in this analysis consists of information gathered about severe physical disciplining from three different data sources: (a) official records of substantiated abuse cases, (b) mothers' reports of their disciplining of their preschool and school-age children, and (c) adolescents' retrospective reports of those same discipline practices used by mothers. Behaviors assessed with self-reports from mothers and adolescents were biting a child; slapping a child so as to bruise; hitting a child with a stick, paddle, or other hard object; or hitting a child with a strap, rope, or belt. Those who were disciplined with two or more severe physical discipline practices were considered maltreated according to the self-report measure. A threshold of two or more incidents was set to eliminate isolated cases of severe physical discipline from an otherwise nonabusive parent. Individuals for whom there was agreement on the prospective parent report and retrospective adolescent reports were added to those identified as abuse victims using official records. Official record reports were used as the benchmark criterion because the severity and chronicity of the abuse leading to the filing of those reports were considered sufficient by themselves to warrant an abuse classification in our scoring. The procedure used to combine the three data sources allowed us to take advantage of the information each provides within a single measured construct. By requiring evidence of abuse on both the prospective and retrospective self-report measures before identifying a child as a victim of abuse, we aimed to lessen the potential measurement bias that might be introduced by one or the other source (Herrenkohl et al., 2005; Tajima, Herrenkohl, Huang, & Whitney, 2004). In addition, requiring cross-informant agreement increases the likelihood that violence exposure did occur. Although this may underestimate the number of exposed children, we can be more certain that those who are included are

not falsely classified. This produced 174 participants who had experienced child abuse (42% of the analysis sample of 416). Agreement in the data sources on abuse cases was moderate (about 50% or cases cross-classified), which is consistent with other studies (Smith et al., 2008).

The dichotomous domestic violence exposure variable includes three types of moderately severe abusive behavior by either parent: physical violence (hit, punch, kick), threats to do physical harm, and breaking things. The measure of domestic violence exposure combines reports from parents during the preschool assessment and adolescents' retrospective reports. Again, to take advantage of various data sources and to limit potential indicator bias, we required agreement between prospective parent and retrospective adolescent self-reports. In cases where parental reports and adolescent reports differed in their responses about whether domestic violence behaviors had occurred, the case was coded conservatively (i.e., no exposure), except in cases where information about domestic violence was missing in one source, where the existing data source was used as a single indicator of violence exposure. These procedures resulted in 197 cases classified as having been exposed to domestic violence (47% of the analysis sample).

Using the dichotomous child abuse and domestic violence exposure variables, the sample was then split into four mutually exclusive groups: (a) no-violence exposure group (identified as *no exposure* in the tables;  $n = 134$ , 33% of the analysis sample), (b) domestic violence exposure only group (*DV only*;  $n = 96$ , 24% on the analysis sample), (c) child abuse only group (*CA only*;  $n = 73$ , 18% of the analysis sample), and (d) exposure to domestic violence and child abuse group (*dual exposure*;  $n = 101$ , 25% of the analysis sample).

**Parent-child attachment.** The outcome variables used in the analysis are from Armsden and Greenberg's (1987) IPPA. This scale, administered in the adolescent wave of the study, consists of three subscales: parent-child communication, trust, and alienation. Answers are scored with a 5-point Likert scale that ranges from (1) *almost never to never* to (5) *almost always or always*. Scores were computed by adding the 1 to 5 scores for all items. Questions ask about parents as a unit. Communication has a range of 8 to 40, with higher scores representing stronger communication between parent and child. Items include the following: "I like to get my parents' point of view on things I'm concerned about," "I feel like it's no use letting my feelings show," and "My parents sense when I'm upset about something." ( $\alpha = .87$ ). Trust has a range of 9 to 45, with higher scores representing more trust and understanding. Items include the following: "My parents respect my feelings," "I feel my parents are successful as parents," and "My parents trust my judgment" ( $\alpha = .91$ ).

Alienation has a range of 11 to 55, with higher scores indicating increased alienation. Items include the following: "I have to rely on myself when I have a problem to solve," "Talking over my problems with my parents makes me feel ashamed or foolish," and "I don't get much attention at home." ( $\alpha = .86$ ). We also constructed a composite measure of parent-child attachment for use in our logistic regression models, as suggested by Armsden and Greenberg, due to high intercorrelation among subscales. To make the composite measure, scores on the alienation subscale are subtracted from the sum of trust and communication. Our composite attachment scores ranged from -38 to 73. For the final stage of our data analysis, we dichotomized the composite variable to differentiate between those with particularly high attachment scores (the top 25%) and all others.

*Antisocial behavior.* Self-reported outcomes of felony assault, minor assault, general delinquency, and status offenses were measured in the adolescent wave of the study. Each outcome is a measure of count of types of offenses. Each is a composite of several indicator variables. For each outcome, scores were again dichotomized to differentiate those in the top 25% (coded 1) of the distribution from those in the remaining 75% (coded 0), using a method similar to that of Farrington and Loeber (2000). This method allows the researcher to differentiate between low and higher frequency (or variety) offending, analyzed dichotomously to ascertain the relative probability of offending over nonoffending. In some cases, the distribution of scores did not allow a cut point at precisely the 75th percentile. Here, we recoded the variable as near to that cut point as possible. We have used a similar approach in other analyses of these data and have found few differences in tested outcomes when variables are analyzed as categories or continuous scores (Tajima et al., 2004).

Felony assault includes being in a gang fight; hitting someone other than parents, brothers, sisters, or persons at work; having the idea of seriously hurting or killing this person; and trying to have or having had sexual relations with someone against her/his will. Minor assault includes hitting or threatening to hit a parent, supervisor, coworker, or other person. Status offenses include running away from home, being absent from school for more than a day without an excuse, drinking alcohol, and getting suspended. Delinquency includes theft, disorderly conduct, and other related behaviors.

Gender of adolescent participants (*male* = 1 or *female* = 0) was included in our final model to control for possible outcome differences for males and females. SES was also included as a control variable in our final model. SES is a continuous-level composite variable that is based on indicators of family

income during the preschool period, mother's occupational status and education level, and total number of rooms in a family's house.

### **Analysis**

We first examined whether patterns in the data are consistent with the hypothesis that children exposed to both abuse and domestic violence have worse outcomes in adolescence than children exposed to only one (or none) of these behaviors. Cross tabulations compared percentages on each outcome for each of the exposure groups (no exposure, DV only, CA only, and dual exposure). The next step in the analysis, a series of three-way analysis of variance models, assessed the association between exposure types and the three subscales of parent-child attachment as well as an overall parent-child attachment composite that combined the three subscales. The analysis examined interactions of gender and attachment to determine whether males and females differ with respect to exposure effects.

Finally, we conducted a series of regression models to examine the association between exposure type and the adolescent outcomes as well as interactions of exposure and parent-child attachment in adolescence. We used only the composite measure of attachment (dichotomized to reflect high vs. low attachment) to examine possible interaction effects. Analyses were run two times, once with the nonexposed group as the reference category and a second time with the dual-exposure group as the reference group. Gender and SES were added as control variables in a final test of the model to determine whether the effects of exposure are maintained when these other known predictors of antisocial behavior are taken into account.

### **Results**

Table 1 contains the results of the initial cross-tabulations of exposure types (no exposure, exposure to domestic violence only, child abuse only, and dual exposure) and measures of antisocial behaviors in adolescence. Findings show that more youth with dual exposure engaged in antisocial behavior during adolescence than those who were not exposed, exposed only to domestic violence, or abused only. For example, 47.5% of dually exposed youth engaged in felony assault as compared to 41.7% who were only exposed to abuse, 36.8% who were only exposed to DV, and 24.8% who were in the no-exposure group. Effects overall of exposure group are significant but modest (phi coefficients of .16-.26,  $p < .05$ ).

**Table 1.** Percent of Respondents in Each Exposure Group Reporting Antisocial Behavior in Adolescence

	No Exposure	DV Only	CA Only	Dual Exposure	$\chi^2$	Phi
	n = 134	n = 96	n = 73	n = 101		
Felony assault	24.8%	36.8%	41.7%	47.5%	13.98	.19
Minor assault	20.1%	37.9%	38.9%	42.6%	16.25	.20
Status offenses	10.4%	26.3%	33.3%	38.6%	27.57	.26
Delinquent behavior	16.5%	26.3%	32.4%	33.7%	10.78	.16

Note: Chi-square tests of differences in group prevalences were significant for all outcomes ( $p < .05$ ). Average analysis sample for each chi-square comparison is 401 after accounting for missing data. Percentages are within-group totals for each outcome. DV = domestic violence; CA = child abuse.

Table 2 shows the results of a three-way analysis of variance model. Test statistics are shown for the main effects of exposure type and gender. Probability values for gender-by-exposure-group interactions are also provided. On the right side of the table are group means of the attachment subscales (Communication, Alienation, and Trust) and the composite attachment scale that combines the subscales for each abuse exposure grouping: no exposure (Subscript a), DV only (Subscript b), abuse only (Subscript c), and dual exposure (Subscript d). Subscripts of the attachment scale means shown in the four columns reflect significant differences in Bonferroni tests of group means for each scale.

As shown in Table 2, for the attachment subscale of Communication, youth in the no-exposure group (Subscript a) differed from those in the dual-exposure group (Subscript d). Those in the child abuse only (CA) group (Subscript c) also differed from youth in the dual-exposure group. However, the child abuse only and domestic violence only (DV) groups did not significantly differ on communication (nor did they differ on the remaining attachment subscales or the overall composite measure). For alienation, the pattern was the same: Means for the no exposure and CA groups were significantly lower than that of the dual-exposure group. For trust, the pattern was also similar, although the DV group differed on this subscale significantly from the dual-exposure group. Finally, for the overall attachment composite measure, the no exposure and CA groups differed from the dual-exposure group. However, the no exposure and DV only groups did not differ. Means of the DV only and CA only groups were also statistically indistinguishable.

Table 2 also shows tests of gender and gender-by-exposure-group interactions. For communication and the overall attachment scale, gender was a significant main effect predictor, with males reporting lower attachment than

**Table 2.** Test Statistics and Means for Comparisons on Subscales of Parent–Child Attachment

Attachment Score	Exposure Group Main Effect	Gender Main Effect	Gender × Group Interaction Effect	Type of Abuse Exposure			
				No Exposure <sup>a</sup>	DV Only <sup>b</sup>	CA Only <sup>c</sup>	Dual Exposure <sup>d</sup>
Communication	$F(3, 392) = 5.94$ $p < .01$ $\eta^2 = .042$	$F(1, 392) = 8.64$ $p < .01$ $\eta^2 = .020$	$F(3, 392) = 1.18$ $p > .05$ $\eta^2 = .008$	28.27 <sub>d</sub>	26.90	27.94 <sub>d</sub>	24.51 <sub>a,c</sub>
				$F(3, 392) = 1.57$ $p > .05$ $\eta^2 = .004$	$F(3, 392) = 1.51$ $p > .05$ $\eta^2 = .011$	27.34 <sub>d</sub>	29.29
Alienation	$F(3, 392) = 6.30$ $p < .001$ $\eta^2 = .047$	$F(1, 392) = 1.01$ $p > .05$ $\eta^2 = .004$	$F(3, 392) = 2.61$ $p > .05$ $\eta^2 = .011$	35.12 <sub>d</sub>	33.87 <sub>d</sub>	34.20 <sub>d</sub>	32.19 <sub>a,c</sub>
				$F(3, 392) = 0.76$ $p < .001$ $\eta^2 = .070$	$F(3, 392) = 1.80$ $p < .05$ $\eta^2 = .054$	36.75 <sub>d</sub>	32.63
Trust	$F(3, 392) = 7.66$ $p < .001$ $\eta^2 = .054$	$F(1, 392) = 4.27$ $p < .05$ $\eta^2 = .010$	$F(4, 392) = 1.80$ $p > .05$ $\eta^2 = .013$	34.49 <sub>d</sub>	34.49 <sub>d</sub>	34.49 <sub>d</sub>	29.64 <sub>a,b,c</sub>

Note: Subscripts correspond to significant differences in group means ( $p < .05$ ) using Bonferroni tests. DV = domestic violence; CA = child abuse.

females. Tests of group-by-gender interactions were nonsignificant ( $p$  values  $> .05$  in each case), although for the subscale of Trust, the interaction term approached statistical significance ( $p < .10$ ). Effect sizes are shown in Table 2 using  $\eta^2$ . Effect sizes are modest, although for exposure group status,  $\eta^2$  is somewhat larger (.04-.07).

As shown in Table 3, in all regression models dual exposure increased over nonexposure the odds of antisocial behavior (for felony assault, minor assault, delinquency, and status offenses). The odds of felony assault for dual exposure compared to no exposure were 2.61 times greater. For minor assault, the odds were 2.90 times greater. For delinquency, the odds were 2.43 times greater. For status offenses, odds for dual exposure compared to no exposure were 5.11 times greater.

Higher odds of violence and delinquency were also shown for single forms of exposure compared to no exposure. For abuse only, the odds of felony assault were 2.19 times greater than no exposure; for minor assault, the odds were 2.67 times greater, for delinquency, 2.47 times greater, and for status offenses, 4.57 times greater. For the domestic violence only group (compared to no exposure), the odds of felony assault were 1.8 times greater, 2.58 times greater for minor assault, 1.84 times greater for delinquency, and 3.20 times greater for status offenses.

Table 4 shows the results of these same models reestimated with dual exposure as the reference group to more precisely test our dual-exposure hypothesis. Consistent with the results of Table 3, abuse alone and domestic violence exposure alone, although trending toward lower risk, were not significantly different from dual exposure. As hypothesized, in these two models, higher parent-adolescent attachment predicted a lower likelihood of antisocial behavior: odds ratios (ORs) of 0.55 for felony assault, 0.53 for minor assault, 0.51 for delinquency, and 0.28 for status offenses.

Final analyses (shown in Table 5) included a reestimation of the effects of exposure on all outcomes with the addition of gender and SES as covariates in the model. This was done to control for potential demographic confounds, which might account in part or in full for the exposure effects shown in Tables 3 and 4. Here, the no-exposure group served as the reference category. Results show that SES and gender are significantly related to each tested outcome, with effects in the expected direction. Dual exposure (compared to no exposure) remained predictive of minor assault (OR: 2.39), delinquency (OR: 2.07), and status offenses (OR: 3.43). Child abuse remained significantly predictive only of status offenses (OR: 2.86), although, for minor assault, the findings suggest a higher risk for child abuse only compared to no exposure or domestic violence exposure only. This is also true for domestic violence exposure for both minor assault and status offenses, where results

**Table 3.** Regression Models for Exposure Groups and Youth Outcomes

	Felony Assault (n = 398)				Minor Assault (n = 398)				Delinquency (n = 397)				Status Offenses (n = 398)			
	B		p Value		B		p Value		B		p Value		B		p Value	
	OR		OR		OR		OR		OR		OR		OR		OR	
Dual exposure (reference = no exposure)	0.96	.001	2.61	1.07	.000	2.90	0.89	.005	2.43	1.63	.000	5.11				
Abuse only (reference = no exposure)	0.79	.013	2.19	0.98	.003	2.67	0.90	.009	2.47	1.52	.000	4.57				
DV only (reference = no exposure)	0.59	.047	1.80	0.95	.002	2.58	0.61	.068	1.84	1.16	.002	3.20				
Parent-child attachment (composite score-dichotomized)	-0.60	.022	0.55	-0.64	.019	0.53	-0.67	.026	0.51	-1.26	.000	0.28				
Nagelkerke R <sup>2</sup>													.058	.155		
-2 log likelihood													483.833		408.746	
Log likelihood ratio test ( $\chi^2$ value)													.001		.000	

Note: Reference category is nonexposed youth. OR = odds ratio; DV = domestic violence.

**Table 4.** Regression Models for Exposure Groups and Youth Outcomes

	Felony Assault (n = 398)						Minor Assault (n = 398)						Delinquency (n = 397)						Status Offenses (n = 398)			
	B	p Value	OR	B	p Value	OR	B	p Value	OR	B	p Value	OR	B	p Value	OR	B	p Value	OR	B	p Value	OR	
No exposure (reference = dual exposure)	-0.96	.001	.38	-1.07	.000	.34	-0.89	.005	0.41	-1.63	.000	.20										
Abuse only (reference = dual exposure)	-0.17	.580	.84	-0.09	.790	.92	0.02	.963	1.02	-0.11	.735	.89										
DV only (reference = dual exposure)	-0.37	.207	.69	-0.12	.686	.89	-0.28	.376	0.76	-0.47	.140	.63										
Parent-child attachment (composite score-dichotomized)	-0.60	.022	.55	-0.64	.019	.53	-0.67	.026	0.51	-1.26	.000	.28										
Nagelkerke R <sup>2</sup>			.064			.079			.058			.155										
-2 log likelihood			504.113			483.833			440.573			408.750										
Log likelihood ratio test ( $\chi^2$ value)			.001			.000			.003			.000										

Note: Reference category is youth with dual exposure. OR = odds ratio; DV = domestic violence.

**Table 5.** Regression Models for Exposure Groups and Youth Outcomes With SES and Gender Added as Controls

	Felony Assault (n = 398)				Minor Assault (n = 398)				Delinquency (n = 397)				Status Offenses (n = 398)			
	B	p Value	OR	B	p Value	OR	B	p Value	OR	B	p Value	OR	B	p Value	OR	
SES	-0.85	.000	0.43	-.40	.020	0.67	-0.54	.006	0.59	-0.72	.001	0.49				
Gender	-1.53	.000	0.22	-.95	.000	0.39	-1.74	.000	0.18	-0.82	.002	0.44				
Dual exposure	0.55	.105	1.73	.87	.010	2.39	0.73	.049	2.07	1.23	.001	3.43				
(reference = no exposure)																
Abuse only	0.10	.770	1.11	.62	.082	1.85	0.40	.294	1.50	1.05	.010	2.86				
(reference = no exposure)																
DV only	0.06	.860	1.06	.71	.036	2.04	0.30	.422	1.36	0.72	.068	2.08				
(reference = no exposure)																
Parent-child attachment	-0.30	.304	0.74	-.45	.110	0.64	-0.38	.233	0.68	-1.10	.002	0.33				
(composite score-dichotomized)																
Nagelkerke R <sup>2</sup>	.252				.149			.224			.222					
-2 log likelihood	442.022				461.954			390.759			387.844					
log likelihood ratio test ( $\chi^2$ value)	.000				.000			.000			.000					

Note: Reference category is nonexposed youth. SES = socioeconomic status; OR = odds ratio; DV = domestic violence.

approach significance. After accounting for gender and SES, exposure to domestic violence only significantly increased the odds of minor assault (OR: 2.04) but no other outcome. Finally, when SES and gender are added to the model, the presumed (main effect) protective effects of parent-child attachment in adolescence remain only for status offenses (OR: 0.33). As before, models were rerun with dual exposure as the reference category, although results (not reported) were largely the same.

## **Discussion**

Results of analyses, particularly the comparison of exposure groups on the various scales of attachment, provide some support for the dual-exposure hypothesis, although differences in the risk of outcomes when dual exposure was compared to single exposure were not as evident as the literature might suggest. In fact, risk effects on outcomes in adolescence for the dual and single exposure groups were, by most analysis results, the same. Thus, results reported in this study differ from at least a few earlier studies that found significant increases in the likelihood of negative adolescent outcomes following a combination of abuse and domestic violence exposure (Wolfe et al., 2003). However, regression results do show that, once gender and SES are taken into account, dual exposure (compared to no exposure) is more consistently predictive of youth behavior than are abuse or domestic violence exposure alone. Thus, although dual and single exposure risk effects may not differ enough from each other to be detected in statistical tests, dual exposure does appear to increase risk levels for antisocial behavior to a point that differences between exposure and no exposure are maintained after other all other variables in the model are taken into account.

Having shown that gender and SES account partly for the effects of single exposure on the outcomes of felony assault and delinquency, one conclusion is that these variables are more important predictors. However, more likely is that demographics and co-occurring risk factors work in a synergistic (additive or cumulative) fashion to increase children's vulnerability to later social influences that reinforce, and possibly motivate, antisocial behavior in the adolescent years (Catalano & Hawkins, 1996; Herrenkohl & Herrenkohl, 2007). Although cumulative effect models are beyond the scope of the current study, these models could be tested in future research. With so few longitudinal studies on family violence and additive risk, there remain many unanswered questions about the constellation and sequence of factors most likely to result in developmental problems of adolescence—those examined here and in other studies (English et al., 2005; Herrenkohl et al., 2008).

Although children dually exposed to child abuse and domestic violence appeared less attached to their caregivers in the years following exposure, lower attachment levels for these youth in adolescence do not appear to account for their higher risk of antisocial behavior during adolescence. Yet, in initial models, tests of attachment main effects suggest that being strongly bonded to parents in adolescence may lower the risk of delinquency, assault (violence), and status offenses apart from exposure. Thus, preventing child abuse and domestic violence exposure and improving family attachments in adolescence may independently lessen the risk of antisocial behavior during adolescence. However, building stronger attachments between parents and their adolescent children within violent households may not counter (or buffer) the negative impact of the exposure itself. Unfortunately, as the measure of attachment used in our study is based on questions about parent caregivers in general (as opposed to nonabusive caregivers in particular), results cannot establish whether parent-child attachments are protective for children exposed to violence when these attachments are with a nonabusive nurturing parent. Further refinement of the measures used here (i.e., focused questions on the nature of the parent-child relationship in relation to prior abuse) could provide a clearer understanding of parent-child attachments and their role in protection and resilience of children. One strong possibility is that protective effects of parent-child attachments would become more evident in cases where relationships were known to be free of violence or abuse in the past. It might also be that children's attachments to adults outside the home would have a buffering effect, particularly if there were ongoing violence in the family and caregivers there were unable to provide a child with emotional support and guidance (Aisenberg & Herrenkohl, 2008). Indeed, research elsewhere has shown that having a close bond with a nonabusive caregiver, particularly a maternal caregiver and siblings, can promote resilience and lessen risk for some abused children (Werner, 2005).

Effects of attachment on outcomes may also be influenced by the way scales used in this study were developed and analyzed. For example, our use of a dichotomous measure of attachment in the final series of regression models may impact the sensitivity of the measure and reduce the likelihood that significance will be achieved. Although the coding of this variable may lower the sensitivity of the measure, prior analyses of these and other data in the larger study suggest that similar results are often observed when variables are analyzed as dichotomous and continuous variables (Tajima et al., *in press*). In fact, Farrington and Loeber (2000) and Tajima et al. (*in press*) report that this process of dichotomization typically results in little loss of information (and easier interpretation of results).

Although we were able to differentiate types of violence exposure using longitudinal data, our study is also limited by the fact we did not investigate the chronicity of abuse or exposure to domestic violence, precise age of exposure, or effects of attachment over time (English et al., 2005). Further studies are particularly needed to help establish the interaction of protective influences and chronic violence exposure in children of differing ages. Studies should include methods of differentiating protective effects for unique and overlapping forms of violence within the family. Yet, on the whole, this study helps advance understanding of the dual exposure hypothesis and the role of attachment as a potential moderator of the impact of exposure on antisocial behavior in adolescents.

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### **Notes**

1. Co-occurrence is reflected in the percentage overlap in cases in which children who witnessed domestic violence also directly experienced child abuse.
2. The middle-income nursery group was added later, in 1979-1980, to increase the socioeconomic diversity of the sample.

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## Bios

**Cindy Sousa** is a doctoral student in the School of Social Work at the University of Washington. She holds a MSW from Portland State University and has a MPH with a Certificate in Global Health from the University of Washington. Her work experience includes program provision for and management of peer health education, advocacy, and counseling programs for homeless, immigrant, adjudicated, or underserved youth, adults, and families. Her current areas of research are violence, trauma and resiliency, with a particular focus on the prevention of mental health consequences that result from both chronic and acute stressors.

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**Roy C. Herrenkohl** is a distinguished university service professor emeritus at Lehigh University. He is a member of Lehigh's department of sociology and anthropology. He received his PhD in social psychology in 1966 from New York University and joined the Lehigh faculty in the same year. He was director of Lehigh's Center for Social Research from 1974 to 1990 when he became vice provost for research and dean of graduate studies. In 1996, he returned to full-time teaching and research and retired from teaching in 2006. He has studied and written extensively on the causes and consequences of child maltreatment. Currently, he is codirecting the adult assessment of the Lehigh Longitudinal Study, a prospective study on child maltreatment that began under his directorship in 1976.

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## Longitudinal Study on the Effects of Child Abuse and Children's Exposure to Domestic Violence, Parent-Child Attachments, and Antisocial Behavior in Adolescence

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### Abstract

This study examined the unique and combined effects of child abuse and children's exposure to domestic violence on later attachment to parents and antisocial behavior during adolescence.

Analyses also investigated whether the interaction of exposure and low attachment predicted youth outcomes. Findings suggest that, while youth dually exposed to abuse and domestic violence were less attached to parents in adolescence than those who were not exposed, those who were abused only, and those who were exposed only to domestic violence, the relationship between exposure types and youth outcomes did not differ by level of attachment to parents. However, stronger bonds of attachment to parents in adolescence did appear to predict a lower risk of antisocial behavior independent of exposure status. Preventing child abuse and children's exposure to domestic violence could lessen the risk of antisocial behavior during adolescence, as could strengthening parent-child attachments in adolescence. However, strengthening attachments between parents and children after exposure may not be sufficient to counter the negative impact of earlier violence trauma in children.

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The United States Department of Health and Human Services (USDHHS) reported that in 2007 an estimated 794,000 children were found to have been abused and neglected (U.S. Department of Health and Human Services, 2009). The majority of these substantiated cases were for neglect, although a sizeable number of cases (10.8%) involved physical abuse. Girls and boys are at almost equal risk for child abuse according to the USDHHS report: 51.5% of documented victims in 2007 were female and 48.2% were male. It is estimated

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that 1,760 children died in 2007 from child abuse or neglect, with an overall fatality rate of 2.35 per 100,000 children.

Children's exposure to domestic violence (also called intimate partner violence or IPV) is another public health concern, which, like abuse, is very costly and widespread (Gewirtz & Edleson, 2007; Herrenkohl, Sousa, Tajima, Herrenkohl, & Moylan, 2008; WHO, 2002). The United States Bureau of Justice found nonfatal IPV affected 1 in 320 households, with injuries occurring in just over half of all such cases (U.S. Department of Justice, 2001–2005b). In many households in which IPV occurs, children are present and often witness the physical injuries and emotional pain inflicted on adult victims. Others may not witness the violence directly, but are well aware of violence in the home (Fantuzzo, Boruch, Beriama, Atkins, & Marcus, 1997). The U.S. Department of Justice reports that children were present in homes where IPV occurred in more than a third (35.2%) of all documented cases; in up to an additional 15.5% of cases it was unknown if children were present, so the number is likely substantially higher. A conservative estimate is that over 200,000 children in the U.S. are exposed to domestic violence annually (U.S. Department of Justice, 2001–2005a). Other sources indicate as many as 3 to 18 million children are exposed to IPV in some form (Tajima, Herrenkohl, Moylan, & Derr, in press).

Much has been published on the deleterious effects of child abuse, with established links to later delinquency in youth (Smith & Thornberry, 1995), aggression and violence (Maas, Herrenkohl, & Sousa, 2008; Stouthamer-Loeber, Loeber, Homish, & Wei, 2001), and many other health risk behaviors and emotional problems during adolescence (e.g., school dropout, substance use, sexual risk taking, teenage pregnancy, depression) (Fergusson, Horwood, & Lynskey, 1996; Fergusson & Lynskey, 1997; Herrenkohl, Herrenkohl, Egolf, & Russo, 1998; Widom, 2000; Wolfe, 1999; Wolfe, Scott, Wekerle, & Pittman, 2001).

Although the effects on children of exposure to domestic violence have been less well studied than those of abuse, findings suggest that domestic violence impacts children's development similarly (Edleson, 1999b; Fantuzzo, et al., 1997; Graham-Bermann, 1998; Hughes, 1988; Licher & McCloskey, 2004; Litrownik, Newton, Hunter, English, & Everson, 2003; McCloskey, Figueiredo, & Koss, 1995; McCloskey & Licher, 2003; Moffitt & Caspi, 2003; Sudermann & Jaffe, 1997). As with child abuse, children's exposure to domestic violence can lead to short-and longer term outcomes of internalizing and externalizing behavior problems during adolescence, including delinquency, status offenses, and perpetration of violence (Curie, 2006; Ehrensaft, et al., 2003; Herrenkohl, et al., 2008).

Strong evidence indicates that physical child abuse and exposure to domestic violence often co-occur (Appel & Holden, 1998; Dong, et al., 2004; Edleson, 1999c; Herrenkohl, et al., 2008). Appel and Holden's (1998) review of research found rates of co-occurrence for abuse and domestic violence exposure in the range of 6% – 18% for community samples and around 40% for clinical samples.<sup>1</sup> In Edleson's (1999c) review of research, abuse and domestic violence exposure overlapped in 30% – 60% of all identified cases.

The extent of overlap in child abuse and children's exposure to domestic violence makes it difficult to determine if their longitudinal effects on youth development are distinguishable. Even still, it is surprising how little research has tried to tease out their unique and combined effects, particularly given the range of adverse outcomes known to relate to these forms of early trauma. Additionally, few studies have examined whether abuse and exposure to domestic violence affect boys and girls in the same ways, despite the interest in gender

<sup>1</sup>Co-occurrence is reflected in the percent overlap in cases in which children who witnessed domestic violence also directly experienced child abuse

differences (Edleson, 1999a; Herrenkohl, et al., 2008; Maughan & Cicchetti, 2002; Sternberg, et al., 1993). Possible explanations for the slow progress on co-occurring forms of violence and gender differences are the lack of suitably designed studies (i.e., gender-balanced and longitudinal), poor or insufficient measurement of abuse or domestic violence exposure, and/or the absence of relevant theories and well-developed hypotheses. Yet, to advance knowledge and practice, it is important that research extend to these topics (McCloskey, et al., 1995).

Wolfe et al.'s (2003) meta-analysis of studies on dual exposure found only four studies that adequately documented the developmental impact of dual exposure on children's later development and risk of internalizing and externalizing behaviors. Effect sizes given in this review suggest that children doubly exposed to abuse and domestic violence fare worse (i.e., are at higher risk) than are those not exposed or exposed only to abuse or domestic violence alone. Hughes and colleagues refer to this as a "double whammy" phenomenon (Hughes, Parkinson, & Vargo, 1989). However, some research has found little or no evidence of a double whammy or dual exposure effect. For example, Sternberg et al.'s (1993) study of the impacts of child abuse and domestic violence reported no greater risk of depression or problem behaviors among adolescents who had been abused and exposed to spouse abuse when compared to those with single exposures. Yet, as expected, children exposed to abuse alone or spouse abuse alone were at higher risk of later problems than were children with no history of family violence (Sternberg, et al., 1993). Additionally, Maughan and Cicchetti's (2002) examination of exposure to interadult violence and maltreatment found that, while maltreatment was predictive of poor behavior in children, neither interadult violence alone or in combination with maltreatment resulted in a statistically significant increase of child behavior problems above those of nonexposed peers (Maughan & Cicchetti, 2002). Other studies provide mixed or contrasting findings (Cunningham, 2003; Feerick & Haugaard, 1999; Heyman & Slep, 2002; Shipman, Rossman, & West, 1999).

Whether children are resilient to the effects of child abuse and exposure to domestic violence is an issue of primary interest to researchers and practitioners in the child welfare field (Herrenkohl, et al., 2008). The study of protective factors (factors that promote resilience and buffer risk in children exposed to violence) is crucial to understanding how children overcome, or positively cope in the face of adversity (Masten, 2001). One consideration is whether children doubly exposed to abuse and domestic violence are measurably more vulnerable (i.e., are at higher risk) and less protected from the consequences of exposure when compared to those with single exposure (i.e., abuse or domestic violence). A hypothesis consistent with the double whammy/dual exposure idea is that children will suffer more emotional harm when they see, and simultaneously experience, abuse at the hands of a trusted adult — a compounding trauma of sorts that interferes with children's bonds of attachment to primary caregivers and leads to later social and behavioral deficits (McCloskey, et al., 1995). Indeed, research has shown that children who are exposed to violence in the home are generally less attached to, and receive less support from their caregivers (Levendosky, 2002; Rikhye et al., 2008; Styron & Janoff-Bulman, 1997). In a review of 13 studies on the impact of physical maltreatment and/or neglect of children on the quality of parent-child attachments, Morton and Browne (1998) reported that 76% of all maltreated infants were classified as being insecurely attached (Morton & Browne, 1998).

Bowlby's (1969) theory of attachment emphasizes the foundational role of healthy parent-child relationships and the importance of these relationships for children's healthy development over the long term (Bowlby, 1969). According to Bowlby and other attachment researchers, early (secure) attachments allow children to explore the surrounding environment, to learn skills of engagement, and to develop confidence in their own ability to

thrive independent of others (Davies, 2004). Strong, secure attachments aid in the development of “internal working models” of the self and others that provide a young child with current and future relationship goals and expectancies. It was Ainsworth et al. (1978) who developed a classification schema for measuring and studying the quality of attachment for infants and their caregivers. Initially, Ainsworth et al. described three attachment styles: secure, insecure-avoidant, and insecure ambivalent (Ainsworth, Blehar, Waters, & Wall, 1978). Later, Main and Solomon (1986) added a fourth attachment style, disorganized/disoriented attachment, to account for the large number of children that did not fall neatly into Ainsworth’s original categories (Main, 1986).

Studies have shown very positive outcomes for children with secure attachments. In contrast, children with weak, avoidant, or unhealthy attachment styles typically do less well as they proceed through developmental stages (Bowlby, 1969; Herrenkohl et al., 2008; Rikhye, 2008; Styron & Janoff-Bulman, 1997). Vandro et al. (2008) found that children with insecure attachments at age 1 were at higher risk of conduct problems in the first grade. Using a sixth-grade sample, Eliot and Cornell (2009) found that insecure attachments were associated with aggressive attitudes and both self-reported and peer-nominated measures of bullying (Eliot & Cornell, 2009).

A majority of studies with maltreated samples have focused on attachment styles or qualities during infancy or early childhood. Few have examined parent-child attachment for vulnerable adolescents in relation to one or more hypothesized outcomes. Attachments in adolescence remain important and are predictive of positive youth development (Aceves & Cookston, 2007; Allen, Moore, Kuperminc, & Bell, 1998; Simons, Paternite, & Shore, 2001). Attention to whether strong parent-child attachments provide some protection for youth who earlier experienced abuse and domestic violence in the home is important because attachments formed or carried into adolescence may offer stability at a point youth encounter other risk factors known to promote problem behaviors, such as delinquency and violence (Maas et al., 2008). For example, youth strongly attached or bonded to one or more parents may be less vulnerable to antisocial peer influences, which are known to predict youths’ involvement in delinquency and violence during mid- and late-adolescence (Catalano & Hawkins, 1996).

To study patterns of attachment for adolescents, Armsden and Greenberg (1987) developed the Inventory of Parent and Peer Attachment (IPPA), a 60-item questionnaire that assesses an adolescent’s feelings of trust, communication, and alienation from a parent/caregiver. More trust and communication, and lower scores of alienation translate to stronger overall attachment, as measured by a single, composite measure (for peers and parents separately). In their study, Armsden and Greenberg found that adolescents more securely attached to their parents had higher scores of well-being, including self-esteem and life satisfaction. Insecure attachments to parents, in contrast, were linked to higher scores of adolescent depression, anxiety, and resentment/alienation (Armsden & Greenberg, 1987).

How abuse and children’s exposure to domestic violence affect parent-child attachments during adolescence is unclear. Also unclear is the extent to which dual exposure in childhood weighs more heavily on these later attachments, and whether parent-child attachments during adolescence are at all protective (from antisocial behavior for adolescents) for children who were abused and earlier exposed to violence in the home. There is limited evidence as well of the role of gender as a moderator of children’s exposure to violence in relation to attachment and delinquency (Egeland, Yates, Appleyard, & van Dulmen, 2002; Morton & Browne, 1998; Styron & Janoff Bulman, 1997).

Our study examines the unique and combined effects of child abuse and children's exposure to domestic violence on parent-child attachments and antisocial behavior during adolescence, including violence perpetration, delinquency, and status offenses. We hypothesize that violence exposure will increase antisocial behavior in youth during adolescence. We also hypothesize that effects of exposure will be particularly strong for children who are doubly abused and exposed to domestic violence (dual exposure). Further, we hypothesize that dually exposed children will be least attached to their parents during adolescence and that lower parent-child attachments will increase antisocial behavior among children exposed to violence. Because so few studies have examined gender differences in outcomes of family violence, we examine gender as another possible moderator of exposure (Cullerton-Sen, et al., 2008). Findings in this case are exploratory, with no particular hypothesis about which gender is likely to be more or less vulnerable to the effects of violence exposure. In sum, this study contributes to the research literature by investigating single and dual exposures in children, attachment during adolescence, and possible gender differences in the prediction of antisocial behavior.

## Method

### Sample

Data are from the Lehigh Longitudinal Study (Herrenkohl, Herrenkohl, Egolf, & Wu, 1991; Herrenkohl & Herrenkohl, 2007). The study began in 1976 with children who ranged in age from 18 months to 6 years (4 years of age on average). The average age of primary parent respondents (mainly mothers) was 28. This first wave of the study included 457 children and their parents (totaling 297 families) who were recruited from child welfare programs, Head Start centers and childcare programs in a two-county area of Pennsylvania. Agency staff referred the families from the child welfare programs; the remaining children were recruited from 13 Head Start centers, 12 daycare programs, two programs for handicapped children, three Head Start programs, and eight nursery school programs.<sup>2</sup> The counties were urban/suburban and rural. The original study sample ( $N = 457$ ) was 54% male. The race breakdown is as follows: 80.7% ( $n = 369$ ) White, 11.2% ( $n = 51$ ) more than one race, 5.3% ( $n = 24$ ) Black or African American, 1.3% ( $n = 6$ ) American Indian/Alaska Native, 1.3% ( $n = 6$ ) unknown, 0.2% ( $n = 1$ ) Native Hawaiian or Other Pacific Islander. At the initial assessment, 86% of the families were from two-parent households; 63% of families had incomes below \$700 per month. Parents on average had completed 12 years of schooling.

A second wave of data collection commenced approximately 4 years later when children were in elementary school were on average 8 years of age and parents were in their early 30s (avg. 33). A third assessment followed when children were adolescents, approximately 10 years after the school-age interview. At the time of the adolescent assessment, youth participants were, on average, 18 years of age. Approximately 91% of the original 457 child participants were reassessed in adolescence ( $n = 416$ ).

Tests of the equality of attrition across groups in the adolescent wave of the study showed the percentage lost to attrition varied somewhat: child welfare abuse (13.9%), child welfare neglect (10.5%), Head Start (7.1%), day care (4.7%), and middle income (8.1%), although these percentages overall did not differ significantly ( $\chi^2 > .05$ ). Further tests for comparability in attritors and nonattritors found no significant differences in childhood SES, physically abusive discipline used by parents, or childhood exposure to domestic violence. An assessment of the panel, now adults, is underway, although analyses here are limited to the first three waves of complete data.

<sup>2</sup>The middle-income nursery group was added later, in 1979–1980, to increase the socioeconomic diversity of the sample.

## Measures

The dichotomous child abuse variable used in this analysis consists of information gathered about severe physical disciplining from three different data sources: (a) official records of substantiated abuse cases, (b) mothers' reports of their disciplining of their preschool and school-age children, and (c) adolescents' retrospective reports of those same discipline practices used by mothers (Herrenkohl, Tajima, Whitney, & Huang, 2005). Behaviors assessed with self-reports from mothers and adolescents were biting a child; slapping a child so as to bruise; hitting a child with a stick, paddle or other hard object; or hitting a child with a strap, rope or belt. Those who were disciplined with two or more severe physical discipline practices were considered maltreated according to the self-report measure. A threshold of two or more incidents was set to eliminate isolated cases of severe physical discipline from an otherwise nonabusive parent. Individuals for whom there was agreement on the prospective parent report and retrospective adolescent reports were added to those identified as abuse victims using official records. Official record reports were used as the benchmark criterion because the severity and chronicity of the abuse leading to the filing of those reports were considered sufficient by themselves to warrant an abuse classification in our scoring. The procedure used to combine the three data sources allowed us to take advantage of the information each provides within a single measured construct, although it is unclear whether combining data sources on child abuse necessarily improves the prediction of adolescent outcomes (Smith, Ireland, Thornberry, & Elwyn, 2008). By requiring evidence of abuse on both the prospective and retrospective self-report measures before identifying a child as a victim of abuse, we aimed to lessen the potential measurement bias that might be introduced by one or the other source (Herrenkohl, et al., 2005; Tajima, Herrenkohl, Huang, & Whitney, 2004). In addition, requiring cross-informant agreement increases the likelihood that violence exposure did occur. Although this may underestimate the number of exposed children, we can be more certain that those who are included are not falsely classified. This produced 174 subjects that had experienced child abuse (42% of the analysis sample of 416). Agreement in the data sources on abuse cases was moderate (about 50% or cases cross-classified), which is consistent with other studies (Smith, et al., 2008).

The dichotomous domestic violence exposure variable includes three types of moderately severe abusive behavior by either parent: physical violence (hit, punch, kick), threats to do physical harm, and breaking things. The measure of domestic violence exposure combines reports from parents during the preschool assessment and adolescents' retrospective reports. Again, to take advantage of various data sources and to limit potential indicator bias, we required agreement between prospective parent and retrospective adolescent self-reports. In cases where parental reports and adolescent reports differed in their responses about whether domestic violence behaviors had occurred, the case was coded conservatively (i.e., no exposure), except in cases where information about domestic violence was missing in one source, where the existing data source was used as a single indicator of violence exposure. These procedures resulted in 197 cases classified as having been exposed to domestic violence (47% of the analysis sample).

Using the dichotomous child abuse and domestic violence exposure variables, the sample was then split into four mutually exclusive groups: (a) no violence exposure group (identified as no exposure in the tables) ( $n = 134$ , 32% of the analysis sample); (b) domestic violence exposure only group (DV only) ( $n = 96$ , 23% on the analysis sample); (c) child abuse only group (CA only) ( $n = 73$ , 18% of the analysis sample); and (d) exposure to domestic violence and child abuse group (dual exposure) ( $n = 101$ , 24% of the analysis sample).

**Parent-child attachment**—The outcome variables used in the analysis are from Armsden and Greenberg's Inventory of Parent and Peer Attachment (1987). This scale, administered in the adolescent wave of the study, consists of three subscales: parent-child communication, trust, and alienation. Answers are scored with a 5-point Likert scale that ranges from (1) almost never to never, to (5) almost always or always. Scores were computed by adding the 1 – 5 scores for all items. Questions ask about “parents” as a unit. Communication has a range of 8 – 40, with higher scores representing stronger communication between parent and child. Items include: “I like to get my parents’ point of view on things I’m concerned about,” “I feel like it’s no use letting my feelings show,” and “My parents sense when I’m upset about something.” ( $\alpha=.87$ ). Trust has a range of 9 – 45, with higher scores representing more trust and understanding. Items include: “My parents respect my feelings,” “I feel my parents are successful as parents,” and “My parents trust my judgment” ( $\alpha=.91$ ). Alienation has a range of 11 – 55, with higher scores indicating increased alienation. Items include: “I have to rely on myself when I have a problem to solve,” “Talking over my problems with my parents makes me feel ashamed or foolish,” and “I don’t get much attention at home.” ( $\alpha=.86$ ) We also constructed a composite measure of parent-child attachment for use in our logistic regression models, as suggested by Armsden and Greenberg (1987), due to high intercorrelation among subscales. To make the composite measure, scores on the alienation subscale are subtracted from the sum of trust and communication. Our composite attachment scores ranged from –38 to 73. For the final stage of our data analysis, we dichotomized the composite variable to differentiate between those with particularly high attachment scores (the top 25%) and all others.

**Antisocial Behavior**—Self-reported outcomes of felony assault, minor assault, general delinquency, and status offenses were measured in the adolescent wave of the study. Each outcome is a measure of count of types of offenses. Each is a composite of several indicator variables. For each outcome, scores were again dichotomized to differentiate those in the top 25% (coded 1) of the distribution from those in the remaining 75% (coded 0), using a method similar to that of Farrington and Loeber (2000). This method allows the researcher to differentiate between low and higher frequency (or variety) offending, analyzed dichotomously to ascertain the relative probability of offending over nonoffending. In some cases the distribution of scores did not allow a cut point at precisely the 75<sup>th</sup> percentile. Here, we recoded the variable as near to that cut point as possible. We have used a similar approach in other analyses of these data and have found few differences in tested outcomes when variables are analyzed as categories or continuous scores (Tajima, et al., 2004).

Felony assault includes being in a gang fight; hitting someone other than parents, brothers, sisters, or persons at work; having the idea of seriously hurting or killing this person; and trying to have or having had sexual relations with someone against her/his will. Minor assault includes hitting or threatening to hit a parent, supervisor, coworker, or other person. Status offenses include running away from home, being absent from school for more than a day without an excuse, drinking alcohol, and getting suspended. Delinquency includes theft, disorderly conduct, and other related behaviors.

*Gender* of adolescent participants (male = 1 or female = 0) was included in our final model to control for possible outcome differences for males and females. *SES* was also included as a control variable in our final model. *SES* is a continuous-level composite variable that is based on indicators of family income during the preschool period, mother’s occupational status and education level, and total number of rooms in a family’s house.

## Analysis

We first examined whether patterns in the data are consistent with the hypothesis that children exposed to both abuse and domestic violence have worse outcomes in adolescence than children exposed to only one (or none) of these behaviors. Cross tabulations compared percentages on each outcome for each of the exposure groups (no exposure, DV only, CA only, and dual exposure). The next step in the analysis, a series of three-way analysis of variance (ANOVA) models, assessed the association between exposure types and the three subscales of parent-child attachment, as well as an overall parent-child attachment composite that combined the three subscales. The analysis examined interactions of gender and attachment to determine whether males and females differ with respect to exposure effects.

Finally, we conducted a series of regression models to examine the association between exposure type and the adolescent outcomes, as well as interactions of exposure and parent-child attachment in adolescence. We used only the composite measure of attachment (dichotomized to reflect high versus low attachment) to examine possible interaction effects. Analyses were run two times, once with the nonexposed group as the reference category and a second time with the dual exposure group as the reference group. Gender and SES were added as control variables in a final test of the model to determine whether the effects of exposure are maintained when these other known predictors of antisocial behavior are taken into account.

## Results

Table 1 contains the results of the initial cross tabulations of exposure types (no exposure, exposure to domestic violence only, child abuse only, and dual exposure) and measures of antisocial behaviors in adolescence. Findings show that more youth with dual exposure engaged in antisocial behavior during adolescence than those who were not exposed, exposed only to domestic violence, or abused only. For example, 47.5% of dually exposed youth engaged in felony assault as compared to 41.7% who were only exposed to abuse, 36.8% who were only exposed to DV, and 24.8% who were in the no exposure group. Effects overall of exposure group are significant but modest (phi coefficients of .16–.26,  $p < .05$ ).

Table 2 shows the results of a three-way analysis of variance (ANOVA) model. Test statistics are shown for the main effects of exposure type and gender. Probability values for gender-by-exposure-group interactions are also provided. On the right side of the table are group means of the attachment subscales (communication, alienation, and trust) and the composite attachment scale that combines the subscales for each abuse exposure grouping: no exposure (subscript a), DV only (subscript b), abuse only (subscript c), and dual exposure (subscript d). Subscripts of the attachment scale means shown in the four columns reflect significant differences in Bonferroni tests of group means for each scale.

As shown in Table 2, for the attachment subscale of communication, youth in the no exposure group (subscript a) differed from those in the dual exposure group (subscript d). Those in the child abuse only (CA) group (subscript c) also differed from youth in the dual exposure group. However, the child abuse only and domestic violence only (DV) groups did not significantly differ on communication (nor did they differ on the remaining attachment subscales or the overall composite measure). For alienation, the pattern was the same: means for the no exposure and CA groups were significantly lower than that of the dual exposure group. For trust, the pattern was also similar, although the DV group differed on this subscale significantly from the dual exposure group. Finally, for the overall attachment composite measure, the no exposure and CA groups differed from the dual exposure group.

However, the no exposure and DV only groups did not differ. Means of the DV only and CA only groups were also statistically indistinguishable.

Table 2 also shows tests of gender and gender-by-exposure-group interactions. For communication and the overall attachment scale, gender was a significant main effect predictor, with males reporting lower attachment than females. Tests of group-by-gender interactions were nonsignificant ( $p$ -values  $> .05$  in each case), although for the subscale of trust, the interaction term approached statistical significance ( $p < .10$ ). Effect sizes are shown in Table 2 using  $\eta^2$ . Effect sizes are modest, although for exposure group status,  $\eta^2$  is somewhat larger (.04–.07).

As shown in Table 3, in all regression models dual exposure increased over nonexposure the odds of antisocial behavior (for felony assault, minor assault, delinquency, and status offenses). The odds of felony assault for dual exposure compared to no exposure were 2.61 times greater. For minor assault, the odds were 2.90 times greater. For delinquency, the odds were 2.43 times greater. For status offenses, odds for dual exposure compared no exposure were 5.11 times greater.

Higher odds of violence and delinquency were also shown for single forms of exposure compared to no exposure. For abuse only, the odds of felony assault were 2.19 times greater than no exposure; for minor assault, the odds were 2.67 times greater, for delinquency, 2.47 times greater, and for status offenses, 4.57 times greater. For the domestic violence only group (compared to no exposure), the odds of felony assault were 1.8 times greater, 2.58 times greater for minor assault, 1.84 times greater for delinquency, and 3.20 times greater for status offenses.

Table 4 shows the results of these same models re-estimated with dual exposure as the reference group in order to more precisely test our dual exposure hypothesis. Consistent with the results of Table 3, abuse alone and domestic violence exposure alone, although trending toward lower risk, were not significantly different from dual exposure. As hypothesized, in these two models, higher parent-adolescent attachment predicted a lower likelihood of antisocial behavior: ORs of .55 for felony assault, .53 for minor assault, .51 for delinquency, and .28 for status offenses.

Final analyses (shown in Table 5) included a re-estimation of the effects of exposure on all outcomes with the addition of gender and SES as covariates in the model. This was done to control for potential demographic confounds which might account in part or in full for the exposure effects shown in Tables 3 and 4. Here, the no exposure group served as the reference category. Results show that SES and gender are significantly related to each tested outcome, with effects in the expected direction. Dual exposure (compared to no exposure) remained predictive of minor assault (OR: 2.39), delinquency (OR: 2.07), and status offenses (OR: 3.43). Child abuse remained significantly predictive only of status offenses (OR: 2.86), although, for minor assault, the findings suggest a higher risk for child abuse only compared to no exposure or domestic violence exposure only. This is also true for domestic violence exposure for both minor assault and status offenses, where results approach significance. After accounting for gender and SES, exposure to domestic violence only significantly increased the odds of minor assault (OR: 2.04), but no other outcome. Finally, when SES and gender are added to the model, the presumed (main effect) protective effects of parent-child attachment in adolescence remain only for status offenses (OR: .33). As before, models were rerun with the dual exposure as the reference category, although results (not reported) were largely the same.

## Discussion

Results of analyses, particularly the comparison of exposure groups on the various scales of attachment, provide some support for the dual exposure hypothesis, although differences in the risk of outcomes when dual exposure was compared to single exposure were not as evident as the literature might suggest. In fact, risk effects on outcomes in adolescence for the dual and single exposure groups were, by most analysis results, the same. Thus, results reported in this study differ from at least a few earlier studies that found significant increases in the likelihood of negative adolescent outcomes following a combination of abuse and domestic violence exposure (Wolfe, et al., 2003). However, regression results do show that, once gender and SES are taken into account, dual exposure (compared to no exposure) is more consistently predictive of youth behavior than are abuse or domestic violence exposure alone. Thus, while dual and single exposure risk effects may not differ enough from each other to be detected in statistical tests, dual exposure does appear to increase risk levels for antisocial behavior to a point that differences between exposure and no exposure are maintained after other all other variables in the model are taken into account.

Having shown that gender and SES account partly for the effects of single exposure on the outcomes of felony assault and delinquency, one conclusion is that these variables are more important predictors. However, more likely is that demographics and co-occurring risk factors work in a synergistic (additive or cumulative) fashion to increase children's vulnerability to later social influences that reinforce, and possibly motivate, antisocial behavior in the adolescent years (Catalano & Hawkins, 1996; Herrenkohl & Herrenkohl, 2007). Although cumulative effect models are beyond the scope of the current study, these models could be tested in future research. With so few longitudinal studies on family violence and additive risk, there remain many unanswered questions about the constellation and sequence of factors most likely to result in developmental problems of adolescence -- those examined here and in other studies (English, et al., 2005; Herrenkohl, et al., 2008).

While children dually exposed to child abuse and domestic violence appeared less attached to their caregivers in the years following exposure, lower attachment levels for these youth in adolescence do not appear to account for their higher risk of antisocial behavior during adolescence. Yet, in initial models, tests of attachment main effects suggest that being strongly bonded to parents in adolescence may lower the risk of delinquency, assault (violence), and status offenses apart from exposure. Thus, preventing child abuse and domestic violence exposure and improving family attachments in adolescence may independently lessen the risk of antisocial behavior during adolescence. However, building stronger attachments between parents and their adolescent children within violent households may not counter (or buffer) the negative impact of the exposure itself. Unfortunately, since the measure of attachment used in our study is based on questions about parent caregivers in general (as opposed to nonabusive caregivers in particular), results cannot establish whether parent-child attachments are protective for children exposed to violence when these attachments are with a nonabusive nurturing parent. Further refinement of the measures used here (i.e., focused questions on the nature of the parent-child relationship in relation to prior abuse) could provide a clearer understanding of parent-child attachments and their role in protection and resilience of children. One strong possibility is that protective effects of parent-child attachments would become more evident in cases where relationships were known to be free of violence or abuse in the past. It might also be that children's attachments to adults outside the home would have a buffering effect, particularly if there were ongoing violence in the family and caregivers there were unable to provide a child emotional support and guidance (Aisenberg & Herrenkohl, 2008). Indeed, research elsewhere has shown that having a close bond with a nonabusive caregiver,

particularly a maternal caregiver and siblings, can promote resilience and lessen risk for some abused children (Werner, 2005).

Effects of attachment on outcomes may also be influenced by the way scales used in this study were developed and analyzed. For example, our use of a dichotomous measure of attachment in the final series of regression models may impact the sensitivity of the measure and reduce the likelihood that significance will be achieved. Although the coding of this variable may lower the sensitivity of the measure, prior analyses of these and other data in the larger study suggest that similar results are often observed when variables are analyzed as dichotomous and continuous variables (Tajima, et al., in press). In fact, Farrington and Loeber (2000) and Tajima et al. (in press) report that this process of dichotomization typically results in little loss of information (and easier interpretation of results).

While we were able to differentiate types of violence exposure using longitudinal data, our study is also limited by the fact we did not investigate the chronicity of abuse or exposure to domestic violence, precise age of exposure, or effects of attachment over time (English, et al., 2005). Further studies are particularly needed to help establish the interaction of protective influences and chronic violence exposure in children of differing ages. Studies should include methods of differentiating protective effects for unique and overlapping forms of violence within the family. Yet, on the whole, this study helps advance understanding of the dual exposure hypothesis and the role of attachment as a potential moderator of the impact of exposure on antisocial behavior in adolescents.

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Percent of Respondents in Each Exposure Group Reporting Antisocial Behavior in Adolescence

	No exposure <i>n</i> = 134	DV only <i>n</i> = 96	CA only <i>n</i> = 73	Dual exposure <i>n</i> = 101	$\chi^2$	<i>phi</i>
Felony assault	24.8%	36.8%	41.7%	47.5%	13.98	.19
Minor assault	20.1%	37.9%	38.9%	42.6%	16.25	.20
Status offenses	10.4%	26.3%	33.3%	38.6%	27.57	.26
Delinquent behavior	16.5%	26.3%	32.4%	33.7%	10.78	.16

Note: Chi-square tests of differences in group prevalences were significant for all outcomes ( $p < .05$ ). Average analysis sample for each chi-square comparison is 401 after accounting for missing data.  
Percentages are within-group totals for each outcome.

DV = Domestic Violence; CA = Child Abuse

Test Statistics and Means for Comparisons on Subscales of Parent-child Attachment

Attachment score	Exposure group main effect	Gender main effect	Gender × group interaction effect	Type of Abuse Exposure			
				No exposure	DV only	CA only	Dual exposure
				a	b	c	d
Communication	F(3, 392)=5.94, $p < .01 \eta^2 = .042$	F(1, 392)=8.64, $p < .01 \eta^2 = .008$	F(3, 392)=1.18, $p > .05 \eta^2 = .011$	28.27 <sub>d</sub>	26.90	27.94 <sub>d</sub>	24.51 <sub>a,c</sub>
Alienation	F(3, 392)=6.30, $p < .001 \eta^2 = .047$	F(1, 392)=1.57, $p > .05 \eta^2 = .004$	F(3, 392)=1.51, $p > .05 \eta^2 = .016$	27.34 <sub>d</sub>	29.29	27.81 <sub>d</sub>	32.19 <sub>a,c</sub>
Trust	F(3, 392)=10.01, $p < .001 \eta^2 = .070$	F(1, 392)=.76, $p > .05 \eta^2 = .002$	F(3, 392)=2.61, $p > .05 \eta^2 = .016$	35.12 <sub>d</sub>	33.87 <sub>d</sub>	34.20 <sub>d</sub>	29.64 <sub>a,b,c</sub>
Parent attachment-composite score	F(3, 392)=7.66, $p < .001 \eta^2 = .054$	F(1, 392)=4.27, $p < .05 \eta^2 = .010$	F(4, 392)=1.80, $p > .05 \eta^2 = .013$	36.75 <sub>d</sub>	32.63	34.49 <sub>d</sub>	25.05 <sub>a,c</sub>

Note: Subscripts correspond to significant differences in group means ( $p < .05$ ) using Bonferroni tests.

DV = Domestic Violence; CA = Child Abuse

Regression Models for Exposure Groups and Youth Outcomes (reference category is nonexposed youth)

**Table 3**

	Felony assault (N=398)				Minor assault (N=398)				Delinquency (N=397)				Status offenses (N=398)			
	B	P-value	OR	B	P-value	OR	B	P-value	OR	B	P-value	OR	B	P-value	OR	
Dual exposure (ref = no exposure)	.96	.001	2.61	1.07	.000	2.90	.89	.005	2.43	1.63	.000	5.11				
Abuse only (ref = no exposure)	.79	.013	2.19	0.98	.003	2.67	.90	.009	2.47	1.52	.000	4.57				
DV only (ref = no exposure)	.59	.047	1.80	0.95	.002	2.58	.61	.068	1.84	1.16	.002	3.20				
Parent-child attachment (composite score-dichotomized)	-.60	.022	0.55	-0.64	.019	0.53	-.67	.026	0.51	-1.26	.000	0.28				
Nagelkerke R <sup>2</sup>		.064			.079			.058				.155				
-2 Log likelihood		504.113			483.833			440.573				408.746				
log-likelihood ratio test ( $\chi^2$ - value)		.001			.000			.003				.000				

DV = Domestic Violence

**Table 4**

Regression Models for Exposure Groups and Youth Outcomes (reference category is youth with dual exposure)

	Felony assault (N=398)				Minor assault (N=398)				Delinquency (N=397)				Status offenses (N=398)			
	B	P-value	OR	B	P-value	OR	B	P-value	OR	B	P-value	OR	B	P-value	OR	
No exposure (ref = dual exposure)	-.96	.001	.38	-1.07	.000	.34	-.89	.005	0.41	-1.63	.000	.20				
Abuse only (ref = dual exposure)	-.17	.580	.84	-0.09	.790	.92	.02	.963	1.02	-0.11	.735	.89				
DV only (ref = dual exposure)	-.37	.207	.69	-0.12	.686	.89	-.28	.376	0.76	-0.47	.140	.63				
Parent-child attachment (composite score-dichotomized)	-.60	.022	.55	-0.64	.019	.53	-0.67	.026	0.51	-1.26	.000	.28				
Nagelkerke R <sup>2</sup>			.064		.079			.058			.155					
-2 Log likelihood			.504.113		483.833			440.573			408.75					
log-likelihood ratio test ( $\chi^2$ -value)			.001		.000			.003			.000					

DV = Domestic Violence

**Table 5**

Regression Models for Exposure Groups and Youth Outcomes with SES and Gender Added as Controls (reference category is nonexposed youth)

	Felony assault (N=398)				Minor assault (N=398)				Delinquency (N=397)				Status offenses (N=398)			
	B	P-value	OR	B	P-value	OR	B	P-value	OR	B	P-value	OR	B	P-value	OR	
SES	-0.85	.000	0.43	-.40	.020	0.67	-0.54	.006	0.59	-0.72	.001	0.49				
Gender	-1.53	.000	0.22	-.95	.000	0.39	-1.74	.000	0.18	-0.82	.002	0.44				
Dual exposure (ref = no exposure)	0.55	.105	1.73	.87	.010	2.39	0.73	.049	2.07	1.23	.001	3.43				
Abuse only (ref = no exposure)	0.10	.770	1.11	.62	.082	1.85	0.40	.294	1.50	1.05	.010	2.86				
DV only (ref = no exposure)	0.06	.860	1.06	.71	.036	2.04	0.30	.422	1.36	0.72	.068	2.08				
Parent-child attachment (composite score-dichotomized)	-0.30	.304	0.74	-.45	.110	0.64	-0.38	.233	0.68	-1.10	.002	0.33				
Nagelkerke R <sup>2</sup>	.252			.149			.224				.222					
-2 Log likelihood	442.022			461.954			390.759									
log-likelihood ratio test ( $\chi^2$ -value)	.000			.000			.000				.000					

DV = Domestic Violence

# Temperament, environment, and antisocial behavior in a population sample of preadolescent boys and girls

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Antisocial behavior can be triggered by negative social experiences and individuals' processing of these experiences. This study focuses on risk-buffering interactions between temperament, perceived parenting, socio-economic status (SES), and sex in relation to antisocial behavior in a Dutch population sample of preadolescents ( $N = 2230$ ). Perceived parenting (overprotection, rejection, emotional warmth) was assessed by the EMBU (a Swedish acronym for My Memories of Upbringing) for children, temperament (effortful control and frustration) by the parent version of the Early Adolescent Temperament Questionnaire-Revised, SES by information on parental education, occupation, and income, and antisocial behavior by the Child Behavior Checklist (parent report) and the Youth Self-Report (child report). All parenting and temperament factors were significantly associated with antisocial behavior. The strongest risk-buffering interactions were found for SES which was only related to antisocial behavior among children with a low level of effortful control or a high level of frustration. Furthermore, the associations of SES with antisocial behavior were more negative for boys than for girls. Thus, the effects of SES depend on both the temperament and sex of the child.

**Keywords:** antisocial behavior; childrearing practices; preadolescence; sex differences; socio-economic status; temperament

## Introduction

For the study of antisocial behavior of children and adolescents, both temperament and parenting have been shown to be important. Central to investigations that frame only main effects of temperament and parenting is the notion that children are similarly affected by the same parenting experiences. Contextual theorists (Bronfenbrenner & Morris, 1998) have argued that such a frame is incomplete. Environmental factors may vary in their developmental influence as a function of attributes of the child. Research has also shown that how parents rear their children is partially shaped by the parents' own characteristics and partially by the characteristics of the children that they bring up. Thus, a difficult temperament does not necessarily lead to antisocial behavior by itself; it does so in conjunction with particular environments (Bates, Dodge, Pettit, & Ridge, 1998; Collins, Maccoby, Steinberg, Hetherington, & Bornstein, 2000; Maccoby, 2000). Thomas and Chess (1977) called this a goodness of fit between an individual's temperament and the expectations and resources of specific contexts. Others talked about "risk-buffering" effects with regard to temperament-by-environment interactions (for example Belsky, Hsieh, & Crnic [1998]). The current study deals with such risk-buffering effects for pre-

adolescents on antisocial behavior, and the following paragraphs will explain why we believe such a study is necessary.

The home environment of children, with as important indicators the parenting style and the socio-economic status, has a profound impact on the development of children (Maccoby, 2000). It has been suggested that research that focuses on the interaction effects of parenting and child temperament might do more justice to the complexity of child development (Hinde, 1989; Magnusson & Stattin, 1998). Important recent studies on temperament-by-parenting interactions have been done by, amongst others, Kochanska (1995, 1997) and Belsky, Hsieh, and Crnic (1998). For example, Kochanska (1995, 1997) studied the development of conscience in young children, and discovered that for shy, temperamentally-fearful children, parental power-assertion does not appear to promote conscience development. Gentler techniques are called for with such slow-to-warm-up children. But with bold assertive children, effective parenting involves firmness, along with maternal responsiveness and the formation of a close emotional bond with the child. Belsky et al. (1998) concluded that children with a difficult temperament are most susceptible to parenting practices. Bates et al. (1998) investigated the interaction effect of the child's temperamental resistance to control and parents' restrictive control at an

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early age on externalizing behavior at ages 7 to 11 years. A robust finding was that early resistance to control predicted later externalizing behavior better when the mother had been relatively low in control actions, which fits with Kochanska's (1995, 1997) findings for toddlers. Given high resistance to control, the risk of later externalizing behavior by the child seems to be buffered by high control actions by the mother. Most research on such temperament-by-environment interactions has been done with toddlers and young children, and the question is whether and to what extent we can generalize the results of such studies to late childhood or adolescence.

There are a number of studies that have examined temperament-by-environment interactions in late childhood or adolescence and it is worthwhile having a look at their results. For example, Stice and Gonzales (1998) found in a sample of 631 adolescents aged 16–19 years that temperament interacted with perceived parenting in their effects on antisocial behavior. Effective parenting (i.e., maternal control) was most important for youths that were temperamentally at risk (i.e., high on behavioral undercontrol). They argued that because youth who evidence behavioral undercontrol show more variability in problem behaviors, parenting may have a greater opportunity to operate. Furthermore, Stice and Gonzales (1998) reasoned that adolescents who are behaviorally controlled are unlikely to evidence problem behaviors, regardless of the parenting they experience.

Consistently, other studies found that ineffective parenting was least harmful for youths that were not temperamentally at risk. For example, Wills, Sandy, Yaeger, and Shinar (2001) found in a sample of 1810 participants (mean age 11.5 years at the baseline) that the impact of parental risk factors, i.e. parent-child conflict and parental tobacco and alcohol use, on adolescent substance abuse decreased with higher task attention (focusing on tasks and persisting until finished) and positive emotionality (generally being in a cheerful mood and smiling frequently) of the preadolescent. Wills et al. (2001) argue that these temperamental factors promote adaptation through reducing reactivity to aversive stimuli, a resilience effect. Wills and Dishion (2004) say that, for example, the emergence of good self-control can serve as a resilience factor. Maziade et al. (1990) found that only the combination of difficult temperament and dysfunctional parenting (in particular inadequate behavioral control) in childhood was associated with an increased risk of developing psychiatric disorders in adolescence. Van Leeuwen, Mervielde, Braet, and Bosmans (2004) utilized data from a 3-year longitudinal study of 600 children (aged 7 to 15 at the baseline). They found that negative parental control was more related to externalizing behavior for undercontrollers (i.e., low on conscientiousness and benevolence and around the mean on imagination, extraversion, and emotional stability) than for resilients (i.e., high on imagination, conscientiousness, extraversion, benevolence, and emotional stability). Similar results have been found with young children (Rubin, Hastings, Chen, Stewart, & McNichol, 1998; Shaw et al., 1998). Sanson, Hemphill, and Smart (2004) concluded that the combination of irritable, difficult child temperament with poor, especially punitive, parenting adds to the prediction of antisocial behavior beyond their independent effects.

Most of the studies on temperament-by-environment interactions concerning preadolescents or adolescents have focused on parental control as environmental factor. This still leaves us with the question of whether the temperament-by-environment

interactions for externalizing behavior can also be found for other environments than parental control in adolescence. An answer to this question would be an important further step in the investigation of temperament-by-environment interactions and the present study is dedicated to this task. In our study, we will focus on preadolescent boys and girls (around age 11) and three parental environments (as perceived by the child) that have been found to have important direct effects on anti-social behavior: rejection, overprotection, and emotional warmth. A meta-analysis of Loeber and Stouthamer-Loeber (1986) has shown that not only lack of parental control but also parental rejection and parent-child involvement (i.e. emotional warmth) are powerful predictors of antisocial behavior of children and adolescents. Overprotection was not included in the meta-analysis of Loeber and Stouthamer-Loeber (1986). However, strong associations between overprotection and antisocial behavior have been found in recent cross-sectional and longitudinal research (Mak, 1994; Pedersen, 2000).

## The study

To do more justice to the complexity of child development (Hinde, 1989; Magnusson & Stattin, 1998), we focus not only on main effects of sex, temperament, and environment but also on risk-buffering interactions between temperament and environment in relation to antisocial behavior. We define anti-social behavior as behavior that inflicts physical or mental harm or property loss or damage on others. It is behavior that intends to lower the well-being of other persons that may or may not constitute the breaking of criminal laws (Coie & Dodge, 1998; Loeber & Schmalong, 1985; Rutter, Giller, & Hagell, 1998). It is a problem behavior that is at the forefront of current concerns about youths (Loeber, Farrington, Stouthamer-Loeber, & Van Kammen, 1998).

## Environment

We will make use of perceived parenting rather than observed or parent-reported parenting. There is a good reason for this. Research shows that children are influenced by the rearing behavior of their parents through their mental representations of this behavior (Main, Kaplan, & Cassidy, 1985; Steinberg, Lamborn, Dornbusch, & Darling, 1992). Therefore, when investigating the role of parental practices, it is important to capture the child's perception of the upbringing.

The choice of perceived parenting styles included in our study has been inspired by the fact that several studies have found them to be strongly linked to antisocial behavior. It has been found that *perceived rejection* (characterized by hostility, punishment, derogation, and blaming of subject), and *perceived overprotection* (characterized by fearfulness and anxiety for the child's safety, guilt engendering, and intrusiveness) are both positively linked, whereas *perceived emotional warmth* (characterized by affection, attention, and support) is negatively linked to antisocial behavior (Bugental & Goodnow, 1998; Carlo, Roesch, & Melby, 1998; Dekovic, Janssens, & Van As, 2003; Farrington, 1990; Loeber & Stouthamer-Loeber, 1986).

In addition to the three perceived parental environments, we will also consider SES of the parents as an (objective) environment of the child. SES is a proxy for a number of important

aspects of parenting, and to our knowledge it has not yet been studied in interaction with temperament for preadolescents. SES has proven to be an important proxy for effects of social, cultural, and financial capital on child development that cannot easily be unpacked into factors such as parenting styles (Bradley & Corwyn, 2002). Duncan, Yeung, Brooks-Gunn, and Smith (1998) made clear that socioeconomic conditions in childhood have a big impact on the life chances of children. Heimer (1997) found that lower SES-youths were more likely than higher SES-youths to engage in violent delinquency. Dodge, Pettit, and Bates (1994) also found a relation of low SES to children's problem behavior, and Pinderhughes, Bates, Dodge, Pettit, and Zelli (2000) argue that lower SES parents have fewer cultural and educational resources to deal with children's problem behavior. Researchers also point to the impact of other SES aspects, i.e. occupational level and income (Beyers, Bates, Pettit, & Dodge, 2003; Farrington, 1990; Rutter et al., 1998). For example, the higher the occupational level of parents the higher their autonomy. This autonomy is related to other characteristics of the family, such as the lifestyle, the parenting style, and the aspirations of themselves and their children. Parents with a high occupational level educate their children more authoritatively, whereas parents with a low occupational level educate their children more restrictively (Kessler, Price, & Wortman, 1985; Kohn & Schooler, 1978, 1982). Thus, SES can be seen as a proxy for the human, cultural, and financial capital of a family that will not quite be made superfluous by parenting style.

### *Temperament*

We have focused on two temperamental aspects – effortful control and frustration. Effortful control, denoting the ability to regulate attention and behavior, is believed to make major contributions to social development (Kochanska, Murray, & Harlan, 2000). Children with low effortful control are less likely to consider the possible consequences of their actions, especially consequences that are likely to be long-delayed. The inability to restrain undesirable, hedonic urges is positively associated with antisocial behavior (Caspi et al., 1995; Rothbart & Putnam, 2002; Sanson et al., 2004; Wills & Dishion, 2004). Frustration is a temperament feature characterized by negative affect related to goal blocking or an interruption of ongoing tasks. In other words, children with a high level of frustration react strongly and aversively to obstacles that prevent them from doing what they want. Frustration has been found to affect antisocial behavior positively (Caspi et al., 1994). A low level of frustration may be protective, leading to resilience (Sanson et al., 2004).

### *Potential confounders*

Interpretation of associations between family circumstances and (risk factors for) antisocial behavior is hampered by potential confounders, including sex (Moffitt, Caspi, Rutter, & Silva, 2001) and genetic disposition (Heath, Neale, Kessler, Eaves, & Kendler, 1992; Molenaar, Boomsma, & Dolan, 1993).

Genetic risk factors may have a (direct) effect on both temperament and antisocial behavior, which could mean that observed associations between the two are spurious. In addition, the effect of genetic risk can be indirect, through gene-environment correlations. In other words, what seems to

be the effect of poor parenting behavior may actually be the effect of susceptibility genes, or vice versa (Kendler et al., 1995; Plomin, 1995; Rutter, 2002). To assess possible confounding, we included a proxy of genetic risk, that is, an index of familial externalizing psychopathology, in the analyses.

### Hypotheses

Our first three hypotheses to be tested are straightforward. For the environment and temperament variables and for sex, we expect to replicate the direct effects on antisocial behavior already found in the literature. Thus, our *environment hypotheses* are that rejection and overprotection will be positively associated with antisocial behavior and that emotional warmth and SES will be negatively associated with antisocial behavior.

For temperament, we also expect to replicate the direct effects on antisocial behavior found in the literature. Thus, our *temperament hypotheses* are that effortful control will be negatively and frustration positively associated with antisocial behavior.

The activity level and the tendency to approach novel situations is higher for boys than for girls (Oldehinkel, Hartman, De Winter, Veenstra, & Ormel, 2004). Compared to girls, boys have less preference for close emotional communication, intimacy, and responsiveness within interpersonal relationships (Cyranowski, Frank, Young, & Shear, 2000; Rose & Rudolph, 2006). Boys tend to focus more on themselves and less on others (Feingold, 1994). For all these reasons, boys are more at risk of developing antisocial behavior (Eme, 1992; Gualtieri & Hicks, 1985; Shaw et al., 1998). Our *sex hypothesis* states that the risk of antisocial behavior will be higher for boys than for girls.

With regard to the temperament-by-environment interaction, we base our hypotheses on a *risk-buffering model*, which implies that we mix the perspectives of the environment effects being moderated by temperament and the effect of temperament being moderated by the environment. The major theoretical idea is the following. In the context of developmental psychology, *problem behavior* can be seen as behavior that clashes with the expectations of relevant others, irrespective of the motivation of the child. By contrast, *antisocial behavior* is problematic behavior with the self-reported or imputed intent to inflict harm on others. Certain risk factors (in our case a problematic temperament or parenting style) increase the likelihood of problem behavior – the more so, the higher the risks are. In turn, the higher the frequency of problem behavior, the higher the chance that it will lead to a path dependent development of antisocial behavior. Buffers are protective factors that reduce this chance of a path dependent development. The more frequent the problem behavior, the more the presence or absence of buffers will make a difference with regard to the likelihood that problem behavior will turn into antisocial behavior. The predicted interaction between risks and protective factors is thus the presumed result of buffers that lower the slope of the regression line between risks and antisocial behavior. Risk-buffering may involve both mitigation of the negative effects of a difficult temperament (or sex) by an effective environment (Stice & Gonzales, 1998) or mitigation of the negative effects of an ineffective environment by a favorable temperament (Wills, Sandy, Yaeger, & Shinar, 2001). In the former case environment and in the latter case temperament

serves to promote adaptation through reducing reactivity to aversive stimuli.

Our *protective environment hypotheses* are that the environment protective factors (emotional warmth and SES) will help reduce the more antisocial behavior where the child is temperamentally more at risk (low effortful control and high frustration). The same should hold for the higher risk due to sex. Boys can be expected to profit more than girls from environmental protection against undesirable, hedonic urges that result in antisocial behavior (see also: Sanson et al., 2004).

Our *protective temperament hypotheses* are that the temperamental protective factors (high effortful control and low frustration) will help reduce antisocial behavior more where the environment (overprotection, rejection) puts the child more at risk.

## Method

### Sample

This study is part of the TRacking Adolescents' Individual Lives Survey (TRAILS), a new prospective cohort study of Dutch preadolescents who will be measured biennially until they are at least 25 years old. The key objective of TRAILS is to chart and explain the development of mental health and social development from preadolescence into adulthood. The TRAILS target sample involved pre-adolescent boys and girls living in five municipalities in the North of the Netherlands, including both urban and rural areas.

The present study involves the first assessment wave of TRAILS, which ran from March 2001 to July 2002 (De Winter et al., 2005; Oldehinkel et al., 2004). Of all children approached for enrollment in the study (i.e., children selected by the municipalities and attending a school that was willing to participate;  $N = 3,145$  children from 122 schools, with 90.4% of the schools responding), 6.7% were excluded because of incapability or language problems. Of the remaining 2,935 children, 76.0% were enrolled in the study, yielding a sample size of 2,230. Both the child and the parent consented to participate. The mean age of the children was 11.09 years ( $SD = 0.55$ ); 50.8% were girls; 10.3% were children who had at least one parent born in a non-Western country; and 32.6% of children had parents with a low educational level (i.e., a lower track of secondary education was the highest level attained). We did not find any nonresponse bias in our study for the estimation of the prevalence rates of psychopathology, including antisocial behavior. Boys, children from lower social strata, and children with worse school performance were somewhat more likely to belong to the nonresponse group (De Winter et al., 2005).

### Measures

Well-trained interviewers visited one of the parents (preferably the mother, 95.6%) at their homes to conduct an interview covering a wide range of topics, including the child's developmental history and somatic health, parental psychopathology, and care utilization. The parent was also asked to fill out a questionnaire. Children filled out questionnaires at school (in the classroom), under the supervision of one or more TRAILS assistants. In addition, intelligence and a number of biological and neurocognitive parameters were assessed individually (also

at school). Teachers were asked to fill out a brief questionnaire for all children in their class who were participating in TRAILS. Measures that were used in the present study are described more extensively in the following sections.

*Antisocial behavior.* Antisocial behavior was assessed by the Child Behavior Checklist (CBCL), one of the most commonly-used questionnaires in current child and adolescent psychiatric research (Achenbach, 1991b; Verhulst & Achenbach, 1995). It contains a list of 112 behavioral and emotional problems, which parents can rate as 0 = not true, 1 = somewhat or sometimes true, or 2 = very or often true in the past six months. In addition to the CBCL, we administered the self-report version of this questionnaire, the Youth Self-Report (Achenbach, 1991a). Test-retest reliabilities of the CBCL and YSR have been found to be good. Consistent with other reports (e.g., Achenbach, McConaughy, & Howell, 1987; Jensen, Traylor, Xenakis, & Davis, 1988; Verhulst & Van der Ende, 1992), the agreement between parent-reported and child-reported problems was only moderate ( $r = .31$  for antisocial behavior). We feel that both informants perceive different aspects of problem behavior and differences between informants are meaningful. Antisocial behavior that is rated as present by both parent and child is assumed to be more severe (more generalized) than problems rated by only one informant. Based on this assumption, we used the mean of the parent and child scores as a measure of antisocial behavior in this study. An additional advantage of using the mean score is that it reduces the bias associated with mono-informant information (Angold & Costello, 1996; Sourander, Helstelä, & Helenius, 1999). The outcome variable deviated not much from normality (skewness = 1.07, kurtosis = 1.47).

*Perceived parenting.* The Egna Minnen Beträffande Uppfosttran (My Memories of Upbringing) for Children [EMBU-C] (Markus, Lindhout, Boer, Hoogendoijk, & Arrindell, 2003) has been developed to assess the perception of actual parental rearing by children and early adolescents. The original EMBU-C contained 81 items. Markus et al. (2003) have developed a shorter version. We used that version and dropped the Favoring Subject factor prior to administration, because it was a weak scale (an internal consistency below .60). Children could rate the EMBU-C as 1 = no, never, 2 = yes, sometimes, 3 = yes, often, 4 = yes, almost always. Each item was asked for both the father and the mother. The EMBU-C contains the factors Emotional Warmth, Rejection, and Overprotection. The main concepts of Emotional Warmth are giving special attention, praising for approved behavior, unconditional love, and being supportive and affectionately demonstrative. An example of an item is: "Do your parents make it obvious that they love you?" The Rejection factor is characterized by hostility, punishment (physical or not, abusive or not), derogation, and blaming of subject. An example of an item is: "Do your parents sometimes punish you even though you haven't done anything wrong?" The dimension Overprotection is characterized by fearfulness and anxiety for the child's safety, guilt engendering, and intrusiveness. An example of an item is: "Are your parents concerned about what you do after school hours?"

Principal components analysis (PCA) with three factors (Emotional Warmth, Rejection, and Overprotection) as criterion, followed by VARIMAX rotation, mainly confirmed the results of Markus et al. (2003). With the exception of five items of the Rejection scale, all items loaded on the right scale.

Five Rejection items (the items 8, 24, 35, 71, and 76 in the article of Markus et al.) had loadings lower than .30 or had a loading that differed less than .10 with the second highest loading. The loadings of these items were also relatively low, on average .36, in the study of Markus et al. (2003). We decided to exclude these items from further analyses. The three factors explained 34.0% and 32.5% of the variance in the ratings on fathers and mothers.

The scale for Emotional Warmth contained 18 items with an internal consistency of .91 for both fathers and mothers. The scale for Rejection contained 12 items with an internal consistency of .84 for fathers and .83 for mothers. The scale for Overprotection contained 12 items with an internal consistency of .70 for fathers and .71 for mothers. The answers for both parents were highly correlated ( $r_s = .79$  for Emotional Warmth,  $.67$  for Rejection, and  $.81$  for Overprotection), so we felt it was justified to combine them. The test-retest stability of a shortened version of the EMBU-C (10-item scales) over a 2-month period has been found to be satisfactory,  $r_s = .78$  or higher (Muris, Meesters, & Van Brakel, 2003). Markus et al. (2003) have reported on the validity of the EMBU-C.

**Temperament.** Temperament was assessed by the parent and the child version of the Early Adolescent Temperament Questionnaire-Revised [EATQ-R] (Ellis, 2002; Putnam, Ellis, & Rothbart, 2001). We used the parent version, because its factor structure was superior to that of the child version in our sample (Oldehinkel et al., 2004). The EATQ-R is a 62-item questionnaire based on the temperament model developed by Rothbart and colleagues (Putnam et al., 2001). Effortful Control is the capacity to voluntarily regulate behavior and attention (11 items,  $\alpha = .86$ ). Frustration is the negative affect related to goal blocking or an interruption of ongoing tasks (5 items,  $\alpha = .74$ ). To the best of our knowledge, no test-retest data of the EATQ-R are currently available.

**Sex and SES.** The sample consisted of 50.8% girls and 49.2 % boys. The TRAILS database contains various variables for SES: income level, educational level of both the father and the mother, and occupational level of each parent, using the International Standard Classification for Occupations (Ganzeboom & Treiman, 1996). SES has been measured as the average of

the five items (standardized). The SES scale captures 61.2 % of the variance in the five items and has an internal consistency of .84. Missing values (e.g., when there is only one parent in the family) did not affect the association of this scale with other variables.

**Familial vulnerability to externalizing psychopathology.** Parental psychopathology with respect to depression, anxiety, substance abuse, antisocial behavior, and psychoses was measured by means of the Brief TRAILS Family History Interview, administered at the parent interview. Each syndrome was introduced by a vignette describing its main symptoms and followed by a series of questions to assess lifetime occurrence, professional treatment, and medication use. The scores for substance abuse and antisocial behavior were used to construct a Familial Vulnerability index for Externalizing Disorder. For each syndrome, parents were assigned to any of the categories 0 = (probably) not, 1 = (probably) yes, and 2 = yes and treatment/medication (substance abuse) or picked up by police (antisocial behavior). The Brief TRAILS Family History Interview yielded lifetime rates that were by-and-large comparable to those found in studies that employed CIDI-interviews, with the exception of fathers' rates for substance abuse, which were relatively low (Ormel et al., 2005; Veenstra et al., 2005).

### Analysis

Sex differences were examined by means of *t*-tests; associations between variables by means of Pearson correlations. Main and interaction effects of sex, SES, parenting, and temperament on antisocial behavior, adjusted for familial externalizing psychopathology, were tested by multiple linear regression analyses. To ensure sufficient power for the interaction effects, we wanted to keep the number of interactions fairly small and hence performed separate analyses for SES, Emotional Warmth, Overprotection, and Rejection. Subsequently, interactions that were significant in the separate analyses were included in a model encompassing all variables.

A *p*-value smaller than .05 was considered statistically significant. Because we performed many statistical tests, the results may suffer from capitalization on chance: one would expect some 5% of the associations examined to be significant

**Table 1**  
*Sex differences in antisocial behavior, environment, temperament, and familial vulnerability to externalizing psychopathology*

Variable	Girls			Boys			Difference		
	M	SD	N	M	SD	N	T	df	p
Antisocial Behavior <sup>a</sup>	0.22	0.15	1128	0.29	0.18	1094	-9.95	2220	<.01
<i>Environment</i>									
SES	-0.03	0.78	1115	-0.07	0.82	1073	1.39	2186	.16
Overprotection	1.84	0.37	1123	1.88	0.39	1083	-2.81	2204	<.01
Rejection	1.45	0.29	1123	1.51	0.33	1083	-5.01	2154	<.01
Emotional Warmth	3.26	0.49	1124	3.16	0.51	1083	4.81	2205	<.01
<i>Temperament</i>									
Effortful Control	3.35	0.65	1013	3.10	0.69	972	8.16	1983	<.01
Frustration	2.74	0.64	1012	2.84	0.68	971	-3.35	1981	<.01
<i>Other</i>									
Fam. Ext. Psych.	0.14	0.42	1107	0.14	0.42	1058	0.11	2163	.91

<sup>a</sup> Mean of standardized and transformed parent and self-report scores.

merely on the basis of chance. Hence, a statistically significant result in this context does not have the same weight as a significant result in an experimental design.

To provide an impression of the effect size and facilitate the interpretation of the interaction effects, we wrote out multiple equations, alternating the values of the predictor variables (1 standard deviation below and above the mean for the parenting and temperament variables, 0 and 1 for girls and boys) while holding other variables to their sample means. The resulting predicted antisocial behavior scores were plotted in a series of graphs.

We employed corrected-item-mean (CIM) imputation to handle missing data at the item level (Huisman, 2000). At the scale level we did multiple imputation using the MICE method of multivariate imputation (Allison, 2002; Royston, 2004; Van Buuren, Boshuizen, & Knook, 1999). These procedures assume the data are missing at random. See Table 1 for the amount of missing data. As a result of the imputations we could use all 2,230 cases in our analyses.

## Results

### Descriptives

Table 1 contains means and standard deviation of antisocial behavior, parenting, temperament, SES, and familial externalizing psychopathology, separately for boys and girls. Because SES was based on a standardized score, the mean is close to 0. Familial externalizing psychopathology was highly skewed to the right, with a mean of 0.14 and a maximum of 4.32. All other means represent mean item scores (range Antisocial Behavior 0–2, parenting variables 1–4, temperament variables 1–5).

Except for SES and familial externalizing psychopathology, all variables showed significant sex differences. Girls perceived less Overprotection and Rejection, and more Emotional Warmth than boys. Furthermore, they scored higher on Effortful Control and lower on Frustration and antisocial behavior.

Correlations between the variables are presented in Table 2, above the diagonal for girls, below the diagonal for boys. All parenting and temperament variables were moderately associated with antisocial behavior and with each other. Familial externalizing psychopathology was positively associated with antisocial behavior and negatively associated with Effortful Control and SES but not related to perceived parenting

behaviors. The correlation between Overprotection and Emotional Warmth was higher for boys (.25) than for girls (.13). Rejection and SES were significantly related for girls, but not for boys.

### Testing the hypotheses

*Direct effects.* Table 3 shows the results of the analyses with respect to the interaction of temperament (Effortful Control and Frustration) and environment (Overprotection, Rejection, Emotional Warmth, and SES). In order to control for possible confounding effects of genetic risk which may affect both temperament and antisocial behavior, we controlled for familial vulnerability to externalizing psychopathology (as a proxy for genetic risk) in the regression. Our environment hypotheses stated that Rejection and Overprotection will be positively associated with antisocial behavior and that Emotional Warmth and SES will be negatively associated with antisocial behavior. We see from Table 3 that, as predicted, Overprotection and Rejection are significantly positively associated and Emotional Warmth and SES significantly negatively associated with antisocial behavior. Our temperament hypotheses stated that Effortful Control will be negatively and Frustration positively associated with antisocial behavior. These hypotheses are also supported by our results. Our sex hypothesis stated that being a boy will be more positively related to antisocial behavior than being a girl. Our results are in line with this hypothesis.

*Interaction effects.* Our protective environment hypotheses stated that the environment protective factors (Emotional Warmth and SES) will help reduce the more antisocial behavior where the preadolescent is temperamentally more at risk (low Effortful Control and high Frustration). From Table 3, we see that there are significant interactions of Emotional Warmth with Frustration and SES with Effortful Control and Frustration, consistent with the hypothesis. Observe though, that in the simultaneous model, the interaction of Emotional Warmth and Frustration on antisocial behavior is only significant at the .10 level. To ease the interpretation of the results from the simultaneous model, predicted antisocial behavior scores for each combination of SES and temperament factor were plotted in a series of graphs, see Figure 1. Low and high Effortful Control and Frustration denote, respectively, one standard deviation below and above the mean. The interactions of Effortful Control and Frustration with SES are illustrated by

**Table 2**

*Correlations between antisocial behavior, environment, temperament, and familial vulnerability for girls and boys (correlations above and below the diagonal, respectively)*

	Antisocial Behavior	Overprotection	Rejection	Emotional Warmth	SES	Effortful Control	Frustration	Familial Vulnerability
Antisocial Behavior	—	.25	.44	-.23	-.12	-.37	.46	.13
Overprotection	.20	—	.46	.13*	-.10	-.03	.07	.08
Rejection	.40	.41	—	-.33	-.10*	-.16	.18	-.01
Emotional Warmth	-.24	.25*	-.31	—	.17	.18	-.11	-.01
SES	-.17	-.07	.00*	.13	—	.16	-.06	-.21
Effortful Control	-.37	-.07	-.16	.15	.15	—	-.39	-.14
Frustration	.49	.09	.16	-.09	-.06	-.41	—	.07
Familial Vulnerability	.10	.02	.00	-.04	-.21	-.10	.06	—

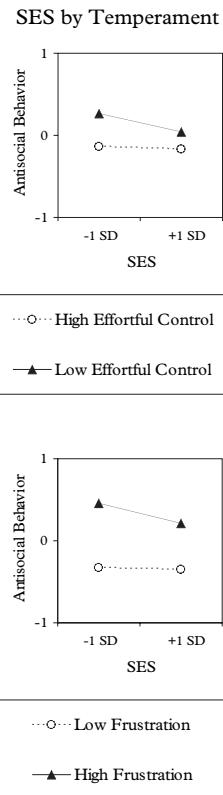
**Bold:**  $p < .01$ ; \* Significant sex difference.

**Table 3**

Main effects and interactions (standardized coefficients) of sex, temperament, environment, and their interactions on antisocial behavior: separately and simultaneously for overprotection, rejection, emotional warmth, and SES

Variable	Model 1: Overprotection ( $R^2 = .34$ )		Model 2: Rejection ( $R^2 = .41$ )		Model 3: Em. Warmth ( $R^2 = .34$ )		Model 4: SES ( $R^2 = .33$ )		Simultaneous Model ( $R^2 = .43$ )	
	B	SE <sup>a</sup>	B	SE <sup>a</sup>	B	SE <sup>a</sup>	B	SE <sup>a</sup>	B	SE <sup>a</sup>
<i>Main Effects</i>										
Sex (1 = boys)	.27	(.04)**	.24	(.03)**	.26	(.04)**	.28	(.04)**	.22	(.03)**
Overprotection	.17	(.02)**	—	—	—	—	—	—	.07	(.02)**
Rejection	—	—	.31	(.02)**	—	—	—	—	.25	(.02)**
Emotional Warmth	—	—	—	—	-.15	(.02)**	—	—	-.06	(.03)*
SES	—	—	—	—	—	—	-.09	(.02)**	-.03	(.02)
Effortful Control	-.20	(.02)**	-.17	(.02)**	-.18	(.02)**	-.20	(.02)**	-.15	(.02)**
Frustration	.37	(.02)**	.35	(.02)**	.38	(.02)**	.38	(.02)**	.34	(.02)**
Familial Vulnerability	.06	(.02)**	.08	(.02)**	.07	(.02)**	.05	(.02)*	.06	(.02)**
<i>Temperament-by-environment</i>										
Overprotection × Effortful Control	-.02	(.02)	—	—	—	—	—	—	—	—
Overprotection × Frustration	.04	(.02)*	—	—	—	—	—	—	.01	(.02)
Rejection × Effortful Control	—	—	.01	(.02)	—	—	—	—	—	—
Rejection × Frustration	—	—	.07	(.02)**	—	—	—	—	.04	(.02)~
Em. Warmth × Effortful Control	—	—	—	—	.01	(.02)	—	—	—	—
Em. Warmth × Frustration	—	—	—	—	-.08	(.02)**	—	—	-.04	(.02)~
SES × Effortful Control	—	—	—	—	—	—	.06	(.02)**	.05	(.02)**
SES × Frustration	—	—	—	—	—	—	-.08	(.02)**	-.06	(.02)**
<i>Sex Interactions</i>										
Sex × Emotional Warmth	—	—	—	—	—	—	—	—	-.04	(.04)
Sex × SES	—	—	—	—	—	—	—	—	-.07	(.03)*

<sup>a</sup>Tests were two-tailed. \*\* $p < .01$ ; \* $p < .05$ ; ~ $p < .10$ .



**Figure 1.** Graphical presentation of the interaction of SES and Temperament in relation to Antisocial Behavior.

steeper lines for high Frustration compared to low Frustration and low Effortful Control compared to high Effortful Control. Simple slope analyses (Aiken & West, 1991) revealed that SES was significantly related to antisocial behavior at one standard deviation below the mean of Effortful Control ( $b = -.08$ ,  $t(2226) = -2.38$ ,  $p = .02$ ), but not at one standard deviation above the mean of Effortful Control ( $b = .02$ ,  $t(2226) = 0.62$ ,  $p = .54$ ). Furthermore, it was significantly related to antisocial behavior at one standard deviation above the mean of Frustration ( $b = -.09$ ,  $t(2226) = -2.79$ ,  $p < .01$ ), but not at one standard deviation below the mean of Frustration ( $b = .03$ ,  $t(2226) = 0.92$ ,  $p = .36$ ).

With regard to sex, we see in the last model in Table 3 an interaction effect with SES, which indicates that SES relates negatively to antisocial behavior for boys ( $b = -.10$ ,  $t(2226) = -3.99$ ,  $p < .01$ ) and not for girls ( $b = -.03$ ,  $t(2226) = -1.23$ ,  $p = .22$ ). This is in line with our expectation. Against our prediction, we find no extra protective effect of emotional warmth for boys.

Our *protective temperament hypotheses* stated that the temperamental protective factors (high Effortful Control and low Frustration) will help reduce antisocial behavior the more the environment (Overprotection, Rejection) puts the child at risk. From Table 3, we see that there is a significant interaction effect of Overprotection as well as Rejection with Frustration. The protective temperament hypotheses with Effortful Control were disconfirmed. Observe though, that in the simultaneous model, only the interaction between Rejection and Frustration remains (marginally) significant. Simple slope analyses (Aiken & West, 1991) revealed that Rejection was indeed a somewhat

weaker predictor of antisocial behavior at one standard deviation below the mean of Frustration ( $b = .21$ ,  $t(2226) = 6.71$ ,  $p < .01$ ) than at one standard deviation above the mean of Frustration ( $b = .29$ ,  $t(2226) = 9.42$ ,  $p < .01$ ).

## Discussion

The results support our *environment hypotheses* and reaffirm similar findings in other studies. All parenting characteristics examined in our study (emotional warmth, overprotection, and rejection) appeared to be related to antisocial behavior. Because they were adjusted for familial externalizing psychopathology, the associations are unlikely to be spurious on account of genetic risk. Consistent with previous studies, we found that rejection was positively linked and that emotional warmth was negatively linked to antisocial behavior (Bugental & Goodnow, 1998; Carlo et al., 1998; Dekovic et al., 2003). These results are also in line with Farrington (1997) who argued that children who are exposed to poor parenting practices may be more likely to offend because they do not build up internal inhibitions against socially-disapproved behavior. Results in the literature with respect to overprotection have been more equivocal. Various studies identified lack of care as the predominant risk factor (e.g., Enns, Cox, & Clara, 2002), some found, in addition to a lack of parental care, overprotection to be related to antisocial behavior (Rey & Plapp, 1990; Reti et al., 2002). The reasoning behind our hypothesis about a positive association of antisocial behavior with overprotection, is that autonomy is valued highly among children and antisocial behavior might be an act of protest against too much parental interference (related to this are discussions about the impact of a maturity gap: Moffitt, 1993).

Our *temperament hypotheses* that effortful control will be negatively and frustration positively associated with antisocial behavior were also supported. Again, spurious associations due to familial vulnerability are unlikely. Consistent with earlier studies, we found effortful control to be negatively associated with antisocial behavior. Children with low effortful control, that is with a limited ability to regulate attention and behavior, are less likely to consider the possible consequences of their actions, especially consequences that are likely to be long-delayed. The inability to restrain undesirable, hedonic urges by considering their consequences may result in antisocial behavior. Frustration reflects the tendency to experience negative feelings if things do not run according to plan. It was positively associated with antisocial behavior. If the efforts to reach a goal do not succeed, the situation involves loss, and the irritation and anger associated with blocked goals renders highly-frustrated children prone to externalizing (Caspi et al., 1995; Kochanska et al., 2000; Rothbart & Putnam, 2002). We found that boys were more at risk of developing antisocial behavior than girls. This replicates previous findings and is consistent with our *sex hypothesis*.

The hypotheses on *temperament-by-environment interactions* were based on the idea of risk-buffering which can also be found in a variety of other studies, even though not much yet in studies on preadolescents and with other environments than parental control (Bates et al., 1998; Belsky et al., 1998; Kochanska, 1995, 1997; Sanson et al., 2004; Stice & Gonzales, 1998; Wills et al., 2001). We predicted that environmental factors that protect against the risk of antisocial behavior (emotional warmth, SES) are assumed to be more

helpful for children who are temperamentally (or because they are boys) more at risk of committing antisocial behavior. Conversely, temperamental factors that protect against the risk of antisocial behavior (effortful control and low frustration) are assumed to work better for children who are environmentally more at risk (because of overprotection and rejection). Seemingly, SES has extra protective effects for preadolescents who are temperamentally at risk of committing antisocial behavior. This is in line with other research showing that relations of parenting to self-regulation have been found to be stronger in more disadvantaged, i.e. low SES, populations (Raver, 2004).

It turned out that SES is almost exclusively protective for preadolescents who are at risk either because of a difficult temperament (low effortful control or high frustration) or because of sex (being a boy means a higher risk of antisocial behavior). This makes it extra important to consider interaction effects when studying the impact of SES on antisocial behavior. Lynam et al. (2000) found a similar interaction between temperament (high impulsivity) and environment (neighborhood). A poor neighborhood, defined by the census-SES, had only an effect on juvenile offending for impulsive boys and not for non-impulsive boys.

Maybe the mechanisms linked to SES, as identified by Pinderhughes et al. (2000), can help us explain such temperament by environment effects. They found that higher SES is associated with less attribution of hostile intent when the child misbehaves and with more alternative discipline strategies than physical punishment. When parents are better able to distinguish hostile intent from temperamental sources (lack of effortful control and being easily frustrated) of antisocial behavior and when they have a wider repertoire of discipline strategies to deal with them, they are more likely to buffer the effects of non-hostile temperamental problems.

We have no ready explanation as to why the interactions with emotional warmth are weaker (with frustration) or absent (with effortful control). We can only speculate that parental emotional warmth bleeds into overprotection for children who are at risk of committing antisocial behavior. In Table 2, we can see that emotional warmth correlates .25 with overprotection for boys and .13 for girls. This suggests that emotional warmth does indeed bleed into overprotection and that it does so more for boys than for girls. The extra protective effect of emotional warmth may thus be counteracted by its closeness to overprotection exactly for those preadolescents who are most at risk of antisocial behavior.

With regard to the fact that we found no strong indications that favorable temperaments are extra protective when environmental risk is high, we also have no ready explanation (we only found interaction effects of overprotection and rejection with frustration, indicating that low frustration buffers the effect of environmental risk, but this effect is considerably weakened when the interactions with SES are added). Here too we can only speculate. It is possible that with regard to rejection, there is a confounding effect with negative aspects of temperament. In part, parents may reject the child because of the negative temperamental aspects (see correlations in Table 2). This confound may mask the risk-buffering effect of favorable temperament. For overprotection, we mentioned already that preadolescents might commit antisocial behavior as an act of protest against excessive parental interference. In this case high effortful control and low frustration would not have much mitigating influence. This interpretation is supported by the fact that at least in Dutch society, individual autonomy is

considered very important, especially by young generations. In older age groups and in cultures that value maintenance of affective bonds among family members more highly, parental over-interference is less likely to cause protest behavior (see also: Lui, 2003; Liu et al., 2005). Future research may profitably deal with these possibilities.

### *Strengths, limitations, and future directions*

Our study has a number of notable strengths: It addresses an age group for which so far there have been few studies concerning temperament-by-environment interactions. In addition, the studies with these kinds of interactions for preadolescents had done so mainly for parental control. By contrast, we investigated overprotection, rejection, parental warmth and SES. To our knowledge, our study is the first to look at the temperament-by-environment interaction for preadolescents involving SES for preadolescents. It turned out that for SES there are indeed important interaction effects that should also be explicitly included in future studies. There are also a number of methodological strengths of our study. It included a large sample size, measurement of a number of potential confounders, the use of parent report to assess temperament and child report to assess parenting (instead of using a single informant for both sets of data), and measurement of anti-social behavior with reports from multiple informants.

Clearly, there are also limitations. First, the study was based on data at one time point from a single age group. The longitudinal nature of our survey, TRAILS, allows us to investigate prospective relations in the future. However, even before longitudinal data are available, it is worthwhile investigating temperament-by-environment interactions in order to check the robustness of direct environmental and temperamental factors in relation to interaction effects, and to get a better grip on the possible puzzles to be investigated with a longitudinal data set. For example, a variety of interesting puzzles came to the fore, such as the possible extension of emotional warmth into overprotection; or the possibility that antisocial behavior is not curbed by favorable temperament when it is protest behavior; or the possibility of gene-environment interactions. Of course, in addition to these puzzles, there are aspects of the association between temperament and environment that at present transcend our efforts but may come into reach in the future. For example, a child who starts with more frustration would likely experience more parental rejection and less warmth, which would act to retard effortful control development. These processes would continue in a transactional fashion, as temperament moderates the impact of the environment while also shaping the nature of parent-child interaction (Wills & Dishion, 2004; see for a discussion of gene-environment correlations: Rutter et al., 1998). Second, we relied on questionnaire measures. Studies investigating effects of parenting on social development using observations usually show larger effect sizes than studies centering on child or parent reports (Collins et al., 2000). Given the large sample size, we could not include observations of parenting practices but had to work with children's perceptions of actual parental rearing. However, the main effects on antisocial behavior were strong for all perceived parenting and temperament aspects. Thus, it seems that temperament and environment are strongly related to antisocial behavior. Third, predictors and outcome variable were based on information from only two informants (children and parents). This carries the risk of inflated associations,

although it should be noted that our study is much less prone to this risk than the many studies that use data from a single informant. Finally, our measure of familial vulnerability to externalizing disorder was based on a proxy, the retrospective information from the mother. We hope that in the future, this information can be combined with information from both parents and with genetic information to be gathered in one of the following waves of TRAILS.

Future research may fruitfully investigate our speculative explanations of the fact that we did not find some temperament-by-environment interactions. Another important extension to our study would be to include feedback loops, because parenting is bi-directional and reciprocal. Parents have an impact on children but children also influence their parents (Bell, 1968; Gallagher, 2002; Kerr & Stattin, 2003; Maccoby, 2000). The longitudinal nature of our study will allow us to use such a bi-directional approach in the future. A third important extension would be to include other environmental factors, such as neighborhood context and peer influences, in the model (Beyers et al., 2003; Wills & Dishion, 2004). The search for temperament-by-environment interactions is an exciting and promising research area that will help to improve our understanding of pathways to adaptive and maladaptive development.

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# Exposure to partner violence and child behavior problems: A prospective study controlling for child physical abuse and neglect, child cognitive ability, socioeconomic status, and life stress

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### **Abstract**

Previous research suggests an association between partner violence and child behavior problems. However, methodological shortcomings have precluded the formation of directional conclusions. These limitations include failure to control for the effects of child physical abuse and general life stress, employment of nonrepresentative samples from battered women's shelters, and reliance on a single contemporaneous reporter, usually the mother, for information on both independent and dependent measures. This study used prospective, longitudinal data ( $N = 155$ ) and multiple informants to examine the relation between maternal reports of partner violence in the home and teacher- and youth-report ratings of concurrent and prospective child behavior problems. Hierarchical multiple regression analyses were used to control for the effects of child physical abuse, child physical neglect, socioeconomic status, child cognitive ability, and life stress. The contribution of partner violence to child behavior problems was confirmed for boys' ( $n = 81$ ) externalizing problems and girls' ( $n = 74$ ) internalizing problems. Child developmental status at the time of exposure further influenced these relations. For boys, behavior problems in middle childhood were most strongly related to contemporaneous partner violence, whereas behavior problems among both boys and girls at age 16 were most strongly related to partner violence exposure during the preschool years.

Children who observe partner violence constitute a significant population of at-risk youth. Estimates extrapolated from the National Family Violence Survey (Straus, Gelles, & Steinmetz, 1980) indicate that 3–4 million children

between the ages of 3 and 17 years of age are exposed to interparental physical violence annually (Carlson, 1984). A substantial body of research suggests that exposure to partner violence has a deleterious impact on children's emotional and behavioral development (see Buehler et al., 1997; Davies & Cummings, 1994; Edleson, 1999a; and Grych & Fincham, 1990, for reviews). Correlational data demonstrate that exposure to interparental violence in childhood is associated with concurrent and prospective indices of child behavior problems (Augustyn, Parker, Groves, & Zuckerman, 1995; Emery, 1982, 1989; Grych, Jouriles, Swank, McDonald, & Norwood, 2000; Holden & Ritchie, 1991; Kerig, 1998), although not ev-

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eryone has found this association (Hughes, 1988; Jouriles, Barling, & O'Leary, 1987; Rosenbaum & O'Leary, 1981a).

The majority of this literature has been grounded in the theoretical framework of social learning theory, which posits a strong association between partner violence and later behavior problems through observational learning (Bandura, 1973; Bandura & Walters, 1963). For example, a social learning perspective would hold that male to female violence in the home models aggressor and victim roles, which, in turn, promotes aggressive and undercontrolled behaviors among males and inhibition and overcontrol among females. However, social learning theory provides an incomplete model for examining the relation between exposure to partner violence and child adjustment because it fails to account for the influence of developmental status on this relation. Moreover, social learning theory is limited in its capacity to explain the array of maladaptive patterns that follow from exposure to partner violence.

An organizational model of development provides a broader framework for conceptualizing the impact of partner violence. Within this perspective, development is conceptualized as a hierarchically integrative process, such that experience at each phase and the resulting organization that encompasses it form the foundation for later patterns of adaptation and experiential integration (Sroufe, 1979; Sroufe & Rutter, 1984). In this view, partner violence represents a major perturbation that has the potential to profoundly influence development. The intense stimulation and threat attendant to partner violence is highly arousing and even terrifying for the child witness. The arousing nature of such experiences is intensified because it is completely uncontrollable, perhaps even more so than other stressors such as direct abuse, which may at times be avoided through actions of the child. At any age, especially if chronic, such experiences are emotionally dysregulating. In early childhood, however, when the capacity for emotional regulation is emerging, such experiences may be especially detrimental. Emotional self-regulation is not only the core issue for the pre-school period, it is the foundation for negoti-

ating the major issues of all later periods (Sroufe, 1995). For example, sustaining interaction with peers, negotiating conflict, and coordinating close friendships with the demands of the larger group all entail the capacity for flexible emotional regulation (Sroufe, Egeland, & Carlson, 1999). Emotional dysregulation is also at the core of conduct problems and all major psychiatric disorders (Cole, Michel, & O'Donnell, 1994). Thus, serious compromising of emotional regulation may have a cascading effect, ultimately affecting wide areas of functioning. All of this is in addition to the indirect effects on the child that occur due to compromised caregiver responsiveness to the child's needs in the face of their own distress.

Within an organizational framework, early experience provides a foundation for subsequent adaptations such that it may influence later adjustment above and beyond more temporally proximal experiences (Sroufe, Carlson, Levy, & Egeland, 1999; Sroufe, Egeland, & Kreutzer, 1990). Thus, exposure to partner violence during early childhood is expected to have a stronger and more enduring negative effect on future adaptation than later exposure experiences, both for the reasons outlined above and because of the child's strong identification with the parent at this age. In support of this hypothesis, several studies have found that exposure to partner violence has a particularly strong impact on infants and preschoolers (Fantuzzo, Boruch, Beriama, Atkins, & Marcus, 1997; Fantuzzo et al., 1991; Hughes, 1988; Hughes & Barad, 1983; Stagg, Wills, & Howell, 1989). However, other studies have found more prominent behavioral and emotional problems among school-aged children who have been exposed to partner violence (Carlson, 1990; Hughes, Parkinson, & Vargo, 1989). Although there is some evidence that the relation between partner violence and children's behavioral adjustment may vary as a function of the child's developmental status at the time of exposure, the findings to date have been equivocal. Moreover, the question of whether the timing of exposure affects the relation between partner violence and prospective, rather than concurrent, adaptation remains to be addressed.

Studies exploring gender differentials in the impact of partner violence on children's behavioral adjustment are similarly disparate. The dominant belief in the family violence literature is that boys are more vulnerable than girls to the impact of stressful life events (Jaffe, Wolfe, Wilson, & Zak, 1986; Zaslow & Hayes, 1986). In support of this assertion, Porter and O'Leary (1980) found that marital conflict was positively correlated with boys' behavior problems across a range of externalizing and internalizing disorders but was not related to girls' behavior, even though the girls came from more discordant family environments. These data are consistent with other studies demonstrating stronger negative effects of partner violence on boys' adjustment than on girls' adaptation (Hughes & Barad, 1983; Reid & Crisafulli, 1990). Adult retrospective reports further suggest that males are at greater risk for negative developmental sequelae following childhood exposure to domestic violence than are females (Carlson, 1984; Rosenbaum & O'Leary, 1981b). In contrast, several investigations found that girls are at higher risk than males for manifesting internalizing and externalizing behavior problems following exposure to marital violence (Cummings, Pepler, & Moore, 1999; Holden & Ritchie, 1991; Spaccarelli, Sandler, & Roosa, 1994). Still, other studies suggest equally deleterious consequences for boys and girls (Carlson, 1990; Fantuzzo et al., 1991; Grych et al., 2000; Grych, Seid, & Fincham, 1992; Hughes et al., 1989; Katz & Gottman, 1993; Kerig, 1998; O'Keefe, 1994; Sternberg et al., 1993).

One interpretation of these seemingly contradictory data posits that the gender differential among child witnesses of partner violence is of a qualitative, rather than quantitative, nature with girls being predisposed to develop *internalizing* problems and boys being at greater risk for later *externalizing* disorders (Emery, 1982; Moffitt & Caspi, 1998). Support for this assertion derives from experimental studies showing that boys report more anger in response to observing hostile exchanges between adults, whereas girls report more fear and distress (Hennessy, Rabideau, Cicchetti, & Cummings, 1994). In addition,

several studies found that boys display increased aggression and externalizing behaviors in response to witnessing interparental violence, whereas girls are more apt to exhibit emotional distress or depression (Crockenberg & Covey, 1991; Sternberg et al., 1993).

In sum, the extant literature suggests that there is a negative association between exposure to partner violence and children's behavioral adjustment. Furthermore, age and gender appear to influence this relation, though studies have yielded equivocal findings with regard to their specific effects. While providing a useful departure point for the current investigation, prior research addressing the relation between exposure to partner violence and child behavior problems is constrained by a multitude of methodological limitations that may contribute to the inconsistent patterns of observed data reviewed thus far.

First, the majority of research addressing the impact of partner violence on children's adjustment derives from retrospective accounts of mothers and children in battered women's shelters (see Fantuzzo et al., 1997; Fantuzzo & Lindquist, 1989; and Spaccarelli et al., 1994, for discussion). Participants from shelter-based samples are likely to be nonrepresentative of the larger population of children exposed to partner violence with respect to the severity of abuse, family income, social and kinship support, and other factors (Edleson, 1999a; Kashani & Allan, 1998). Studies comparing child witnesses of partner violence from shelter and community samples indicate that children residing in shelters exhibit higher levels of social, emotional, and behavioral impairment, independent of family violence variables (Fantuzzo et al., 1991; Jouriles, Norwood, McDonald, Vincent, & Mahoney, 1996; Wolfe, Zak, Wilson, & Jaffe, 1986). Furthermore, these children exhibit some spontaneous reduction in behavior problems upon returning home, suggesting that the crisis events surrounding shelter placement may account for some of the variance in child behavior problems (Wolfe et al., 1986).

Second, the extant research may be confounded by shared method variance, which results from reliance on a single informant, usually the mother, to report on both independent

measures of children's exposure to partner violence and outcome measures of children's behavioral adjustment (Edleson, 1999a; Fantuzzo & Lindquist, 1989; see Sternberg, Lamb, & Dawud-Noursi, 1998, for discussion). Maternal reports may distort the intensity of children's behavior problems, depending on the mother's defensiveness, desire for help, or psychological distress (Hughes, 1988). Concerns related to shared method variance are particularly salient when interpreting findings from shelter-based samples. The crisis events precipitating a woman's flight from home likely result in extreme emotional duress, which may interfere with her ability to accurately report on either the nature of violence within the family or her children's behavioral and emotional adjustment (Hughes et al., 1989; Spaccarelli et al., 1994; Sternberg et al., 1993). Therefore, the use of multiple informants is the most effective, though underutilized, technique to assess the relation between partner violence and children's adjustment (Grych & Fincham, 1990; Sternberg et al., 1998).

Third, research in this area is limited by a pervasive reliance on indices of violence exposure as univariate predictors of later child pathology (Jouriles et al., 1987). Families affected by partner violence often experience multiple jeopardies under the strains of poverty, female-headed households, child physical abuse, low levels of parental education, and residential instability (Fantuzzo et al., 1997; Spaccarelli et al., 1994). Concomitant stressors of this nature may contribute independently to children's adjustment problems and/or mediate the effects of partner violence on children's adaptation (Spaccarelli et al., 1994). For example, Wolfe and colleagues found that reported marital conflict failed to predict child behavior problems when the effects of maternal stress (i.e., disruption and change in the mother's life) were statistically controlled (Wolfe, Jaffe, Wilson, & Zak, 1985). The importance of controlling for the role of other stressors with appropriate comparison groups and statistical techniques is supported by research showing a cumulative negative impact on children's adaptation as a function of exposure to multiple stressors (Rutter, 1985; Sameroff, in press).

Finally, parent-child aggression, though often proposed as a mediator of the observed association between partner violence and child behavior problems (Hughes, 1988; Jouriles et al., 1987), is rarely controlled in these studies. Children in families reporting high levels of partner violence are more likely to be abused, physically or otherwise, by one or both parents (for reviews, see Appel & Holden, 1998; Edleson, 1999b; McCloskey, Figueiredo, & Koss, 1995; Moffitt & Caspi, 1998). Parent reports of parent-child aggression are more strongly correlated with child behavior problems than are reports of partner violence (Jouriles et al., 1987). Further, abused child witnesses of partner violence exhibit higher rates of problem behaviors than either non-abused child witnesses or comparison children (Hughes, 1988). Even if not directly victimized by parent-child aggression, children in homes characterized by partner violence may be more vulnerable to emotional and physical neglect as a consequence of parental unavailability, which may contribute to later maladjustment (Erickson & Egeland, 1996). Thus, it is critically important that research in this area consider the variance in child behavior problems that is explained by other life stressors, particularly child physical abuse and neglect (Cummings, 1998; Widom, 1989).

Using data from a prospective, longitudinal study of firstborn children of low-income mothers, the current study examined several methodological issues heretofore not systematically addressed. First, the sample was derived from a community-based population that was selected independently of partner violence status. Second, this investigation employed multiple informants, thereby eliminating the distorting influence of shared method variance. Finally, the variance in child behavior problems that may be accounted for by other risk and experiential factors, including child physical abuse and neglect, child cognitive ability, socioeconomic status, and life stress, was statistically controlled in order to examine the unique contribution of exposure to male to female partner violence to children's behavioral adjustment.

This investigation examined the contribu-

tion of maternal reports of male to female partner violence in the home (hereafter referred to as partner violence) to children's contemporaneous and prospective behavior problems, independent of other known risks to child development. First, correlational analyses were conducted to examine the relation between childhood exposure to partner violence during two time periods (preschool and middle childhood) and outcome measures of children's behavioral adjustment, as rated by teachers in middle childhood (Grades 1–3) and by teachers' and youth's self-report in adolescence (age 16). Second, multiple regression analyses were used to examine whether exposure to partner violence in the home made an independent contribution to the prediction of children's externalizing and internalizing behavior problems, while statistically controlling for other demographic and experiential factors that have been found to contribute to child behavior problems, including child physical abuse and neglect (Eckenrode, Laird, & Doris, 1993), child cognitive ability (Lynam, Moffitt, & Stouthamer-Loeber, 1993), socioeconomic status (SES; Guerra, Huesmann, Tolan, Van Acker, & Eron, 1995), and life stress (Pianta, Egeland, & Sroufe, 1990). In addition, the extent to which exposure to partner violence during the preschool period (18–64 months) predicted later behavior problems above and beyond more proximal exposure experiences in middle childhood (Grades 1–3) was examined by entering the preschool exposure variable last in the regression models. An alternative regression model would enter the variables chronologically to assess whether early exposure remained significant after the entry of later exposure. However, the preschool exposure variable was entered into the final step of the regressions in order to directly test our hypothesis that early experiences of partner violence in the home have a significant effect on child behavioral adjustment above and beyond more temporally proximal exposure experiences. Finally, all analyses were run on male and female subsamples to examine gender differences in the relations between witnessing partner violence and children's internalizing and externalizing behavior problems.

## Method

### Participants

Participants were drawn from the Minnesota Parent-Child Project, a 25-year longitudinal study of developmental adaptation in a sample of young mothers living in poverty ( $M = 20.5$  years,  $SD = 3.74$ ) and their firstborn children (see Egeland, 1991; for complete sample data, see Egeland & Brunnquell, 1979). The original sample of primiparous mothers ( $N = 267$ ) was recruited in 1975–1977 from the Minneapolis Public Health Clinic, where they were receiving prenatal care. Of 190 participants at 18 months when the current investigation began, 82% ( $N = 155$ ; 81 males, 74 females) were also available at every assessment throughout the preschool and school years and constitute the sample used in this study.

The total sample of mothers was 83% Caucasian; 12% African American; and 5% Latino, Asian, or Native American. Approximately 15% of the children were of mixed racial heritage. The families were identified as at-risk for parenting problems due to poverty (100%), single motherhood (62%), and low maternal educational attainment (40% had not completed high school). There were no significant differences between the current participants and those not included in these analyses with respect to relevant demographic variables.

### Procedures

Extensive data were collected at several points in time using multiple informants and assessment procedures, including psychological tests, interviews, questionnaires, and direct observations of child behaviors and mother-child interactions. In the first year, home visits were conducted six times, and there was an additional lab visit at 12 months. After the 1st year, home visits were conducted every 6 months until 64 months (except at 36 months), annually thereafter through Grade 3, and at several time points throughout adolescence. Detailed information was obtained from teacher interviews, teacher ratings and behavior checklists, and school files at the end of first, second, and third grades and when the

**Table 1.** Partner violence rating scale

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0. No evidence of family violence.
  1. Slight evidence of violent interaction between parent and any individual other than partner or evidence of violent interaction among extended family members, past or present.
  2. Rare (has not occurred more than twice) mild form of violent interaction (this includes a single shove that occurs in an episode that is quickly terminated).
  3. Mild form of violent interaction that has occurred on more than two occasions.
  4. More severe form of interaction that occurs on one occasion only and is not repeated. The interaction may result in a mild form of injury for the mother that does not require medical attention, and the mother does not seek shelter. The mother may remain in this relationship or may terminate it, but episodes of violence are not repeated with this partner or with subsequent partners.
  5. More severe form of violent interaction that has occurred on more than one occasion between mother and partner(s). The interaction elicits fear and may include mild injury for the mother, not requiring medical attention.
  6. Severe form of violent interaction. This interaction is of a chronic nature and can easily, and often does, result in injury to the mother. Medical attention may be required and shelter placement may follow.
  7. Most severe form of violent interaction. This interaction has the potential for serious injury to the mother and, if it occurs, should require medical attention, police intervention, and/or shelter placement. It is frequently accompanied by threats to the mother's life.
- 

participants were 16 years old. Measures used in the current analyses assessed the level of male to female partner violence in the home as reported by the mother, child physical abuse and neglect, child cognitive ability, SES, mother-reported life stress, and teacher and youth self-report ratings of child behavior problems.

#### *Independent measures*

*Partner violence ratings.* The degree of mother-reported male to female partner violence in the home was rated using an 8-point scale that was developed to reflect the frequency and severity of physical violence directed toward the mother by her partner in the home (see Table 1). Partner violence ratings were based on information from face to face interviews with the biological mother and on items pertaining to physically violent behavior between adults in the child's home taken from the Life Events Scale (LES, see description below). The partner violence ratings were made by trained coders after a comprehensive review of all the interview and life stress data in a given time period. Because there were no specific questions probing the presence or nature of partner violence in the home, information about physically violent behavior between the adults in the home was coded

whenever it was mentioned in the face to face interviews or on the LESs. Thus, the partner violence ratings were based on spontaneous maternal disclosures of partner violence in the home. In this poverty sample, biological fathers and other male caregivers were not consistent participants in the children's lives. Because neither biological fathers nor father figures were available for study in this sample, the partner violence ratings are based on maternal report of male to female partner violence only.

To increase the reliability of the partner violence ratings, they were summed across several interviews during each of two age periods. The preschool rating was based on semistructured interviews and LESs administered at 18, 24, 30, 42, 54, and 64 months. The middle childhood exposure rating consisted of data from semistructured interviews and LESs administered at the end of first, second, and third grades. Interrater reliability was calculated at each time point on the basis of 50 ratings that were completed by two graduate research assistants. Pearson  $r$  calculations for interrater reliability ranged from .93 to .99.

*Child maltreatment history.* Sample participants have been classified into maltreatment groups at three time periods, infancy (birth-

24 months), preschool (24–64 months), and middle childhood (Grade 6; Egeland, 1997). Current analyses employed the second of these classifications because it most closely coincides with the partner violence ratings and is the most valid of the available classifications. Child physical abuse and neglect were coded dichotomously (present/absent) for each participant on the basis of information from several sources, including home observations, extensive interview data, and child protection records. All sources of information were available for each participant in the current sample ( $N = 155$ ). Using all the available data, a team of project staff conferred and classified families into one or more of the maltreatment groups. Despite the subjectivity of this case conference approach, there was nearly perfect agreement among staff members regarding maltreatment classification.

Physical abuse was operationalized as parental acts that resulted in physical damage to the child (i.e., bruises, cuts, burns). Physical neglect was classified as incompetent and irresponsible management of the child's day to day care, inadequate nutritional or health care, and dangerous home environments due to insufficient supervision by a primary caregiver. All cases of child physical abuse ( $n = 14$ ) had been referred to child protection services or were under the care of child protection services at some point prior to the physical abuse rating. Children who were classified as neglected ( $n = 14$ ) had been, or were currently, under the care of either the public health nurse or child protection services. Two of the participants in this sample were classified as both physically abused and neglected.

*Child cognitive ability.* The Wechsler Intelligence Scale for Children—Revised (WISC-R; Wechsler, 1974) was administered to each participant in third grade to assess intelligence or mental capacity. The WISC-R demonstrates high test-retest ( $r = .95$ ) and split-half ( $r = .96$ ) reliabilities for the entire scale with populations of children ages 6–16 years (Wechsler, 1974). The Vocabulary, Similarities, and Block Design subtests were administered as an abbreviated version of the entire scale. These three subscales adhere to estab-

lished criteria for research use (Salvia & Ysseldyke, 1985), correlate highly with full-scale IQ scores, and have adequate reliability and validity (Sattler, 1988). Prorated IQ scores were derived with Sattler's (1988) formula and used in these analyses.

*SES (Grades 1–3).* Household SES was assessed in Grades 1, 2, and 3 as the mean of  $z$  scores from multiple sources of information. At all three time points, parents' occupational status was classified using the revised Duncan Socioeconomic Index (Duncan, 1961; Stevens & Featherman, 1981) and mother's level of education was obtained. In Grade 3, a maternal report of household income was collected in addition to the other two measures. SES indices based on  $z$ -score means were transformed into  $t$  scores to produce positively scaled distributions for these variables at each time point. The  $t$  scores from Grades 1, 2, and 3 were averaged to form the composite index of SES used in the current analyses.

*LES.* Life stress was assessed using a modified version of the 40-item Life Events Inventory (Cochrane & Robertson, 1973) with items added and deleted to increase its relevance to the project sample (Egeland & Deinard, 1975). The resultant 39-item LES was designed to assess the amount of social and economic stress experienced by the family. Life stress data were collected during each of 10 semi-structured maternal interviews between 12 months and third grade. The interviewer asked whether each event (e.g., job loss, death of a family member) had occurred since the preceding assessment. Positive responses were probed further to enable independent, trained coders to rate the severity of each stressor on a 3-point scale reflecting the extent to which the event was disruptive to the family's functioning (Egeland, Breitenbucher, & Rosenberg, 1980; Pianta & Egeland, 1990).

Each LES item was weighted for severity based on established criteria that specified the frequency of the experience since the last assessment and the extent to which the event involved a person with whom the mother had a close relationship. For example, if the par-

ticipant indicated that "someone in the family was convicted of a violation," the response would be weighted as follows: (0) there was no consequence besides a warning or parking ticket; (1) a household member was convicted of speeding or other moving violation *or* a family member on whom the mother is not dependent and who does not reside in the home committed a more serious violation (i.e., drunk driving, burglary); (2) a household member was convicted of a moderate violation (i.e., drunk driving) that led to hardship (i.e., loss of license); and (3) a conviction of a more serious crime (i.e., weapon possession, assault) that was committed by someone on whom the mother was dependent for support (i.e., boyfriend, mother's parents). Across all items, the mean interrater agreement was .86.

At each time point, a total weighted life stress score was computed by summing the number of items checked on the scale, with the weights assigned according to the severity of each stressor. The current analyses were conducted using a composite life stress score, which was calculated by summing across standardized *z* scores at each time point. Any LES items pertaining to violence in the home that were used to inform the partner violence ratings were *not* included in this composite.

#### *Dependent measures*

*Internalizing and externalizing behavior problems.* During interviews conducted with teachers when the participants were in first, second, and third grades, and when the participants were 16 years old, teachers completed the Child Behavior Checklist: Teacher's Report Form (TRF; Achenbach & Edelbrock, 1986). The Child Behavior Checklist (CBC) is designed to assess children's behavior problems and social competence and has demonstrated high reliability and validity (Achenbach, 1991a, 1991b). The checklist consists of 118 behavioral descriptions, which are rated by the teacher as *not true* (0), *somewhat or sometimes true* (1), or *very true or often true* (2). Eight subscale scores, an internalizing score, an externalizing score, and a total problem score are derived from the TRF. Teacher

participation in this study was outstanding. Of over 500 teachers asked to contribute CBC data, only one declined to participate.

At the time of the 16-year interview, participants completed the Youth Self Report (YSR; Achenbach, 1991c), which is the CBC corollary that allows adolescents to report on their own problem behaviors. The YSR yields the same subscale and broadband scores as the TRF. The broadband externalizing and internalizing scales from the TRF and YSR were used for analyses in this study.

Raw scores were transformed into *t* scores, and two composite behavior problem ratings were calculated for each participant. Then, *t* scores from the TRF were summed across Grades 1, 2, and 3 as an indicator of behavior problems in middle childhood. TRF and YSR scores from the 16-year assessment were averaged to yield an adolescent behavior problem rating.

The current study incorporated both self- and teacher-report information at age 16 in an effort to obtain a maximally reliable and valid reflection of adolescent behavioral adjustment. It has been suggested that adolescents may produce a more accurate behavioral picture through self-reports than do outside informants, particularly with respect to internalizing problems (Jensen et al., 1999). Although low correlations between multiple informants on the CBC have been interpreted as indicating unreliability, Achenbach and colleagues note that the low correlations observed across different informants reflect the contribution of unique, but valid, information by each reporter (Achenbach, McConaughy, & Howell, 1987).

## **Results**

#### *Descriptive findings*

The mean and standard deviation for each independent predictor and behavioral outcome are presented in Table 2. Males and females were compared on each measure to examine gender differences. Males and females obtained comparable scores on all measures, with one exception. Ratings of partner vio-

**Table 2.** Descriptive characteristics of the total sample and gender comparisons for males and females

Variable	Total Sample (N = 155)		Males (n = 81)		Females (n = 74)		<i>t</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	
1. WISC-R	104.07	16.12	103.93	16.86	104.23	15.37	-0.12
2. Socioeconomic status	49.59	9.06	49.20	9.07	50.02	9.09	-0.56
3. Life stress	5.41	2.37	5.37	2.19	5.46	2.57	-0.251
4. Child physical abuse	0.09	0.29	0.10	0.30	0.08	0.28	0.381
5. Child neglect	0.09	0.29	0.09	0.28	0.10	0.30	-0.176
6. PV rating (middle childhood)	0.45	1.00	0.31	0.69	0.60	1.25	-1.75
7. PV rating (preschool)	0.45	0.79	0.32	0.63	0.60	0.92	-2.28*
8. Internalizing (Grades 1–3)	53.70	7.93	54.45	8.32	52.88	7.45	1.24
9. Internalizing (age 16)	53.19	7.23	52.71	7.09	53.72	7.40	-0.86
10. Externalizing (Grades 1–3)	55.62	8.93	56.35	8.89	54.81	8.97	1.07
11. Externalizing (age 16)	57.20	7.94	56.67	7.44	57.78	8.47	-0.87

Note: WISC-R, Wechsler Intelligence Scale for Children—Revised; PV rating, partner violence rating.

\**p* < .05.

lence during the preschool period were consistently higher for females,  $t$  (153) = -2.28,  $p$  < .05.

Partner violence was a prominent risk in this sample. During the preschool period (18–64 months), 12% of the mothers reported mild partner violence in their primary relationship (i.e., a rating of 3 or lower on the partner violence rating scale; see Table 1) and 25% reported more severe levels of partner violence in the home (i.e., a rating of 4 or higher on the partner violence rating scale; see Table 1). During the middle childhood years (Grades 1–3), 5% of the mothers reported mild partner violence in their primary relationship and 16% reported more severe levels of partner violence in the home.

A cutoff point of  $t$  = 63, which corresponds to the 90th percentile, was used to identify clinical levels of externalizing and internalizing symptoms on the TRF and YSR. During the middle childhood period (Grades 1–3), 23% of the total sample obtained scores in the clinical range for externalizing problems and 11% obtained scores in the clinical range for internalizing problems. At the time of the adolescent reporting (age 16), 21% of the total sample obtained scores in the clinical range for externalizing problems and 8% obtained

scores in the clinical range for internalizing problems.

#### *Relations among independent and dependent measures*

Pearson  $r$  correlations between all variables are shown in Table 3. There were a number of significant associations among the predictor variables themselves, as well as between the independent measures and the dependent behavioral ratings. All the predictor variables, except for child cognitive ability, were correlated significantly and in the expected direction with one or both indices of partner violence in the home;  $r$  values (155) ranged from -.21 to .45. There were modest relations between preschool exposure to partner violence and both externalizing,  $r$  (155) = .26,  $p$  < .01, and internalizing,  $r$  (155) = .17,  $p$  < .05, behavior problems at age 16.

Gender differences in these relations were present, but complex. As seen in Table 4, exposure to partner violence in middle childhood was related to contemporaneous reports of boys' externalizing behavior problems in middle childhood;  $r$  (81) = .29,  $p$  < .01. Interestingly, exposure to partner violence in the preschool period was associated with boys'

**Table 3.** Bivariate correlations among independent predictors and child outcomes for the total sample (N = 155)

Variable	1	2	3	4	5	6	7	8	9	10
1. WISC-R	—									
2. Socioeconomic status	.42**	—								
3. Life stress	-.02	-.15	—							
4. Child physical abuse	-.14	-.13	.16*	—						
5. Child neglect	-.34**	-.29**	.11	.06	—					
6. PV rating (middle childhood)	-.11	-.21*	.28**	.14	.26**	—				
7. PV rating (preschool)	-.05	-.14	.44**	.18*	.02	.45**	—			
8. Internalizing (Grades 1–3)	-.09	-.17*	.10	.18*	.02	.01	.06	—		
9. Internalizing (age 16)	-.09	-.15	.13	.02	.13	.12	.17*	.16	—	
10. Externalizing (Grades 1–3)	-.04	-.13	.21**	.29**	.07	.11	.06	.45**	.11	—
11. Externalizing (age 16)	-.04	-.08	.18*	.10	-.03	.13	.26**	.15	.47**	.42**

Note: WISC-R, Wechsler Intelligence Scale for Children—Revised; PV rating, partner violence rating.

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

externalizing behavior in adolescence;  $r(81) = .31$ ,  $p < .01$ . There were no significant associations between boys' exposure to partner violence in both time periods and either contemporaneous or prospective ratings of internalizing behavior. Conversely, girls' exposure to partner violence in the preschool period was positively related to teacher ratings of internalizing behaviors in adolescence;  $r(74) = .29$ ,  $p < .05$  (see Table 4). However, there were no significant associations between girls' exposure to partner violence in both time periods and either contemporaneous behavior problem ratings in middle childhood or externalizing behaviors in adolescence.

Gender differences were further supported by comparing the strength of the relations between exposure to partner violence and boys' and girls' behavior problems. Specifically, the relation between exposure to partner violence in middle childhood and contemporaneous externalizing behavior was stronger for boys than for girls,  $z(155) = 1.64$ ,  $p < .05$ . The correlation between exposure to partner violence in early childhood and externalizing behavior at age 16 was not significantly different between boys and girls. Exposure to partner violence during early childhood was, however, more strongly related to internalizing behavior problems at age 16 among girls than among boys,  $z(155) = 2.01$ ,  $p < .02$ .

#### *Analyses identifying the unique effects of partner violence in the home*

Hierarchical multiple regression analyses of externalizing and internalizing child behavior problem ratings in middle childhood and adolescence were conducted on the predictor variables to examine the unique contribution of exposure to partner violence to contemporaneous and prospective child behavioral outcomes.<sup>1</sup> The seven predictor variables were entered hierarchically in the following order: the WISC-R score, the composite socioeconomic index for Grades 1–3, the cumulative life stress score, the child physical abuse score, the child neglect score, the middle childhood partner violence exposure rating (Grades 1–3), and the preschool partner vio-

1. The correlations between the TRF and YSR were low for ratings of externalizing,  $r(143) = .30$ , and internalizing,  $r(143) = .16$ , behaviors. However, these  $r$  values are consistent with interrater agreement in other studies (see Achenbach et al., 1987, for review). In follow-up analyses that employed adolescent outcome measures based on either the TRF or YSR alone, the data followed the expected pattern. Using the TRF alone, the adolescent findings for externalizing behavior were strengthened but the internalizing outcomes became nonsignificant. In contrast, using the YSR alone, the adolescent findings for internalizing behavior were strengthened but the externalizing outcomes became nonsignificant.

**Table 4.** Correlations among independent predictors and outcomes for males (n = 81, below diagonal) and females (n = 74, above diagonal)

Variable	1	2	3	4	5	6	7	8	9	10	11
1. WISC-R	—	.49**	-.03	-.18	-.44**	-.04	-.06	.02	.09	-.08	.14
2. Socioeconomic status	.37**	—	-.14	-.15	-.30**	-.19	-.20	-.22	-.12	-.11	.00
3. Life stress	-.01	-.16	—	.14	.08	.27*	.45**	.14	.19	.24*	.14
4. Child physical abuse	-.10	-.12	.19	—	-.10	.22	.21	.19	.01	.16	-.03
5. Child neglect	-.25*	-.29**	.14	.19	—	.22	-.02	.01	-.04	.02	-.22
6. PV rating (middle childhood)	-.23*	-.3**	.31**	.05	.37**	—	.50**	.05	.07	.03	.09
7. PV rating (preschool)	-.05	-.096	.43**	.17	.07	.29**	—	.13	.29*	.05	.21
8. Internalizing (Grades 1–3)	-.17	-.11	.058	.17	.03	.00	.04	—	.10	.41**	.08
9. Internalizing (age 16)	-.24*	-.19	.059	.04	.28*	.18	-.03	.22*	—	.20	.58**
10. Externalizing (Grades 1–3)	-.01	-.14	.18	.40**	.16	.29**	.12	.48**	.03	—	.37**
11. Externalizing (age 16)	-.06	-.17	.23*	.23*	.17	.19	.31**	.24*	.36**	.48**	—

Note: WISC-R, Wechsler Intelligence Scale for Children—Revised; PV rating, partner violence rating.

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

lence exposure rating (18–64 months). The independent predictors were entered individually to examine the influence of specific contextual variables that have emerged as salient contributors to children's behavioral adjustment in previous research. As described previously, the preschool partner violence rating was entered in the final step of each model to determine whether exposure in early childhood predicted behavior problems in middle childhood and adolescence above and beyond more temporally proximal partner violence exposure in middle childhood. Separate multiple regressions were conducted to predict internalizing behavior and externalizing behavior problems in Grades 1–3 and at age 16. Only regression analyses yielding significant findings are reported in tabular form.

As suggested by the correlations for the total sample, there were no significant contributions of exposure to partner violence in the home to behavior problems in middle childhood. However, regression analyses with the total sample revealed a unique contribution of exposure to partner violence in the preschool years to externalizing behavior problems at

age 16 (see Table 5). This predictive relation was above and beyond the influences of child cognitive ability, family economic status, life stress, child directed abuse and neglect, and more temporally proximal exposure to partner violence in middle childhood ( $\Delta R^2 = .03, p = .04$ ). Notably, early exposure to partner violence was one of only two variables to contribute significant predictive strength to behavior problems at age 16, the other variable being life stress ( $\Delta R^2 = .03, p = .04$ ). Together, the predictors in the model accounted for 8% of the variance in externalizing behavior at age 16. Moreover, in follow-up analyses we found that, rather than being attenuated, this predictive relation appeared even more robust when the TRF score from middle childhood was added to the model. When child behavior problems in Grades 1–3 were controlled, the contribution of preschool partner violence exposure to the remaining variance in externalizing behavior in adolescence was strengthened ( $\Delta R^2 = .04, p = .01$ ).

Independent regression analyses on male and female subsamples confirmed and strengthened the associations revealed by the zero-

**Table 5.** Hierarchical multiple regression of externalizing behavior at age 16 on independent predictors for the total sample (N = 155)

Step	Predictor	B	SEB	$\beta$	$R^2$	$\Delta R^2$	p Value
1.	WISC-R	.02	.04	.04	.00	.00	.62
2.	Socioeconomic status	-.10	.08	-.12	.01	.01	.20
3.	Life stress	.57	.27	.17	.04	.03	.04*
4.	Child physical abuse	2.04	2.26	.07	.05	.01	.37
5.	Child neglect	-1.55	2.39	-.06	.05	.00	.52
6.	PV rating (middle childhood)	.74	.68	.09	.06	.01	.28
7.	PV rating (preschool)	2.05	.97	.20	.08	.03	.04*

Note: SEB, standard error of B; WISC-R, Wechsler Intelligence Scale for Children—Revised; PV rating, partner violence rating.

\* $p < .05$ .  $F(7, 147) = 1.91$ ,  $p < .07$ .

**Table 6.** Hierarchical multiple regression of externalizing behavior in Grades 1–3 on independent predictors for boys (n = 81)

Step	Predictor	B	SEB	$\beta$	$R^2$	$\Delta R^2$	p Value
1.	WISC-R	-.00	.06	-.01	.00	.00	.96
2.	Socioeconomic status	-.16	.12	-.16	.02	.02	.19
3.	Life stress	.66	.46	.16	.05	.03	.15
4.	Child physical abuse	11.21	3.14	.38	.19	.14	.00***
5.	Child neglect	2.06	3.52	.07	.19	.00	.56
6.	PV rating (middle childhood)	3.63	1.49	.28	.25	.06	.02*
7.	PV rating (preschool)	-.59	1.64	-.04	.25	.00	.72

Note: SEB, standard error of B; WISC-R, Wechsler Intelligence Scale for Children—Revised; PV rating, partner violence rating.

\* $p < .05$ . \*\*\* $p < .001$ .  $F(7, 73) = 3.47$ ,  $p < .003$ .

order correlations. Contemporaneous exposure to partner violence in middle childhood predicted boys' externalizing behavior in Grades 1–3 above and beyond the variance explained by the other predictor variables ( $\Delta R^2 = .06$ ,  $p = .02$ ; see Table 6). However, preschool exposure to partner violence, as assessed from 18 to 64 months, did not add to this relationship. The other predictor variables in the model explained a total of 19% of the variance in boys' externalizing behavior in middle childhood, with child physical abuse making the largest contribution ( $\Delta R^2 = .14$ ,  $p = .00$ ). Still, exposure to partner violence in middle childhood explained an additional 6% of the variance. Together, these predictors accounted for 25% of the variance in externalizing behavior problems during the middle childhood period.

As was evident in the bivariate correlations, regression analyses of boys' behavior

problems at age 16 on the predictors confirmed that preschool exposure to partner violence accounted for boys' externalizing behavior in adolescence better than the more temporally proximal middle childhood exposure variable (see Table 7). Exposure to partner violence in the preschool period accounted for 4% of the variance in boys' externalizing behavior at age 16 ( $\Delta R^2 = .04$ ,  $p = .06$ ), with the other predictors explaining an additional 12% of the variation. Again, this relation became even more pronounced when the level of teacher-reported problem behaviors in middle childhood was added to the model ( $\Delta R^2 = .05$ ,  $p = .02$ ).

As suggested by the bivariate correlations, these analyses revealed a qualitatively different pattern of predictive relations for girls (see Table 8). Exposure to partner violence in the preschool years accounted for significant unique variance in girls' internalizing behav-

**Table 7.** Hierarchical multiple regression of externalizing behavior at age 16 on independent predictors for boys (n = 81)

Step	Predictor	B	SEB	$\beta$	$R^2$	$\Delta R^2$	p Value
1.	WISC-R	.03	.05	-.06	.00	.00	.62
2.	Socioeconomic status	-.14	.10	-.17	.03	.03	.16
3.	Life stress	.71	.38	.21	.07	.04	.07†
4.	Child physical abuse	4.48	2.76	.18	.10	.03	.11
5.	Child neglect	2.30	3.09	.09	.11	.01	.46
6.	PV rating (middle childhood)	1.01	1.36	.09	.12	.01	.46
7.	PV rating (preschool)	2.81	1.45	.24	.16	.04	.06†

Note: SEB, standard error of B; WISC-R, Wechsler Intelligence Scale for Children—Revised; PV rating, partner violence rating.

† $p < .10$ .  $F(7, 73) = 1.96$ ,  $p < .07$ .

**Table 8.** Hierarchical multiple regression of internalizing behavior at age 16 on independent predictors for girls (n = 74)

Step	Predictor	B	SEB	$\beta$	$R^2$	$\Delta R^2$	p Value
1.	WISC-R	.05	.06	.09	.01	.01	.43
2.	Socioeconomic status	-.17	.11	-.21	.04	.04	.11
3.	Life stress	.50	.34	.17	.07	.03	.14
4.	Child physical abuse	-.40	3.21	-.02	.07	.00	.90
5.	Child neglect	-.81	3.37	-.03	.07	.00	.81
6.	PV rating (middle childhood)	.06	.77	.01	.07	.00	.94
7.	PV rating (preschool)	2.48	1.19	.31	.13	.06	.04*

Note: SEB, standard error of B; WISC-R, Wechsler Intelligence Scale for Children—Revised; PV rating, partner violence rating.

\* $p < .05$ .  $F(7, 66) = 1.42$ ,  $p < .22$ .

ior problems at age 16 ( $\Delta R^2 = .06$ ,  $p = .04$ ). Although the other predictor variables in the model explained 7% of the variance in girls' internalizing behavior at age 16, only the contribution of preschool exposure to partner violence was significant, accounting for an additional 6% of the variance. When the factor of behavior problems in middle childhood was controlled, the contribution of preschool exposure to partner violence remained the same ( $\Delta R^2 = .06$ ,  $p = .05$ ). After entering the other predictor variables into the model, exposure to partner violence in the home at both time points was not significantly associated with girls' behavior problems in middle childhood or with externalizing behaviors in adolescence.

## Discussion

Consistent with previous research (Appel & Holden, 1998; Fantuzzo et al., 1997; Spaccarelli et al., 1994), bivariate correlations re-

vealed a substantial degree of overlap among partner violence and other risk factors. The correlations between exposure to partner violence and child behavior problems, though modest, were consistent with earlier work showing a negative relation between witnessing partner violence and child behavioral adjustment (Augustyn et al., 1995; Emery, 1982, 1989; Grych et al., 2000; Kerig, 1998). However, only the associations between exposure to partner violence during the preschool period and child behavior problems at age 16 attained significance in the total sample.

Effects of child gender and developmental status were also apparent, though the relations were again modest. Boys' exposure to partner violence in middle childhood was positively associated with contemporaneous reports of externalizing problems in Grades 1–3, whereas boys' exposure during the preschool period was significantly associated with externalizing problems in adolescence. For girls, expo-

sure to partner violence in the preschool period was positively related to internalizing problems at age 16. This qualitative gender difference is consistent with prior work showing a stronger association between witnessing partner violence and externalizing problems among boys but internalizing symptoms among girls (Crockenberg & Covey, 1991; Emery, 1982; Hennessy et al., 1994; Moffitt & Caspi, 1998; Sternberg et al., 1993).

Although the correlations between exposure to partner violence and child behavior problems were modest, these relations survived a rigorous test. When one controls for factors such as general life stress, which may itself be influenced by partner violence (i.e., relocation, work problems, divorce), some non-extraneous variance is sacrificed. Moreover, the true significance of these associations is made more salient when one considers that these relations were observed by different reporters and span extended time periods. As discussed by Grych and colleagues, shared method variance may have contributed to overestimation of the relation between partner violence and child adjustment in the existing literature (Grych et al., 2000). The use of multiple informants in this study mitigated these confounding effects and likely attenuated the strength of obtained correlations. In addition, the use of multiple informants across large time periods (i.e., from maternal reports in preschool to behavior problem ratings at age 16) further decreased the chances of obtaining strong correlations.

The current findings may also have been attenuated by partner violence data that likely underestimated the true prevalence in this sample. The ratings of male to female partner violence were based on maternal disclosures of partner violence in face to face interviews and LES; however, the participants were not directly queried about the presence and nature of partner violence in the home. Furthermore, the ratings do not account for the possible presence of reciprocal or mother-initiated partner violence in the home. Finally, we had to assume that the target child was exposed to the male to female violence in the home. Thus, our findings may be less robust either due to contamination, either of the nonvio-

lence sample with nonreporters or of the child witness sample with nonwitnesses.

Multiple regression analyses confirmed the relations between childhood exposure to partner violence and both concurrent and prospective child behavior problems. Gender differences were indicated by significant differences at the level of the bivariate correlations, as well as in the hierarchical regression analyses, with stronger contributions of witnessing partner violence to boys' externalizing problems and to girls' internalizing behaviors. These data suggest that partner violence in the home is equally deleterious to the behavioral adjustment of boys and girls. However, the manifestation of these behavior problems may vary by gender (Crockenberg & Covey, 1991; Sternberg et al., 1993).

Child developmental status further influenced these relations with middle childhood exposure making a unique contribution to contemporaneous behavior and preschool exposure relating more strongly to adolescent behavioral adjustment. Although the preschool partner violence rating consisted of more assessments, over shorter time periods, and across a longer period of developmental change than the middle childhood rating, it is not likely that the predictive contribution of the preschool rating to the adolescent outcomes reflects a methodological artifact because the preschool rating did not predict behavior problems in middle childhood above and beyond contemporaneous partner violence exposure.

Contemporary perspectives on development emphasize the disproportionate influence of early experience on later adaptation (Sroufe, 2000). As demonstrated in this study, regulatory capacities can be influenced at all stages of development. However, it is during early childhood that emotional self-regulation capacities and strategies first emerge and are especially sensitive to experiential influence. In the context of the early caregiving environment, the child develops her or his first prototypes for self-regulation and expectations of relationships. These, in turn, form the foundation for both concurrent and later adaptive strategies. Early exposure to partner violence in the home is expected to have an especially

powerful and enduring impact on later adaptation because it influences the formation of the organizational foundation on which subsequent development is predicated. Exposure to partner violence during the middle childhood period may serve as a stressor that interferes with contemporaneous adaptation, but it is not likely to fundamentally compromise core emotion regulation capacities or to warp the child's perception and negotiation of the social world more broadly.

In sum, partner violence in the early care-giving environment may forecast vulnerabilities in future adaptive strategies because it instantiates patterns of self-regulation and behavioral expression on the part of the child that elicit negative and unsupportive reactions from others. Further, witnessing partner violence in later developmental periods may compromise the child's contemporaneous adaptation as was found in the middle childhood years. Partner violence disproportionately affects young families (Hughes & Fantuzzo, 1994), especially those with infants and preschool age children (Belsky & Rovine, 1990; Edleson, 1999a; Fantuzzo et al., 1997). The current findings provide compelling evidence that such experiences have an enduring deleterious impact on children's behavioral adjustment.

#### *Strengths and limitations of the study*

The design of the current study adds to the extant literature on children exposed to partner violence in several ways. In contrast to the majority of studies in this area, which employ concurrent ratings of partner violence and child behavior problems, the longitudinal, prospective design of this investigation enables the formation of directional conclusions, as well as the examination of both acute and long-term effects of exposure to partner violence in childhood. It is striking that the role of exposure to partner violence in the home during the preschool period would have been deemed negligible if the current study had not extended into adolescence. Indeed, these data suggest that there are times in development when contemporaneous experience may overshadow the latent, but significant, influence

of early experience on adaptation. It is only through prolonged developmental analysis that the complex relations between early experience and later adaptation can be fully understood.

The current data derive from a community-based sample that was followed using multiple informants and methods. Thus, the problems pertaining to shelter samples (Fantuzzo et al., 1997; Kashani & Allan, 1998) and to shared method variance (Edleson, 1999a; Fantuzzo & Lindquist, 1989; Sternberg et al., 1998) were mitigated, if not wholly avoided. The significant contribution of partner violence in the home to later behavior problems, despite these rigorous controls, speaks to the powerful influence of this risk factor on child development.

Additional contributions were made by the structure of the data analyses in this investigation. As suggested by prior research (Cummings et al., 1999; Osborne & Fincham, 1996), all analyses were run separately on male and female subsamples in order to explore putative gender differences. In addition, this study offers one of the first explorations of the influence of child age, both at the time of exposure to partner violence and at contemporaneous and prospective follow-ups, on the relation between partner violence and child behavior problems. Most studies have not explored the influence of developmental status on the effects of witnessing partner violence (Fantuzzo & Lindquist, 1989); moreover, the few investigations that have done so only explored this factor with respect to the age of the child at the time of exposure (Carlson, 1990; Fantuzzo et al., 1997; Fantuzzo et al., 1991; Hughes, 1988; Hughes & Barad, 1983; Hughes et al., 1989; Stagg et al., 1989). Finally, hierarchical multiple regression analyses were used to partial out the contributions of other demographic and experiential factors to child behavior problems, which have confounded much of the extant research in this area. Thus, the current findings distinguish the effects of exposure to partner violence in the home from those of its associated risks such as poverty, child physical abuse and neglect, and life stress.

Nevertheless, this investigation suffers from

significant limitations, many of which reflect the constraints inherent in any secondary analysis. First, these analyses were limited to maternal reports of male to female partner violence occurring in the home. Therefore, these data preclude the possibility of examining the effects of either reciprocal or mother-initiated partner violence (see Archer, 2000, for a review). Second, we had to assume that the children were exposed to the partner violence occurring in their home at some point in time. Third, the available data did not permit us to explore the possibility that the child's relationship to the perpetrator and the number of violent partners to whom the child was exposed affects these relations. Future research in this area should examine these variables, as both have been found to influence the relation between partner violence and children's adjustment (Osofsky, 1995; Wolak & Finkelhor, 1998). Similarly, the qualitative features of the partner violence in the home were not examined here, though substantial evidence indicates that the frequency (Jouriles et al., 1996; Porter & O'Leary, 1980), intensity (Jouriles, Murphy, & O'Leary, 1989), content (Osborne & Fincham, 1996), and resolution (Cummings, Pellegrini, Notarius, & Cummings, 1989) of the violence to which children are exposed are important factors. Fourth, the extensive data collected on each subject precluded the recruitment and retention of a larger sample, which likely would have rendered the current findings even more compelling. Finally, the limited sample size constrained our capacity to employ more comprehensive developmental designs.

Undoubtedly, the current model likely oversimplifies the complex relations among partner violence, child abuse, neglect, poverty, life stress, and children's behavioral adjustment. Other contributors to pathological family relations such as parental mental illness and parental substance abuse should be incorporated into future investigations. Similarly, these analyses fail to highlight the reciprocal influences among different forms of familial dysfunction such that domestic violence likely contributes to other risk factors (i.e., parental psychopathology, unemployment, child neglect) and vice versa. Ultimately,

however, the analyses employed herein clearly demonstrate the unique contribution of exposure to partner violence in childhood to contemporary and prospective child behavior problems.

#### *Implications for future research and intervention*

Exposure to partner violence in the home is associated with, and may initiate a developmental pathway toward, behavioral maladaptation. It is important, however, that a substantial proportion of children who were exposed to partner violence in the home during early and/or middle childhood did not display clinically significant behavior problems, suggesting that some factors may mitigate the negative effects of partner violence in the home. Additional research is needed to identify the factors that contribute to adaptive outcomes, despite prior exposure to interparental violence. For example, potential protective influences may include adaptive parent-child relationships (e.g., secure attachment; Pianta et al., 1990) and active coping strategies (Edleson, 1999a).

As others have suggested (e.g., Spaccarelli et al., 1994), we support the adoption of a process-oriented, multilevel approach to future investigations in this area with the aim of elucidating the mechanisms that mediate the relation between exposure to partner violence and child behavior problems. In accordance with Bergman and Magnusson's (1997) person-oriented approach to the study of individual adaptation over time, we encourage researchers to recognize that the mechanisms that mediate the association between partner violence and child behavior problems may be differentially salient for individual children or groups of children (i.e., boys vs. girls). Finally, research in this area should be grounded within the framework of developmental psychopathology, which aims both to identify the antecedents of particular developmental pathways and to explore the factors that mediate persistence and desistence on these trajectories (Sroufe et al., 1999). Future investigations conducted within this framework will contribute greatly to our understanding of the pro-

cesses that mediate observed associations between partner violence in the home and children's behavioral adjustment.

Several processes have been identified as possible mediators of the relation between partner violence in the home and child adjustment problems. These include interference with the development of empathy and prosocial behaviors (Fantuzzo et al., 1991), the undermining of children's emotional security (Davies & Cummings, 1994) and affect regulation (Gottman & Fainsilber-Katz, 1989; Grych & Fincham, 1993), the negative effect of partner violence on parent-child relationships (e.g., attachment security, Kashani, Daniel, Dandoy, & Holcomb, 1992, disciplinary practices, Crockenberg & Covey, 1991; McCloskey et al., 1995; emotional availability, Osofsky, 1995), the traumatic stress resulting from exposure to partner violence (Pynoos & Eth, 1986), and the modeling and tacit normalization of aggressive approaches to problem solving (Bandura, 1973; Dodge, 1986; McNeal & Amato, 1998). However, additional research is needed to explore the validity of these hypotheses.

These findings further suggest that gender and age must be considered as important influences on the relation between partner violence and children's adjustment. Cognitive-contextual theorists suggest that children's understanding and cognitive appraisals of partner violence may moderate the relation between exposure to violence and child adjustment (Grych & Fincham, 1990; Kerig, 1998). Similarly, children's beliefs in their

self-efficacy and perceived control in coping with family violence may influence their adjustment (Rossman & Rosenberg, 1992). Gender and developmental status likely influence children's understanding of and attributions about male to female partner violence, which may, in turn, have an impact on their behavioral outcomes. However, this assertion is also in need of further empirical testing.

Perhaps most important, these data indicate that exposure to partner violence in the home makes a unique contribution to children's behavior problems. Moreover, the negative effects of witnessing male to female partner violence in childhood are long term and vary according to child gender and developmental status. In this study, the level of partner violence in the home was more consistently related to children's concurrent and prospective behavioral adjustment than cognitive ability, SES, life stress, or child physical abuse and neglect. These findings strongly suggest that future research efforts may be profitably directed toward this heretofore underappreciated threat to children's adjustment. Evidence indicates that exposure to violence in the family of origin (Grych et al., 2000) and behavioral disturbances in adolescence (Magdol, Moffitt, Caspi, & Silva, 1998) may contribute to the perpetration of violence later in adulthood. Thus, it is critically important to elucidate the antecedents, correlates, and developmental consequences of childhood exposure to partner violence in order to develop and implement effective and appropriate intervention and prevention initiatives.

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